DOCTORAL THESIS

An extended model of temporal leadership, team processes, and project team performance.

Siddiquei, Ahmad

Award date:
2019

An extended model of temporal leadership, team processes, and project team performance

Ahmad Nabeel Siddiquei

Submitted in partial fulfilment of the requirements of the degree of

Doctor of Philosophy

January 2019

Bond Business School

Professor Cynthia D. Fisher, Associate Professor George A. Hrivnak and Associate Professor Anthony Erickson

Abstract

A new model of leadership, temporal leadership, has recently been introduced which considers specific leader behaviours regarding the use and management of time as critical elements in project team performance against deadlines. This research proposes an extended input-process-outcome (IPO) framework of temporal leadership within the project team context. The extended IPO framework suggests that the conceptualisation of temporal leadership includes two facets, temporal planning and temporal reminders, each important at different temporal stages in the project lifecycle. This conceptualisation is integrated with a two-phase model of team processes to suggest the mechanisms of team processes through which each aspect of temporal leadership may facilitate end-of-project task and social performance. Temporal planning is hypothesised to enable performance during the project initiation stage via the mediating mechanism of team transition processes, whereas temporal reminders are hypothesised to be useful for performance during the project execution stage via the mediating mechanism of team action processes. The explanatory power of temporal leadership facets to predict task and social performance above and beyond the classical leadership construct of initiating structure is also examined.

Data were collected using survey questionnaires from the members and leaders of 62 application development teams. Two hundred twenty-five team members and their 62 leaders from four information technology companies participated in the study. Team members reported leader temporal planning and team transition processes just after the initiation of a new fixed-length project (Time 1) and leader temporal reminders and team action processes near the middle of the project (Time 2). The outcome variables of team task performance (timeliness and quality of output) and social performance (team cohesion) were rated by team leaders and team members (respectively) at the end of the project.

The hypothesised multi-level relationships were tested using multilevel structural equation modelling and relative importance analysis. At project initiation, team transition processes mediated the relationship between leader temporal planning and team outcomes in the form of both task and social performance. During the project execution stage, team action processes mediated the relationship between leader temporal reminders and team social performance. The prediction that team action processes would mediate the relationship between temporal reminders and team task performance was not supported. Both facets of

temporal leadership were more important and accounted for incremental variance in the prediction of team task and social performance above and beyond leader initiating structure measured at the same two project stages. The positive associations between temporal leadership behaviours and team processes remained significant when considered simultaneously with initiating structure measured at the same two time points. The study concludes with several theoretical and practical implications and suggested areas for future research.

Keywords: *temporal leadership, initiating structure, project teams, team processes, team performance, group cohesion, time and leadership, project leadership, project lifecycle.*

Research Outputs and Publications During Candidature

Published and Presented Conference Abstracts

Siddiquei, A. N., Fisher, C. D., & Hrivnak, G. A. (2018). *Leading project teams: The relative importance of temporal leadership and initiating structure*. Paper presented at 78th Annual Meeting of Academy of Management, Chicago, USA, 10-14 August 2018.

Declaration by Author

This thesis is submitted to Bond University in fulfilment of the requirements of the degree of Doctor of Philosophy (PhD). This thesis represents my own original work towards this research degree and contains no material that has previously been submitted for a degree or diploma at this University or any other institution, except where due acknowledgement is made.

Full name: Ahmad Nabeel Siddiquei

Signature**:** _____

Ethics Declaration

The research associated with this thesis received ethics approval from the Bond University Human Research Ethics Committee. Ethics application number: 0000015671

Acknowledgements

The four years of my PhD journey have been enlightening, challenging, frustrating, and ultimately rewarding - a journey I will remember and rejoice for the rest of my life. This journey would never have been started and completed without the support and care of my parents, wife, teachers, relatives, colleagues, and friends. It is my greatest pleasure and honour to say thank you to all of you for taking me to a point where I am writing my acknowledgments and thinking of everyone's academic and non-academic contribution throughout my doctoral program.

First and foremost, I would like to thank my principal supervisor, Professor Cynthia D. Fisher. You have been more than just a supervisor: a mentor, a colleague, a co-author, and a friend. Thank you for being a fair critic of my work, for spending hours reading my drafts, for instilling confidence in me, and for all the genuine care and support during the years we have worked together. Not only you made sure that I learn and grow as a research scholar but also strike the right work-life balance. It is your guidance, belief, and motivation that have helped me to see the academic world and research with the proper perspective. Because of you I now realise the importance of doing everything in life with the utmost effort, passion, dedication, and perfection. Second, I would like to express my most profound regard and thankfulness to my secondary supervisor, Dr. George A. Hrivnak, who passed along his passion for studying and teaching leadership to me. Thank you for being a friend, sharing all the useful reading material, guiding me in the right direction with your subject expertise, being a great statistics teacher, and importantly, taking me out for a coffee whenever I am down and out. If given another life, I would once again opt to work with both of you, Cyn D. and George. Third, I would like to thank Dr. Anthony Erickson for giving me essential and significant feedback in the first year of my doctoral programme.

I cannot be thankful enough to my parents - Muhammad Luqman and Samina Yasmeen - for everything you have done for me throughout your lives. Sending me to Australia was indeed a very difficult decision for you, but you made the right decision. Once again, thank you for believing in my abilities since Grade I, sending me to the best possible school, letting me chase my dreams, and allowing me to marry during my PhD with the girl I love the most - Hina Asghar. Without the love, peace, and comfort of married life, I would never have been able to complete my dissertation. Thank you Hina for everything you have done and are still doing for Imaad and me. I am incredibly grateful to you for allowing me space and time to work, for taking care of even the smallest of things at home and for being a

great friend. You are the Best, AK47! I am also deeply indebted to my siblings - Nabia, Zain, Fazeel, Raza, and Irshad - for their everyday support and for being always capable of finding words of encouragement to give me the power to move on.

I pay my gratitude to all my teachers, past and present, especially the ones who taught me during my PhD. I am exceedingly obliged to Dr. Stephen Holden, Dr. (late) Joy Cameron-Dow, Dr. Gulasekaran Rajaguru, Professor Robert Vandenberg, Philip Holmes-Smith, and Professor Ronald Landis for sharing their experience and insights in refining my academic thoughts. Through each of you, I have developed a deeper appreciation of what it takes to serve in this noble and privileged profession.

One of the biggest challenges in my PhD was to collect data. This would never have been possible without the support and attention of Mr. Faisal Hayat, Mr. Nabeel Shafique, Mr. Ahsan Khilji, Mr. Zohaib Iqbal, Mr. Rao Nawaz, Mr. Ahmad Raza, and Mr. Usman Zarif. Thank you for obtaining all the necessary approvals from your higher authorities, finding time from your busy schedules, and eventually making it possible for me to complete the data collection process.

I would like to acknowledge the unwavering help of Bond Business School's academic and administrative staff. My special gratitude goes to the Associate Dean Research, Dr. Bruce Vanstone, the former Associate Dean Research, Professor Mark Spence, and Research Development Manager, Ms. Emma Hunt for always being there to answer all the enquiries and concerns since my first day at Bond University. Finally, my way to the Doctoral degree would not be the same without my friends and relatives from Pakistan and Australia- Rafay, Hassan, Joni, Kashif, Jacky, Khaleeq, Babar, Asif, Dr Ali Asadullah, Qazi Waqar and family, Nasir Ghumman, Sahar Asghar, Shams, Safdar Khan, Habib, Asif Saeed, Shah, Umair Ghouri, and Johannes, who have always been there when I needed them most.

Dedication

This thesis is dedicated to my son- Imaad Ahmad Siddiquei- who means the world to me.

Table of Contents

TITLE PAGE ..... **I**

ABSTRACT ..... **II**

KEYWORDS ..... **III**

DECLARATION BY AUTHORS ..... **IV**

RESEARCH OUTPUTS ..... **V**

ETHICS DECLARATION ..... **VI**

ACKNOWLEDGEMENTS ..... **VII**

DEDICATION ..... **IX**

TABLE OF CONTENTS ..... **X**

LIST OF TABLES ..... **XII**

LIST OF FIGURES ..... **XIV**

CHAPTER 1: Introduction 1

Temporal Leadership 3

CHAPTER 2: Theoretical Framework 8

Project-Based Organisations 8

Time and Models of Team Activity 11

Tuckman's stage model of team development 12

Punctuated equilibrium model 15

Recurring phase model of team processes 19

Time in Leadership 22

Temporal leadership 23

Adding Time and Processes to Temporal Leadership: An Integrated Framework of Project Teams 31

Temporal leadership as two types of behaviours 31

The Relative Contributions of Temporal Leadership and Initiating Structure to Project Team Outcomes 40
Initiating structure and team performance 42
CHAPTER 3: Methodology 49
Organisational Context 49
Design 50
Procedure 51
Sample Size 53
Measures 53
Analytical Strategy 58
CHAPTER 4: Results 63
Reliability and Measurement Models 63
Construct Aggregation 70
Model Testing: Temporal Leadership, Team Processes, and Outcomes 75
Multilevel structural equation modelling 75
Relative importance analysis 79
Multilevel structural equation modelling with the Inclusion of Initiating Structure 82
Supplementary Relative Importance Analysis 87
CHAPTER 5: Discussion 91
Summary of Findings 91
Theoretical Implications 96
Managerial Implications 104
Limitations and Future Research 106
REFERENCES 116
APPENDICIES 137

List of Tables

Table 1	Summary of Hypotheses	47
Table 2	Three Data Collection Points Corresponding to the Project Task Cycle	52
Table 3	Skewness and Kurtosis of Variables under Study	64
Table 4	Cronbach's Alpha Values of Variables under Study	65
Table 5	Confirmatory Factor Analyses of Temporal Leadership: Evaluation of Alternative Models	66
Table 6	Unconstrained and Constrained Confirmatory Factor Analyses Results for Two Dimensions of Temporal Leadership	67
Table 7	Confirmatory Factor Analyses of Team Processes: Evaluation of Alternative Models	69
Table 8	Confirmatory Factor Analyses of Temporal Leadership and Team Processes: Evaluation of Alternative Models	70
Table 9	ICC (1) And ICC (2) Values of All the Variables Measured at Level 1	73
Table 10	Means, Standard Deviations, and Correlations of Variables at the Team Level	74
Table 11	Test of Direct and Indirect Effects Using MSEM (Hypotheses 1-6b)	77
Table 12	Relative Importance of Temporal Planning (Time 1) and Initiating Structure (Time 1) in Predicting Task Performance	81

	and Team Cohesion (Time 3) (Hypotheses 8a & 8b)	
Table 13	Relative Importance of Temporal Reminders (Time 2) and Initiating Structure (Time 2) in Predicting Task Performance and Team Cohesion (Time 3) (Hypotheses 8a & 8b)	83
Table 14	Test of Direct and Indirect Effects Using MSEM (Temporal Leadership vs Initiating Structure)	85
Table 15	Relative Importance Analysis of Temporal Planning (Time 1) and Temporal Reminders (Time 2) to Predict Team Task Performance (Time 3) and Team Cohesion (Time 3)	88
Table 16	Relative Importance Analysis of Transition Processes (Time 1) and Action Processes (Time 2) to Predict Team Task Performance (Time 3) and Team Cohesion (Time 3)	90
Table 17	Summary of Hypotheses and Results	92

List of Figures

Figure 1	Adding time, type, and processes to temporal leadership: Conceptual framework.	7
Figure 2	Adding time, type, and process to temporal leadership: An integrated framework of project teams	33
Figure 3	Number of published studies using initiating structure	42

CHAPTER 1
Introduction

Project teams have become a central fixture of organisational life in many firms ranging from software giants like Google and Microsoft to more traditional manufacturers such as automakers Honda and General Motors. There is a long history of project-based work being accomplished through temporary teams in sectors including information technology, filmmaking, engineering, and construction (Burke & Morley, 2016; Lindner & Wald, 2011). Other contemporary and dynamic industries such as fashion and biotechnology are also embracing this mode of task execution to cope with rapidly changing market demands (Bakker, 2010; Jacobsson, Burström, & Wilson, 2013). Even public and non-profit organisations use temporary project teams to perform stand-alone tasks such as election campaigns and disaster relief operations (de Waard & Kramer, 2008; Janowicz-Panjaitan, Bakker, & Kenis, 2009).

Project teams face unique demands regarding time, tasks, membership, and context compared with more stable on-going organisational units (Bakker, 2010; Burke & Morley, 2016; Lundin & Söderholm, 1995). The fundamental characteristics of project-based work are the short-term, creative, and varying nature of tasks which require cross-disciplinary integration of team members. Each team member offers a specific skill set to the team and has an essential assigned role that contributes towards project success. The nature of the task is often complex, uncertain, interdependent and required to be completed within a given timeframe. The time-limited duration of projects enhances the coordination demands requiring team members to synchronise their actions towards project completion (Labianca, Moon, & Watt, 2005; Mohammed & Harrison, 2013; Waller, Conte, Gibson, & Carpenter, 2001). Notably, project teams are assembled to match the demands of each unique project concerning the specific skills needed and the required number of participants. However, the members temporarily grouped on a specific project may not have experience of previously working together. Task roles, responsibilities, and expectations must be developed *de novo* for each new project, further adding to the challenge of project work.

Unfortunately, as we see a shift towards more project-based work (Burke & Morley, 2016; Lundin, Arvidsson, Brady, Ekstedt, Midler, & Sydow, 2015), project teams often struggle to deliver high-quality products within the allocated time frame (Gevers & Claessens, 2008; Kozlowski & Bell, 2003; Mathieu, Maynard, Rapp, & Gilson, 2008; Mohammed, Hamilton, & Lim, 2009). Industry reports suggest an alarming rate of project

failures with as much as 64% of projects failing to complete on time, on budget and/or achieve quality goals, or alternatively being cancelled at some point before completion (e.g., Standish Group, 2015). The causes of project failure sometimes reside in the lack of team member technical skills, but more commonly seem to be due to the team's collective inability to coordinate and synchronise their skills and actions towards on-time project completion.

Indeed, previous teams research has established that project teams are not naturally equipped to self-manage their temporal resources, often wasting considerable amounts of time early in a project (e.g., Gersick, 1988; Labianca et al., 2005). In the presence of time constraints, project teams may fail to effectively self-regulate their activities through scheduling, prioritising, and sequencing tasks, resulting in difficulties in meeting performance goals and task deadlines (Chong, Van Eerde, Chai, & Rutte, 2011; Waller et al., 2001). The time-challenging context coupled with the complex task environment creates temporal challenges for teams who lack the necessary capability to self-manage toward project success. In addition to task performance (success against deadlines and project specifications), another desirable outcome is for project teams to experience cohesion rather than extensive and divisive conflict. The social performance outcome of cohesion may underlie the future success and sustainability of the team in subsequent projects. The complex demands of project work place a premium on the role of the project leader in helping the team perform effectively (Bakker, Boroş, Kenis, & Oerlemans, 2013; Burke, Georganta, & Hernandez, 2017; Halbesleben, Novicevic, Harvey, & Buckley, 2003; Mumford & Licuanan, 2004). Effective project team leadership is frequently offered as a potential solution for teams to overcome the challenges of project-based work designs. However, there is a reason to believe that leading a temporary project team is considerably different and arguably more challenging than leading a stable team in a conventional organisation (Lee-Kelley & Sankey, 2008; Tyssen, Wald, & Spieth, 2013). As described previously, the dynamic environment of project-based work presents significant temporal and coordination challenges to teams. Existing leadership and teamwork theories lack an explicit temporal focus and were not explicitly designed for such an environment. Therefore, given the increase in the prevalence of organisational project teams, it is essential that leadership theories suited to this environment are developed and refined.

Despite past calls to approach team leadership from a temporal perspective (e.g., Alipour, Mohammed, & Martinez, 2017; Bluedorn & Jaussi, 2008; Casimir, 2001; Castillo & Trinh, 2018; Halbesleben et al., 2003; Shamir, 2011), there is very little research examining

the intersection of leadership, time and performance in project teams (Kozlowski & Bell, 2003; Burke et al., 2017; Lord & Dinh, 2014; McGrath & Tschan, 2004; Mohammed & Harrison, 2013; Shipp & Cole, 2015; Sonnentag, 2012). The leadership literature is surprisingly silent on questions such as: What time-oriented leadership behaviours may be used to manage and coordinate teams in short-term projects to accomplish deadlines? What are the mechanisms by which time-oriented leader behaviours influence project success? At what point in the project lifecycle are time-oriented leader behaviours most effective? How should leader behaviour change throughout a project cycle?

Recently, there has been a small amount of research investigating how self-managing teams plan and organise their activities in the face of time-related challenges (e.g., Gevers, Rutte, & Van Eerde; 2006; Gevers, Van Eerde, & Rutte, 2009; Janicik & Bartel, 2003). This research emphasises the importance of active team coordination and synchronised team actions to accomplish project deadlines. This research inspired Mohammed and Nadkarni (2011) to extend these concepts to the level of project leader behaviour, which they call temporal leadership. In this dissertation, I will expand on Mohammed and Nadkarni's (2011) conceptualisation of temporal leadership and present an input-process-outcome framework of the effect of temporal leadership behaviours on project team outcomes via intervening team processes.

Temporal Leadership

Mohammed and Nadkarni defined temporal leadership as "leader behaviors that aid in structuring, coordinating, and managing the pacing of task accomplishment within the team" (2011, p. 492). Temporal leadership considers leader behaviours aimed at the use and management of time as central components of effective project team leadership. This new form of leadership is consistent with the functional approach to leadership which suggests that the leader's main job is "to do or get done," whatever is needed to accomplish the team's goal (Zaccaro, Rittmana, & Marks, 2011). Temporal leadership is the first theory in the leadership literature to address team leadership exclusively through a temporal lens.

Mohammed and Nadkarni (2011) conceptualised and operationalised temporal leadership as a unidimensional construct by borrowing and combining two concepts from the existing literature on self-managing teams: temporal planning (Janicik & Bartel, 2003) and temporal reminding (Gevers et al., 2006). Temporal planning refers to discussions of temporal issues and constraints associated with task completion, including consideration of when specific actions will occur, how long they will take, and what schedule and deadlines

should be adopted (Janicik & Bartel, 2003). Temporal reminders refer to ongoing monitoring of activities and progress against goals and schedules, and the implementation of adaptive actions or contingency plans when needed to assure on-time task accomplishment (Gevers et al., 2006). Mohammed and Nadkarni (2011) recast the concepts of self-managed team temporal planning and team temporal reminders in terms of actions by the team leader.

Subsequent to Mohammed and Nadkarni's (2011) seminal work, there have been only four empirical and one conceptual published paper using their temporal leadership ideas. All of this work has drawn on the unidimensional conceptualisation and operationalisation of temporal leadership suggested by Mohammed and Nadkarni (2011). Significant main effects of temporal leadership on timely project completion have been reported in the empirical studies conducted in a team project context. This preliminary evidence is encouraging and suggests both direct and indirect effects of unidimensional temporal leadership on project team performance.

In terms of a direct relationship, Mohammed and Nadkarni (2011) reported that temporal leadership was positively related to project team performance assessed as timeliness in meeting project milestones and client satisfaction ($r = 0.59$, $p < 0.01$). Myer and Mohammed (2012) found that team temporal leadership predicted incremental variance in perceived leader effectiveness and willingness to follow leader beyond initiating structure and consideration. In terms of an indirect relationship, Santos, Passos, Uitdewilligen, and Nübold (2016) found that temporal leadership predicted project team performance by reducing temporal conflicts among team members. The conceptual work of Mohammed and Alipour (2014) proposed that team temporal leadership builds shared temporal cognition which subsequently aids in accomplishing team task performance as well as social performance in the form of cohesion. Maruping, Venkatesh, Thatcher, and Patel (2015) found that temporal leadership was most important in facilitating team performance when time pressure was high and that it acted by enabling effective team processes that might otherwise degrade under time pressure. Recently, Yuan and Lo (2018) reported that temporal leadership predicted the performance of sales marketing teams by building competency and followership among sales employees. Collectively, the limited empirical research appears to support the contention that temporal leadership facilitates project team performance both directly and indirectly.

This thesis will advance the understanding of temporal leadership and its role in facilitating project team performance in four ways. First, I substantially extend Mohammed

and Nadkarni's (2011) temporal leadership conceptualisation in two ways. I add both "type of temporal leader behaviour" and "time of leadership inputs" to the original concept of temporal leadership. Initial studies included a unidimensional conceptualisation of temporal leadership, though the measure actually refers to two types of behaviours (specifically, temporal planning and temporal reminders) derived from two previously separate constructs and measures. I argue that each type of temporal leader behaviour may be most helpful to the team at different stages of the project lifecycle, whereas existing temporal leadership theory does not consider that team needs change over time requiring different leadership inputs (Fleishman, Mumford, Zaccaro, Levin, Korotkin, & Hein, 1991; McGrath, 1962; Zaccaro et al., 2002). I submit that temporal leadership can be conceptualised as having two aspects: temporal planning and temporal reminders. Thus, I add "type of temporal leader behaviour" to the existing temporal leadership conceptualisation by decoupling temporal planning from temporal reminding behaviour.

Second, I incorporate "time" into the temporal leadership literature by suggesting that each type of leader temporal behaviour is particularly relevant at a different stage of the project lifecycle. The project management literature (PMI, 2013) establishes that projects have at least two stages: initiation and execution. I suggest that each stage requires different leadership inputs to achieve the desired team performance by the end of the project. I propose that leader temporal planning is useful at the project initiation stage as it involves setting task deadlines and priorities, planning the sequence of activities throughout the project, and helping the team understand the needed pace and milestones. Temporal reminders, on the other hand, should be useful during the project execution stage as this behaviour creates urgency and ensures coordinated actions leading to adherence to the plan and deadlines established earlier.

Third, I propose and test an input-process-outcome framework consisting of leader temporal behaviours (input) - team processes (process) - task performance and social performance (outcome) to delineate the team process mechanisms by which leader temporal behaviour at each project stage facilitates task and social performance at the end of the project. To theorise the mediating mechanisms, I draw on Marks, Mathieu, and Zaccaro's (2001) recurring phase model of team processes, comprising initial transition phase processes followed by action phase processes. During the transition phase, teams are engaged in developing task objectives, identifying resources needed to achieve those objectives, and formulating a strategy to achieve objectives. The primary focus is not on task execution but

on developing structures, procedures, and schedules that will facilitate task completion. During the action phase, teams are primarily involved in conducting, monitoring, and coordinating their activities in the service of task accomplishment. Here, the focus is on the coherent and unified task execution effort according to the plans developed in the transition phase.

Taken together, I hypothesise that leader temporal planning contributes to team transition phase activities, which in turn help the team to achieve project team task performance (i.e., meeting deadlines, budget, and quality goals), as well as to develop team cohesion. Once the project is well underway, leader temporal reminders help to improve team action phase processes, thereby enabling teams to make a coordinated and coherent effort leading to successful project task performance and team cohesion. I contend that examining the two forms of temporal leadership and their relationship to team processes at different project stages will provide additional insights and utility beyond viewing temporal leadership as a unidimensional construct measured at only one project stage.

Finally, I compare the effectiveness of the two aspects of temporal leadership (temporal planning and temporal reminders) to that of a long-standing and more generic task-focused leadership construct, initiating structure (Fleishman & Harris, 1962; Fleishman & Hunt, 1973). The initial studies have considered temporal leadership as a form of task-focused leadership (Mohammed & Alipour, 2014). Studies by Mohammed and Nadkarni (2011) and Myer and Mohammed (2012) found moderate positive correlations (0.47 and 0.43 respectively) between temporal leadership and initiating structure. I propose that both temporal planning and temporal reminders are unique constructs which account for substantial incremental variance in project team performance above and beyond initiating structure at their respective stages of the project lifecycle.

I conclude that the expanded input-process-outcome framework of temporal leadership presented in this study is useful in predicting successful project task and social performance and does so at least partly via team processes which differ at two stages of the project life cycle. In sum, this study integrates the literature on temporary project teams, team processes, and temporal leadership, thereby providing a valuable approach to understanding team temporal leadership which promises to be useful in addressing the temporal challenges encountered by project teams. Figure 1 presents the conceptual framework of this study.

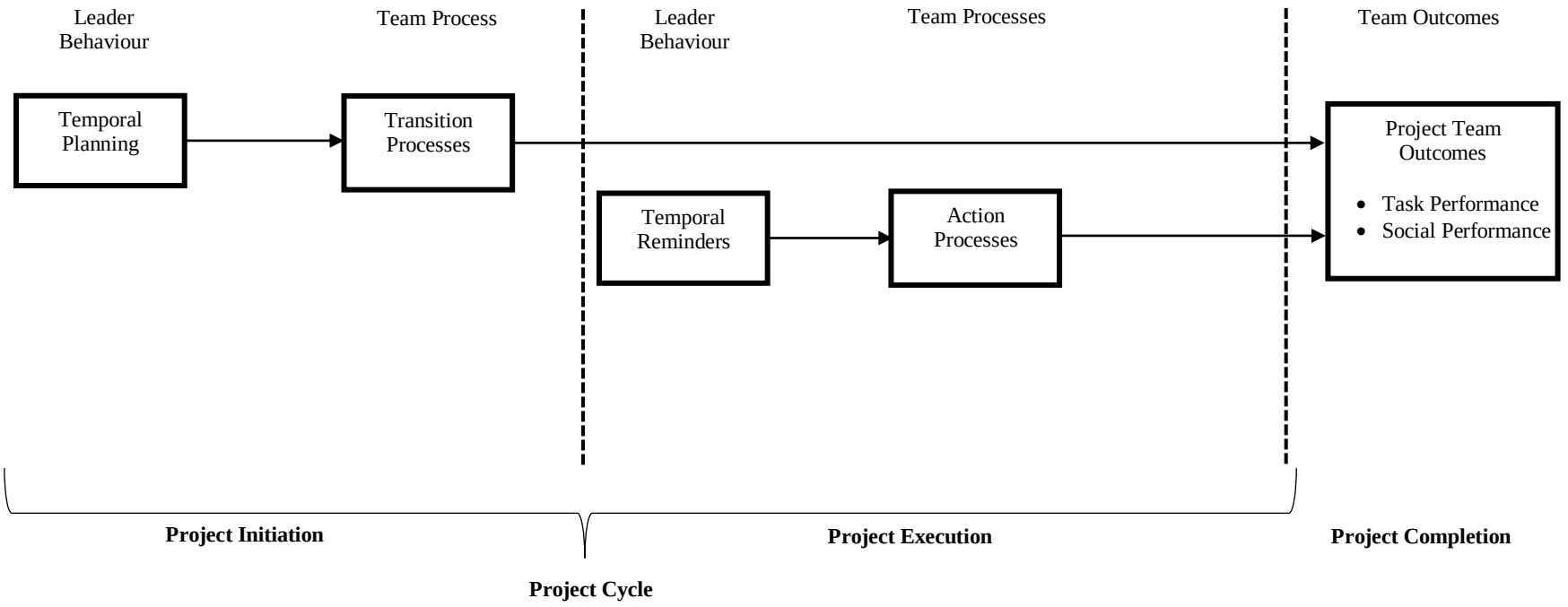


Figure 1. Adding time, type, and processes to temporal leadership: Conceptual framework.

CHAPTER 2

Theoretical Framework

This chapter will synthesise the literature from three different, but inter-related streams of research: temporary project teams, time and team development models, and temporal leadership. There are five main sections: (i) project-based organisations, (ii) time and models of team activity, (iii) time in leadership, iv) adding time and team process to temporal leadership, and (iv) the relative contributions of temporal leadership and initiating structure to project team processes and outcomes.

The project-based organisations section describes the concept of project teams - the utility, composition, and characteristics of project teams within such organisations, the failure of projects, and the importance of time within project teams. The second section on time and models of team activity presents the conceptualisation of time in existing sequential, non-sequential, and recurring phase models of team processes. In the third section, I describe the importance of time in team leadership from the perspective of a functional approach to leadership. This section concludes with the description of the existing conceptualisation, measurement, and literature evidence for team temporal leadership. The fourth section of this chapter introduces the proposed input-process-outcome framework developed and tested in this study. This model integrates temporal leadership and team processes discussed in the preceding sections to present multilevel direct and mediation hypotheses, with a focus on team temporal leadership and team processes at two stages in the project lifecycle. The closing section discusses the likely utility of temporal leadership compared to initiating structure in the prediction of project team outcomes.

Project-Based Organisations

Project-based organisations (PBOs) are common in many industries such as information technology, filmmaking, fashion, research services, and construction (Burke & Morley, 2016). The knowledge, capabilities, and resources of PBOs are built up through the execution of time-limited projects. Running a project is the reason that PBOs exists and therefore most of their operational activities are planned and performed using project teams (Bakker et al., 2013; Lundin, Arvidsson, Brady, Ekstedt, & Midler, 2015). Temporary teams are the central functional unit of their core business. The overhead functions of the organisation are there to start, support, monitor, and finish projects. That is, to assist over the entire lifetime of the projects.

Typical examples include information technology (IT) and filmmaking organisations which are structured around temporary project teams. In such organisations, project teams and their products are the primary sources of revenue (Lundin et al., 2015). For instance, the software development function within information technology might require the creation of new teams comprised of individuals with specialised competencies such as programming, animation, and graphic design, depending on the nature of the project. Team members are often unfamiliar with one another's skills at the outset but must collaborate to perform a complex, unique, and interdependent task within a short timeframe. Similarly, the production of a film requires the collaboration of different functional experts such as story writers, set designers, musicians, and logistics experts who are temporarily grouped to produce a film then disband after its production.

The composition of temporary project teams varies from one project to the next due to the functional requirements of each project. Team size and member technical skills vary to address the particular demands of the new project. Members assigned to a given project are often unfamiliar with each other. Team members are reassigned to different projects individually after the completion of the project. In sum, each project has a new team performing an interdependent task within a strict timeframe.

Turner and Muller (2003) maintained that "a project is a temporary organisation to which resources are assigned to undertake a unique, novel and transient endeavour managing the inherent uncertainty and need for integration in order to deliver beneficial objectives of change" (p. 7). Short-term projects possess the following characteristics:

> (i) a unique, once-in-a-lifetime task, (ii) with a predetermined date of delivery, (iii) being subject to one or several performance goals such as time and financial resource usage and quality of product output, and (iv) consisting of a number of complex and/or interdependent activities (Packendorff, 1995, p. 320).

Lundin and Soderholm (1995) introduced a broad conceptual framework to differentiate temporary project teams from stable teams based on several foundation characteristics including time, task, and team. In this framework, time is offered as a central characteristic of temporary project teams. Since temporary project teams are by definition "temporary," their time-limited existence or deadline is their fundamental property and significantly impacts the activities of the team. The characteristics of the task are considered the "reason for being" for temporary project teams. The task is new and unique in every project, providing a legitimate purpose for the existence of a team. The task can only be

performed by a group of highly skilled and competent individuals. The team is positioned as a human resource with multidisciplinary competencies dedicated to accomplishing their new interdependent tasks within a given timeframe or deadline.

Project success may be judged by two key outcomes: task performance and social performance. First, task performance is exemplified by the completion of the project on time, within budget, and with the desired quality. These three criteria, referred to as the golden triangle of project success, are the most critical measures of project team task performance (Turner & Zolin, 2012). The challenge of every new project team is to manage project time effectively, meet interim timelines and milestones, and avoid project delays to deliver a high-quality product on time and within budget. Second, social performance represents the new team developing a collective and valued identity. In this study, I conceptualise social performance as team cohesion (Chin, Salisbury, Pearson, & Stollak, 1999). Cohesion refers to team members' feelings of belonging to a team and their desire to remain associated with the team and its members (Bollen & Hoyle, 1990; Chin et al., 1999; Liu et al., 2011). The effective functioning of the project demands parallel activities and cooperation between individuals with differing competencies. Interpersonal tensions and low cohesion in a team may undermine team effectiveness and success in the current project, as well as negatively influence future project success when some of the same individuals are assigned to work together again.

Project failures. Attention to the temporal aspects of project team functioning is essential for the task as well as the social performance of temporary project teams. Such time-limited teams often fail to meet task deadlines, budgets, and functional goals. They may also encounter disputes and conflicts over performing different task activities. Regarding task performance, both research and industry reports show an alarming rate of project failures, particularly in information technology projects. In the landmark Chaos research conducted by the Standish Group (2015), only 36% of projects were successful in meeting deadlines, achieving budget, and providing all planned functional requirements to clients. As many as 48% of projects were completed and operational but went over budget, missed deadlines, or fulfilled fewer functional requirements than intended. The remaining 16% of projects they studied were cancelled at some point before completion. Other published project failure evidence comes from Flyvbjerg and Budzier (2011), who examined 1,471 information technology projects of a variety of types from enterprise resource planning to management information systems, comparing their planned budgets, schedules, and performance targets

with actual costs and functional value. They found that one in six projects had a cost overrun of 200%, on average, and a schedule overrun of almost 70%.

Regarding social performance, the project team literature also reports a high prevalence of conflicts and adverse social environments during project work (Chin et al., 1999). Most conflicts are related to both task and time-related aspects of the project. Task-specific conflicts are disputes and ambiguities related to the approach, objectives, and roles and responsibilities of sub-tasks, whereas time-related concerns involve the pacing and sequencing of sub-tasks (De Dreu & Weingart, 2003; Jansen & Kristof-Brown, 2005; Mohammed & Harrison, 2013). Such conflicts, mainly in the presence of quality and time goals, are detrimental to team morale, commitment, and the ability to take coordinated actions (Bollen & Hoyle, 1990; Chin et al., 1999).

Time is an essential but problematic feature for project teams. The impact of time on team task and social performance has increasingly captured scholarly attention over the years. This research interest is evident in the variety of empirical and theoretical models investigating the development of new project teams to achieve team outcomes (Kozlowski & Bell, 2003; Mathieu, Maynard, Rapp, & Gilson, 2008). Collectively, these models postulate that teams achieve their task goals and manage their interpersonal relationships by working through distinct stages or phases of team development across the project lifecycle (Gersick, 1988; Marks et al., 2001; Tuckman, 1965). Each phase or stage has characteristic team progress, pacing, and task activities as well as an associated socio-environment. The next section reviews the literature on how temporal considerations impact the development and activities of new teams.

Time and Models of Team Activity

The time and team development literature contain three perspectives on how team development and behaviour play out over time to enable or impede team performance. The first perspective suggests that time is related to team development and task progress in a linear manner in which new teams progress through a logical sequence of stages throughout their life, often referred as a linear sequential model of group development (e.g., Tuckman, 1965; Tuckman & Jensen, 1977). The second perspective suggests that time has varying salience and motivational properties for teams at different stages of a fixed-length project, known as a non-sequential model of group development. The passage of time may trigger changes in the nature and velocity of progress towards the end goal (e.g., Gersick, 1988, 1989; Seers & Woodruff, 1997). The third perspective considers that time is related to team

performance in a series of episodic cycles of goal-related behaviours, referred to as the recurring phase model of team processes (Marks et al., 2001). Performance episodes are the distinct periods of time during a project over which work is planned, performed, and evaluated. The next section will review each perspective in more detail.

Tuckman's stage model of team development. Tuckman (1965) proposed a four-stage linear sequential model of group development. This model is renowned for the labels of the four stages: forming, storming, norming, and performing. Each stage was thought to vary regarding both task-focused activities and group interpersonal relationships. The team begins as a group of individuals who experience initial conflicts and later develop cohesion to become a productive group. Each stage was thought to be necessary to reach effective group functioning. Later, Tuckman & Jensen (1977) updated the original model and added a fifth stage of adjourning for teams that are temporary (Tuckman & Jensen, 1977). Tuckman's (1965) original model was based on a qualitative review of 50 articles on three categories of teams: therapy-groups, training or T-groups, and a combination of natural and laboratory groups. Thirty-seven out of the 50 studies in Tuckman's sample involved therapy groups and T-groups.

Forming is the first stage of group development which is characterised by uncertainty and unfamiliarity of group members in both task and interpersonal spheres. In the project context, group members are briefed about the nature, functions, and goals of the new project. As a newly composed unit, group members establish the boundary conditions of the task and interpersonal relationships. While anxiety and uncertainty prevail at this stage, members try to familiarise themselves with each other, their leader, their client, and the project.

Storming is the second stage of group development which is characterised by intragroup conflicts about the task and polarisation around interpersonal issues. In the context of project teams, the group may experience disagreements and conflicts about the roles and responsibilities of individual team members, standards, pace, sequence, and priority of tasks as well as sub-tasks. In the interpersonal relationship sphere, group members may express individuality, resist the formation of a group structure, and experience a high level of emotions.

Norming is the third stage of development which is characterised by increasing group communication, familiarity, agreement, and eventual cohesion. In the project task realm, group members develop agreement on the individual roles, responsibilities, and task standards as well as understand each other's way of performing tasks and sub-tasks. In the

interpersonal realm, group members overcome resistance, share opinions, and become more familiar with each other. Because of the increasing communication and understanding, this stage is characterised by group consensus on interim deadlines and milestones, pace, flow, sequence, and coordination of interdependent activities.

Performing is the fourth stage of group development in which the group makes a focused, coordinated, and collective effort towards achieving its shared objectives. In the project context, the interpersonal environment becomes supportive of the task activities. Individual efforts are supported and well-coordinated. Group structure, functions, and performance standards are understood and adopted by every member. Individual task roles become flexible and functional, and energy is channelled into project success.

Adjourning is the fifth and final stage. In this stage, group objectives are achieved, the project is completed, and group activities are terminated, either temporarily or permanently. Project members may be reassigned to different projects with different team members.

The generalizability of Tuckman's framework to project teams remains a question since the composition, function, leadership, and objectives of therapy and T-groups are entirely different from those of temporary project teams in work organisations. Therapy groups are usually unstructured so that group interaction and activities can be utilised as a mechanism to develop interpersonal relationships and negotiate the group's desired goals. Often the role of the therapist/leader is intentionally passive so that members must take responsibility for communicating, sharing experiences, and deciding on group activities and goals. The settings Tuckman studied contrast starkly to the situation in most project teams in organisational contexts. Project teams do not rely on team activities to negotiate final objectives. Most project teams have well-defined objectives and specific deadlines and budgets from the beginning. The key to their success depends on the planning and coordination of interdependent team activities towards known final goals, often facilitated by a proactive leader.

Nevertheless, Tuckman (1965) reviewed teams which were newly formed, like most project teams, and provided a basic framework to explore team dynamics which may have implications for the project context. Even in organisational project teams, there is often a need to reconcile team members' divergent perceptions about the task, time, and interpersonal relationships needed to meet project objectives. Such teams often experience

conflicts on time, task, and social spheres over their lifespan which can impede their ability to meet deadlines and desired performance goals.

Despite the popularity of Tuckman's sequential model, there is very little scholarly evidence to either support or contradict his group development model (Bonebright, 2010; Humphrey & Aime, 2014). Only one empirical study attempted to directly test Tuckman's propositions of sequential group development (Runkel, Lawrence, Oldfield, Rider, & Clark, 1971). This study found that teams progressed through the expected four development stages sequentially over their lifespan, and each of the stages had specific task-related activities and interpersonal challenges (Runkel et al., 1971).

Some authors have explicitly highlighted the limitations of Tuckman's model. Cassidy's (2007) theoretical work explored the extent to which Tuckman's (1965) model adequately described group development outside of the therapy context. Analysing a practitioner perspective on group dynamics published in books on therapy, education, and management between 1990 and 2001, she found that all group development models could be mapped on to the five-stage framework proposed by Tuckman. However, the extent to which the storming stage occurred, characterised by task and interpersonal conflict, varied considerably between groups. This variation may be explained by the variety of sources of conflicts that arise at different stages in a group's life such as team member disagreements about task and sub-tasks, disagreements about task pace and priority, and attempts to control or dominate group processes.

Rickards and Moger (2000) noted that Tuckman's model lacks a complete explanation of group development over time in the project context. They highlighted two significant questions of Tuckman's model relating to group performance. First, what if the storming stage never ends and groups never attain a satisfactory level of cohesion? Second, what is needed to exceed performance norms and achieve outstanding creative performance? Rickards and Moger (2000) suggested an essential role for the team leader as an explicit mechanism to reduce team conflict, facilitate interpersonal coherence, and guide accomplishment of project objectives.

In sum, Tuckman's linear sequential model suggests that teams make little progress on their end goals in the early stage of their existence due to intergroup conflicts and lack of communication and cohesiveness. In contrast, teams make more progress in later stages due to supportive factors such as established task and interpersonal norms, team familiarity, and clarity about group function and structure. Despite the lack of empirical support, this model

has remained an influential approach to team development. It not only provided a much-needed basic framework to understand team dynamics over time but also initiated a debate about the impact of time on team life.

Punctuated equilibrium model. In an alternate and second perspective, researchers have noted that group development does not necessarily occur in a linear progression (e.g., Arrow, 1997). Gersick's (1988) Punctuated Equilibrium Model (a non-sequential group development model) demonstrates that time-to-deadline serves as the primary driver of team progress, with an impending deadline motivating teams to pay more attention to time and pace and complete their work within the allocated time. Gersick (1988) developed her Punctuated Equilibrium Model by analysing activities in eight field and eight laboratory project teams with specific deadlines. She observed that project teams approached and paced their work differently based on the amount of time remaining before the project deadline. She found that, instead of developing gradually and making progress on the team task in a linear manner, project teams experienced lengthy periods of inertia/inactivity that were punctuated by intense revolutionary periods of significant change and accomplishment. She called this process "punctuated equilibrium."

According to this model, groups undergo a two-phase developmental pattern when undertaking a fixed-length project. Phase 1 is a period of relative inertia, the direction of which is set by the end of a team's first meeting. During this phase, teams tend to waste time and display little visible progress or vigour in achieving project goals and deadlines. Initial assumptions and plans for executing the task are not challenged or modified. This first phase lasts for almost half of the specified project completion time. At or near the middle of the project, the team undergoes a transition that initiates significant changes in task execution, allowing them to re-visit their strategy, re-understand their task objectives, and adopt novel approaches to the task that are helpful to make progress towards task completion. This mid-point transition may be followed by greater activity as teams work to enact the plans made at the transition point, before a possible second period of relative inertia. This second phase of inertia ends with the second and last transition right before the project deadline, bringing a shift in the team's behavioural patterns. A final burst of activity then enables teams to accelerate and complete their task before the termination point.

This theory suggests that time serves as a marker of team progress by providing milestones and interim deadlines throughout the project. These temporal markers indicate what work must be completed by the time teams reach a particular stage of a project, thus

providing a clear metric with which to self-assess progress. Team members' awareness that nearly half of their time has passed can act as a sudden wake-up call to re-evaluate plans and progress. Approaching the project mid-point punctuates the state of inertia, sparks activities and motivates further effort towards project completion (Gersick, 1988). Importantly, when meeting the final project completion deadline is essential, specifying short-term deadlines throughout the project for interim progress should be able to spark early transitions and reduce the waste of available time. In this way, rather than waiting for half the time to the final deadline to pass, teams should be able to avoid inertia and make more consistent progress towards project completion.

Following Gersick's influential work, there have been efforts to replicate her findings and better understand the development of team processes in time-limited projects (e.g., Okhuysen & Waller, 2002; Seers & Woodruff, 1997; Waller, Zellmer-Bruhn, & Giambatista, 2002). This literature has mostly assumed the connection between project deadlines and attention to time, as deadlines encourage the team to pay more attention to task execution, improve the pace and flow of activities, and complete the project within the allocated time. Seers and Woodruff (1997) observed the pace of team progress during a fixed-length project. Consistent with the punctuated equilibrium model, they found evidence that teams made significantly less progress during the first half of the project than during the second half of the project. This study supports the idea that task pacing is a deadline-driven process, wherein teams approach their task with higher intensity and effectiveness as they approach the final deadline. Waller et al. (2002) found that teams gradually increased their attention to time as deadlines approached, rather than sharply increasing attention at the mid-point, but that teams often do engage in task transitions at or near the middle of the project.

Analysing a sample of 80 small teams, Okhuysen and Waller (2002) examined the boundary conditions of mid-point transitions during a project's life and provided two critical findings. First, the half-way transition point is not a universal phenomenon which occurs in every team, but a phenomenon with contingencies including formal instructions about time management and team familiarity. Both contingencies serve as boundary conditions which enhance the occurrence of deadline-driven pacing and a project mid-point transition. As teams work on a complex task, explicit formal instructions about the practical utilisation of time influences teams to perceive it as a scarce resource worthy of constant monitoring. Similarly, when team members are more familiar with each other, members interrupt their activities during project work to fulfil social needs. During such interruptions, team members

interact with others, and a part of their discussion is on the task at hand, evaluating each other's work and setting new future directions for task completion. This finding is consistent with my consideration of team cohesion as a vital team outcome.

Labianca, Moon, and Watt (2005) conducted a lab study to determine the impact of variations in task deadlines on the performance of project teams. In their experiment, all teams were given the same amount of time to complete their project, but the starting point was manipulated to be "prototypical" (e.g., 09:00) or "atypical" (e.g., 09:08). Teams that started their one-hour task at prototypical times were able to calculate their remaining time better, plan and execute task activities, and eventually produce a better-quality project output than teams which started their task at atypical times. Teams assigned prototypical times had a more explicit mid-point transition point, and hence left themselves enough time to perform all phases of the task and achieve project deadlines.

Woolley (1998) performed a lab study of team interventions to explore the impact of time and type of intervention (task strategy vs teamwork) on project team performance. The task strategy intervention asked teams to discuss and evaluate different team goals, strategies to achieve these goals, and the best use of resources to complete the project. The teamwork intervention emphasised how to make the best use of each member's ideas and work well as a collective unit. This study found that making the team focus on their task-specific strategy during the temporal mid-point of the project (rather than at the beginning) was beneficial for ultimate team performance. The task-specific intervention was a sufficiently strong event to change the equilibrium state of the team. The intervention helped teams realise that they were pursuing the wrong track and should revisit their strategy and make conscious efforts to re-establish team processes (Woolley, 1998). In contrast, making a team focus on their teamwork did not affect ultimate team performance whether the intervention was delivered at the beginning or the mid-point of the project. In sum, Gersick's (1988) punctuated equilibrium model has mostly been supported in subsequent studies, with time-to-deadline sparking a reorientation of team activities at the approximate mid-point of a project, and teams generally not using the first part of their time as effectively as they could.

Tuckman's (1965) classic team development model and Gersick's (1988) punctuated equilibrium model may seem to conflict, but in fact, may be considered complementary (Humphrey & Aime, 2014). There have been two empirical studies by Chang, Bordia, and Duck (2003) and by Seers and Woodruff (1997) which compared the sequential and the non-sequential team development models. Chang et al. (2003) suggested that both perspectives of

team development provide useful and converging insights on three distinct aspects of team functioning: time, task, and socio-emotional. The punctuated equilibrium model, as a non-sequential model, presents the team's time awareness, task pacing, and changes in task activities over time. The shift in the intensity of the team's goal-related activities later in the project is because of noteworthy events such as the temporal mid-point of the project. The linear sequential model highlights the change in the team's structure and process over time on task and socio-emotional dimensions. Such sequential models present different developmental stages in team life regarding the proportion of time a team spends on task and socio-emotional issues that are characteristic of a stage. These stages should be seen as "temporal shifts" of team activities on both dimensions.

Seers and Woodruff (1997) found some evidence for mid-point transitions where there is a shift in the intensity and progress of team task activities at or near the project mid-point. Comparing both models, they concluded that task pacing seems to be deadline-driven progress, and sequential team development involves social factors which can extend beyond task-required interactions. Both models inform researchers about different development patterns and aspects of project team functioning.

Gersick (1988) presented a "task progress" perspective in which time has an active role in triggering a conscious effort to adopt effective task activities and then to complete the task. Tuckman's (1965) work is a "group development model" which was somewhat passive about time and concerned with temporal changes in team structure and activities along task and socio-emotional dimensions that co-occur systematically. Collectively, it appears that teams do not have a natural tendency to manage their temporal resources and self-regulate their activities particularly well under time pressure and early in their history (e.g., Gersick, 1988; Labianca et al., 2005). Both models suggest that there is a lack of progress, pace, and cohesion in the preliminary stages of a project, supporting the argument that teams do not have a default mechanism to distribute their time across different sub-tasks. The mid-point crisis may be partly due to slow progress on some of the group development activities identified by Tuckman.

Marks et al. (2001) synthesised the literature on sequential and non-sequential team models to present the third perspective on the impact of time on team performance, called the recurring phase model of team processes. This phase model considers that time is related to team task and social outcomes in a series of episodic cycles of goal-related activities. The episodes are the distinct periods during a project over which tasks are planned, performed,

and evaluated. The model is based on the temporal nature of team activities and pertains best to teams working on short-term projects (Burke et al., 2017; Marks et al., 2001). I have used the Marks et al. recurring phase model of team processes in developing the input-processes-outcome framework for this study. With over 2,910 Google Scholar citations and 773 Web of Science citations as of October 2018, Marks et al.'s (2001) recurring phase model is a well-established framework of team processes and is frequently cited in top-tier journal articles. The next section presents a detailed explanation of the model.

Recurring phase model of team processes. McGrath (1964) presented an input-process-outcome (IPO) model which considered that team processes act as a mediating mechanism between the team's inputs and outcomes. Inputs are the antecedent factors that enable and constrain members' goal-related activities. These include individual team member characteristics (e.g., personalities, skills, and competencies), team-level factors (e.g., leader behaviour), and organisational and contextual factors (e.g., organisational design and task complexity). These antecedents influence team processes, which are the team members' goal-related activities focused on task accomplishment. Processes are important because they describe how team inputs are transformed into outcomes. Outcomes are the results of team goal-related processes and include team performance (e.g., quality and quantity) and members' affective reactions (e.g., team satisfaction, cohesion) (Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000).

Team processes are defined as "members' interdependent acts that convert inputs to outcomes through cognitive, verbal, and behavioral activities directed toward organising task work to achieve collective goals" (Marks et al., 2001, p. 357). Team processes are the mechanisms by which team members work on a highly interdependent task and utilise resources, such as skills, competencies, equipment, time, and finances, to achieve meaningful team outcomes (e.g., commitment, satisfaction, cohesion, product development, innovation). Team processes play a significant role in the effectiveness of the team and are used to direct, align, and monitor taskwork (LePine, Piccolo, Jackson, Mathieu, & Saul, 2008). Effective execution of team processes aids teams in orchestrating their activities toward goal accomplishment and achieving both task and social performance.

Marks et al.'s (2001) taxonomy of team processes argues that team performance occurs over a series of episodes. An episode can be broken down into two phases characterised by different goal-related processes: the transition phase and the action phase. Transition phases are those periods of time during which the team focuses primarily on

structuring the team, setting the objectives, planning the team's upcoming task, and (where relevant) evaluating the team's past performance. In contrast, action phases are those periods of time when the team is engaged in tasks that directly contribute to task accomplishment. The output of the transition phase (e.g., plans, goals, deadlines) serves as an input to action phase activities during the episode. In this thesis, I view a discrete project as being an episode with an initial transition phase followed by an action phase, though projects may also have sub-episodes regarding interim tasks and deadlines. Were the teams to continue intact beyond one project, they would encounter subsequent episodes.

The taxonomy of team processes by Marks and colleagues (2001) includes two broad phases which tend to alternate in time: (i) transition phase and (ii) action phase, and another category of activities which is on-going through both phases: (iii) interpersonal processes. The first phase of a new episode or project is called the transition phase. According to Marks et al. (2001), the transition phase involves three broad team processes: (i) mission analysis, (ii) goal specification, and (iii) strategy formulation. During this phase, teams are engaged in the development of their task objectives, identification of the resources needed to achieve those objectives, prioritisation of future tasks and sub-tasks, and planning for courses of action to achieve those objectives. Within the time-limited project context, transition phase processes also include team planning related to task schedules, priorities, interim deadlines, and milestones associated with each sub-task. Thus, the primary focus of this phase is not on direct task work but on planning the structures and procedures that will enable task accomplishment.

The action phase follows the transition phase. According to Marks et al. (2001), the action phase involves three broad team processes: (i) team monitoring, (ii) team backup behaviour, and (iii) team coordination. During this phase, teams are primarily involved in monitoring and coordination activities that lead directly to task accomplishment. The objective of monitoring is to evaluate the team's progress towards task objectives and interim deadlines and goals adopted in the transition phase. Monitoring includes keeping track of team resources (e.g., personnel, information, time, and the external environment). Team backup behaviour involves assisting team members to perform their task through feedback, coaching, or completing a task for a teammate. The objective of coordination is to facilitate the exchange of information and regulation of team actions through synchronisation of time, flow, and sequence of interdependent activities.

According to Marks et al. (2001), interpersonal processes include: (i) conflict management (ii) motivation and confidence building and (iii) affect management. These processes are implemented to resolve conflicts that may emerge in a team environment, build a sense of collective inspiration and confidence, develop task-focused cohesion, and manage team affect. Overall, the objective is to enhance positive team environments that encourage achieving collective harmony and the task goal. Teams are involved in these interpersonal processes throughout the transition and action phases. However, for this study, I concentrate on the more distinct transition phase and action phase processes because of the theoretical nature of temporal leadership inputs.

The effective execution of team processes is vital to the final task and social performance of the project. Team transition and action processes enable teams to devise a well-defined project plan and coordinate members' interdependent actions towards achieving the goal. In this study, task performance involves the completion of the project on time, within budget, and with desired quality standards. Social performance refers to team cohesion which includes member identification/belonging/desire to affiliate with the team and its members.

Measures based on Marks et al.'s taxonomy have been shown to predict various team outcomes including team effectiveness (Mathieu et al., 2008). LePine et al. (2008) tested the validity of the taxonomy of the team processes framework introduced by Marks et al. (2001). Their meta-analysis found encouraging results as the data fit a model where ten narrow teamwork processes loaded onto three second-order team process constructs (transition, action, interpersonal), which in turn reflected an even more general team process construct. Although these are promising findings, the number of studies exploring these three second-order team process dimensions within a single study is low (Mathieu et al., 2008). For this thesis, I have adopted Marks et al.'s (2001) team processes taxonomy and included two relevant second-order team process dimensions (transition processes and action processes) within my proposed IPO framework.

Teams may not spontaneously develop effective team processes or use their limited time to their best advantage. Effective leadership may be the key, and leader behaviour may be considered an input to team processes and subsequently to team outcomes. Therefore, I suggest that leader temporal behaviour is useful in facilitating team transition processes and team action processes at project initiation and during project execution, respectively, and subsequently contributing to successful project outcomes. The existing literature lacks an

integrated perspective on the specific leadership behaviours which may help regulate team processes at two different stages of the project cycle. Therefore, the next section presents a review of the literature on the importance and use of time in teams and by team leaders.

Time in Leadership

Temporal considerations have attracted limited research in the team leadership literature (Kozlowski, Mak, & Chao, 2016; Mohammed & Alipour, 2014; Shamir, 2011). Despite several calls for more research on time and team leadership (Casimir, 2001; Halbesleben et al., 2003; Zaccaro et al., 2002), leadership scholars have yet to catch up to the demands of modern project teamwork. Time has remained a relatively unexplored dimension in published leadership studies (e.g., Bluedorn & Jaussi, 2008; Castillo & Trinh, 2018). Bluedorn and Jaussi (2008) lamented that "the formal use of temporal variables in leadership research has been scarce and scattered; work from temporal theory has not made its mark on many examinations of the leader-follower space or the leadership process" (p. 657). In a very recent paper, Castillo and Trinh (2018) have reiterated the need for longitudinal studies which consider the temporal effects of leadership behaviours on follower outcomes over time. Similarly, Alipour, Mohammed, and Martinez (2017) noted that there is a lack of research on the temporal characteristics of leaders and extended propositions about the congruence between the habitual time orientations of leaders and followers as the basis of team coordination and leadership effectiveness.

Earlier, van der Erve (2004) also advocated the importance of time in team leadership and suggested that "the notion of leadership should become more inclusive when it comes to the temporal or time-related needs of the organisation" (p. 605). Similarly, Morgeson and DeRue (2006) emphasised that the team leader has a significant role in managing the timeliness of team activities, especially during critical and urgent task events such as looming deadlines. Halbesleben et al. (2003) suggested that the leader's understanding of temporal complexities - managing time frames, adjusting tempo, recognising time-related differences, and synchronising the abilities of members, is critical to leading people effectively in deadline-driven projects.

Clearly, there is a need for a dynamic framework at the intersection of time, project teams, and leadership. Leading a temporary project team is somewhat different and more challenging than leading a stable team in a conventional organisational structure (Tyssen, Wald, & Spieth, 2013). There are substantial temporal challenges in the project team context which have profound implications for the enactment of leadership. Existing leadership

theories may not adequately address the time-oriented leadership behaviours which are critical within the project context. A significant step in the right direction was the development of the concept of team temporal leadership by Mohammed and Nadkarni in 2011. The next section provides the conceptual grounding of temporal leadership, followed by an analysis of the limited literature on temporal leadership.

Temporal leadership. The term temporal leadership was introduced in 2001 by Ancona, Goodman, Lawrence, and Tushman. They described temporal leadership in terms of the temporal perspective of top management teams as they entrain their organisations to technology cycles, manage across multiple time frames, create temporal architectures, and maintain a vision that provides an anchor for the strategic pacing of the firm. Their work postulated that temporal leadership is rooted in the top management team's ability to manage the cycles of environmental change requiring strategic responses as well as building ambidexterity across subunits which necessarily operate on different time frames, from very short- to very long-term (Ancona et al., 2001). Chen and Nadkarni (2017) also conceptualised temporal leadership from a strategic perspective, highlighting the facilitating role of the CEO's temporal leadership behaviour in managing the timely strategic initiatives of the organisation. These scholars helped to highlight the importance of a top leader's time-management skills to the success of the organisation.

Mohammed and Nadkarni (2011) built on this foundation, but focused on leader behaviour in a team context, often a time-limited project team, with the aim of managing the team's work to successful completion within a (usually imposed) deadline. Their study incorporated temporality as a central component of leadership behaviour. Mohammed and Nadkarni (2011) conceptualised and operationalised the construct of team temporal leadership. Their conceptualisation of temporal leadership was theoretically grounded in McGrath's (1991) time, interaction, and performance theory and the functional approach to team leadership (Fleishman et al., 1991; Zaccaro et al., 2002).

The conceptual grounding of temporal leadership. The idea of temporal leadership was drawn from the insights of time, interaction, and performance (TIP) theory and the functional leadership perspective. McGrath's (1991) TIP theory suggests that a group of individuals working together on a project to complete a collective task faces three common temporal problems: temporal ambiguity (uncertainty about when a particular event or activity will occur in the task cycle), conflict of temporal interests (inconsistent task priorities and pacing behaviours), and scarcity of temporal resources (increasing time pressure as a result of

deadlines and milestones) (McGrath & Kelly, 1986; McGrath & Rotchford, 1983). As a solution, there are three useful responses: *scheduling of activities*, *synchronisation of activities*, and the *allocation of temporal resources*. To reduce temporal ambiguity, scheduling of activities is useful in setting time-based milestones and deadlines so that individual team members have a coherent plan and understanding of the sequence of events to track their progress. To overcome the conflict of temporal interests, synchronisation of activities is needed to regulate the flow of task activities and provide effective coordination among individuals. Lastly, to manage the scarcity of temporal resources (time pressure), prioritising task goals, forecasting unexpected contingencies, and efficiently assigning temporal resources is vital to achieving task goals.

Building on this work, the time and teams literature focused on identifying reasons for temporal problems in project teams. Waller et al. (2001) suggested that the primary reason for team temporal problems is differences in the perception of task deadlines among team members. They argued that differences in perceived task deadlines arise naturally from team members' stable individual differences in time urgency and pacing style preferences (Waller et al., 2001). Time urgent individuals are careful about the passage of time and are inclined to continue monitoring the status of remaining time for task completion (Conte, Landy, & Mathieu, 1995; Landy, Rastegary, Thayer, & Colvin, 1991). On the other hand, non-time urgent individuals are less focused on time resources and underestimate the time necessary to complete tasks (Burnam, Pennebaker, & Glass, 1975; Yarnold & Grimm, 1982).

Concerning other individual differences affecting perceived deadlines, Gevers and colleagues suggest that individuals tend to adopt one of three pacing styles: early action, steady action, and deadline action (Gevers et al., 2009). An early action individual immediately focuses on the task and completes it well before the deadline, while deadline action individuals begin their work close to the deadline and complete just before time runs out (Gevers et al., 2006). Steady action individuals distribute their efforts evenly over the time available for task completion. Because of temporal individual differences, the perception of deadlines and subsequent preferences for the pacing and scheduling of work may vary considerably across team members (McGrath & Kelly, 1986; McGrath & Rotchford, 1983). Diversity in team member pacing preference often leads to problems among team members over the pacing, priority, and sequence of task activities, resulting in temporal conflicts (Jansen & Kristof-Brown, 2005; Standifer, Raes, Peus, Passos, Santos, & Weisweiler, 2015) and project delays and backlogs (Labianca et al., 2005; Mohammed & Nadkarni, 2014;

Montoya-Weiss, Massey, & Song, 2001). Temporal conflicts involve disagreements and disputes within teams about time, the duration of tasks, and the amount of time the team should spend on specific tasks (Gevers & Peeters, 2009; Santos et al., 2016). These time-related conflicts are detrimental to a team's ability to complete the task on time (Jehn & Mannix, 2001). However, the three useful responses from TIP theory (scheduling of activities, synchronisation of activities, and allocation of temporal resources) should be instrumental within the time-limited project context to help harmonise time-oriented individual differences between team members (Mohammed & Nadkarni, 2011).

Although McGrath's (1991) theory explained three temporal problems and proposed solutions, it did not explicitly mention or identify who is responsible for implementing these three solutions when a group of individuals encounters temporal problems. The functional approach to team leadership (e.g., Fleishman et al., 1991; Morgeson, DeRue, & Karam, 2010) places the responsibility of setting deadlines, scheduling tasks, and reminding teams of task-based deadlines on the formal team leader, as teams often lack the inbuilt capability to self-regulate within a time-pressured environment (Labianca et al., 2005; Mohammed & Harrison, 2013; Rico, Sánchez-Manzanares, Gil, & Gibson, 2008). Drawing from TIP theory and the functional approach to team leadership, Mohammed and Nadkarni presented the construct of temporal leadership in 2011.

Literature review of temporal leadership. Mohammed and Nadkarni (2011) took the lead in defining and operationalising temporal leadership as applied to project teams. They defined temporal leadership as "leader behaviours that aid in structuring, coordinating, and managing the pacing of task accomplishment within the team" (2011, p. 492). They operationalised temporal leadership as a unidimensional construct by adapting items from two existing measures of team temporal self-management processes: temporal planning (Janicik & Bartel, 2003) and temporal reminders (Gevers et al., 2006). Temporal planning refers to discussions of temporal issues and constraints associated with task completion, including consideration of when specific actions will occur, how long they will take, and what schedule and deadlines should be adopted (Janicik & Bartel, 2003). Temporal reminders refer to ongoing monitoring of activities and progress against goals and schedules, and the implementation of adaptive actions or contingency plans when needed to assure on-time task accomplishment (Gevers et al., 2006). Mohammed and Nadkarni (2011) also added items on scheduling, synchronisation, and allocation of temporal resources.

The source measures of temporal planning and temporal reminders were developed in the self-regulated teams literature and referred to actions taken by teams or team members (Gevers et al., 2006; Janicik & Bartel, 2003). Mohammed and Nadkarni reworded the items to reflect the actions of project leaders. Their seven item temporal leadership measure has been used for leader self-descriptions, follower descriptions of their leader, and outside observer reports of leader behaviour.

In the first empirical study based on this conceptualisation of temporal leadership, Mohammed and Nadkarni (2011) examined how team temporal diversity, that is, team member variation in time urgency, pacing style, and time perspective, can be effectively managed to maximise team performance with respect to time and quality goals. The authors hypothesised temporal leadership as a moderating construct in the relationship between team temporal diversity and team performance. The authors administered the temporal leadership measure in the middle of 71 fixed-length team projects and reached two key conclusions. Firstly, temporal leadership exerts a direct, positive, and significant main effect on team performance ($r = 0.59$; $p < 0.01$). Team leaders who established clear timeframes and conveyed them to members through schedules, reminders, and interim milestones and timeframes tied to project goals had teams that were more likely to reach project goals (Mohammed & Nadkarni, 2011). Secondly, temporal leadership mitigated the adverse effects of temporal individual differences in time urgency and pacing style on team performance. When team members experienced high temporal leadership, providing clear task deadlines and schedules, unambiguous synchronisation of task activities, and explicit allocation of temporal resources, they overcame the harmful effects of their habitual differences in the perception of deadlines and related preferences for the pace of project work. In sum, strong temporal leadership "dynamically adjusts individual work cycles and coordinates a team so that the work is finished on time" (Mohammed & Nadkarni, 2011, p. 494).

These initial findings on temporal leadership are encouraging as the teams literature acknowledges the challenge of integrating and coordinating team activities in a time-constrained environment (Rico et al., 2008). Team scholars have called for studies that consider the explicit coordination mechanisms that can minimise temporal conflicts in the face of temporal challenges. To avoid conflict over temporal issues in teams, the leader needs to take an active role in managing the time available to the team and its members.

Building on this emerging idea of reducing time-related conflicts within project teams, two papers have discussed mediating constructs in the relationship between temporal

leadership and team performance. First, Santos et al. (2016) positioned temporal leadership as an explicit coordination mechanism that allows team members to manage their interdependence, avoid conflicts, and increase performance. They reported a significant effect of temporal leadership on team performance, mediated by temporal conflict. Temporal leadership behaviour is explicitly concerned with the use and management of project time to minimise temporal conflicts and accomplish project goals. Temporal leaders develop a compelling time-based structure of team activities and inform teams about the complexities of project timeframes. Such leadership helps team members to follow a synchronised tempo, rhythm, and cycle of activities throughout the project and minimises the detrimental effect of temporal conflicts (Halbesleben et al., 2003).

Mohammed and Alipour's (2014) conceptual paper proposed that temporal leadership works through creating shared temporal cognitions to facilitate team performance. Shared temporal cognitions represent a team's shared perception about temporal aspects of tasks such as "the importance of meeting the deadline, (sub)task completion times, and the appropriate timing and pacing of task activities" (Gevers et al., 2006, p. 54). At the team level, temporal leadership behaviours such as setting deadlines and milestones and allocating temporal resources may enhance shared temporal cognitions. Consequently, teams should be less likely to waste time or experience temporal conflicts and goals are more likely to be accomplished.

Temporal leadership acts as an explicit coordination mechanism which allows teams to utilise their time effectively. Recall that teams often waste time early in the project cycle by mostly remaining in a state of inertia until the deadline looms and time pressure escalates (Gersick, 1988; Labianca et al., 2005). Maruping et al. (2015) conducted a field study to examine how a team's perception of time pressure affects team processes and subsequent performance under weak versus strong team temporal leadership. Using Marks' team process constructs (transition, action, and interpersonal processes) as mediators, they hypothesised that team processes would deteriorate under high time pressure unless teams experienced strong temporal leadership. Analysing a sample of 111 short-term project teams, they found that the mediated relationship between time pressure and team performance via team processes is non-linear. This non-linear and indirect relationship is moderated by team temporal leadership, such that high or moderate time pressure can motivate teams to develop effective intervening team processes and achieve project goals in the presence of strong temporal leadership. The authors administered the team temporal leadership scale once in the middle of the project and also found a main effect of temporal leadership on team

performance. Maruping and colleagues (2015) provided convincing evidence that project leaders are in an ideal position to draw a team's attention to temporal challenges as well as to guide team members to exhibit synchronised effort in the face of temporal constraints. The study showed that leader time-oriented behaviour may prevent slow team progress and poor coordination which were the concerns of team development models (e.g., Gersick, 1988). In the presence of temporal leadership, teams use the time to their advantage and time pressure can serve as a motivator to produce strong team performance.

In a more recent study, Yuan and Lo (2018) studied the impact of temporal leadership on the performance of sales teams. Participating sales teams were performing interdependent sales activities that required teamwork, time management, and collective effort to achieve quarterly sales targets. Team members reported the temporal leadership behaviour of their team leader once during the quarter. Team leaders rated the performance of the team after the quarter on the criterion of achieving sales targets. This study found a significant, positive, and direct relationship between temporal leadership and sales team performance.

In sum, initial empirical evidence investigating temporal leadership supports a direct, positive relationship between temporal leadership and project team performance (Mohammed & Nadkarni, 2011). This relationship is established by reducing team temporal conflicts during a project (Santos et al., 2016), harmonising diversity in habitual time preferences among team members (Mohammed & Nadkarni, 2011), and enabling teams to streamline project steps and use time pressure effectively (Maruping et al., 2015). It is noteworthy that all empirical studies have measured temporal leadership only once during a project. I suggest that a team's needs may change throughout a project cycle. Correspondingly, the behaviours displayed by the team leader should also change over time to meet the team's needs in different project phases. While team processes have a significant role in achieving positive team outcomes (LePine et al., 2008; Marks et al., 2001), I suggest that appropriate temporal leadership behaviours help build effective team processes and subsequently team outcomes. Leadership behaviour not only affects team outcomes directly but also influences outcomes indirectly via mediating team processes. I build on this argument using the functional approach to team leadership (Burke et al., 2017; Fleishman et al., 1991; Zaccaro et al., 2002). Below I will briefly describe this team leadership approach and how it may be used to examine project team dynamics.

Team leadership: A functional perspective. The functional approach to understanding the roles of leaders dates back many years (e.g., Fleishman et al., 1991; McGrath, 1962). This approach to team leadership recognises the critical role of team leadership in achieving team performance. Underlying this approach is the notion that leaders are useful to the degree that they ensure that critical task and team maintenance needs are met for the team (McGrath, 1962). The focus, therefore, remains on what team leaders should practically be doing to enhance positive team outcomes—their functional role—a perspective that scholars believe to be most productive within the team context (Burke et al., 2017; Kozlowski & Bell, 2003). While the team and leadership scholars note that different leadership inputs are required at different stages of a project, the leader's primary job is: "To do or get done, whatever is not being adequately handled for group needs" (McGrath, 1962, p. 5). "If a leader manages, by whatever means, to ensure that all functions critical to both task accomplishment and group maintenance are adequately taken care of; then the leader has done his or her job well" (p. 75).

The prominent work on the functional approach to team leadership came from Fleishman et al. (1991), who classified leader performance functions for group problem solving into four dimensions: (1) *information search and structuring*, which refers to the leader's systematic search, acquisition, and evaluation of information regarding team objectives (e.g., gathering and assimilating information, providing task guidance and directives), (2) *information use in problem-solving*, which refers to the leader's application of acquired information to team problem solving and accomplishing specified objectives (e.g., team planning, coordination, and communication), (3) *managing personnel resources*, which refers to obtaining, managing, motivating, and monitoring human resources (e.g., dividing workload, setting standards, and recognising performance), and (4) *managing material resources,* which refers to obtaining, allocating, and utilising resources such as financial, technological, and temporal resources that are important for the execution of established plans and task solutions (e.g., providing supplies, workplace facilities and equipment).

Morgeson et al. (2010) incorporated temporality into leader functions and presented a broader framework of team leadership and team outcomes. They identified seven essential leadership functions that are critical during transition phase team activities and eight crucial leadership functions that are essential during the action phase of a performance episode. The transition phase leadership functions are planning oriented such as: compose the team, define the mission, establish expectations and goals, structure and plan, train and develop the team,

sensemaking, and provide feedback. The action phase leadership functions are specific to task execution such as monitor team, manage team boundaries, challenge team, perform team tasks, solve problems, provide resources, encourage team self-management, and support social climate.

Wageman, Fisher, and Hackman (2009) proposed a model of team effectiveness that explicitly identified the different leadership interventions that are most effective at three distinct stages in a team lifecycle. At the beginning of the team's life, motivational interventions such as articulating challenging team objectives and goals and attaching tangible rewards to the achievement of those objectives are most useful. Motivational interventions can motivate teams early in the project to increase the level of effort, build shared commitment, and enhance focus on accomplishing task objectives. In the middle of the team's life, consultative interventions such as exploring alternative ways of getting the task/subtask done and providing insights to tackle team problems are helpful for team effectiveness. Consultative interventions avoid mid-point panic and encourage teams to avoid over-reliance on established routines, re-orient themselves as a unit, and revise performance strategies. At the end of a team's life, educational interventions such as facilitating an environment of peer-to-peer teaching and evaluations are helpful for team effectiveness. Such interventions help team members to acknowledge each other's task contributions and develop their capabilities for future tasks.

Recently, Fischer, Dietz, and Antonakis (2017) highlighted the significance of time in leadership process research. They suggest that processes are the mechanisms which explain how and why leadership effects are transmitted to individual and team level outcomes. However, the existing research has overlooked the critical role of temporality in leadership and processes research. The authors stressed the need to develop time-sensitive models of leadership which take into account the effects of leadership actions on team social and goal-oriented processes as they unfold over time.

Building on the functional team leadership approach, there is a need to develop a comprehensive framework which integrates temporally consistent leadership behaviours with team processes over time in an input-process-outcome (IPO) model. Since team needs change over time and project work is often driven by deadlines and interim goals, it is important to examine specific temporal behaviours that may be helpful in facilitating team outcomes directly as well as indirectly via team processes at distinct stages of the project. Below, I integrate team temporal leadership and a two-phase taxonomy of team processes to suggest

specific leader temporal behaviours that serve as inputs over time to develop effective team processes which eventually result in positive team outcomes. The next section presents the IPO framework proposed and tested in this study. The proposed framework synthesises the team temporal leadership and team processes literature to present direct and mediation hypotheses.

Adding Time and Process to Temporal Leadership: An Integrated Framework of Project Teams

Temporal leadership as two types of behaviours. Recall that Mohammed and Nadkarni (2011) conceptualised and operationalised temporal leadership as a unidimensional construct, containing items on both temporal planning and temporal reminders. The measure was administered during the sales quarter by Yuan and Lo (2018), at the mid-point of a short-term project by Mohammed & Nadkarni (2011) and Maruping et al. (2015), and close to the completion of the project by Santos et al. (2016). The conceptualisation and measurement of temporal leadership in these studies did not take account of project life cycles which may require different leader behaviours at different project stages. In the self-regulated team context, Gevers et al. (2009) noted that temporal planning is essential in the initial stages of the project, followed by the exchange of temporal reminders in the later stages if project goals and deadlines are to be achieved.

I propose an IPO framework that adds "time" and "type of leader behaviour" to the conceptualisation of temporal leadership. I suggest that the type of leader temporal behaviour needed by teams changes over the two stages of a project cycle, as identified by Marks et al. (2001). In particular, leader temporal planning is especially useful at the project initiation stage as it involves setting task deadlines and priorities, planning the sequence of activities throughout the project, and helping the team understand the needed pace and milestones. Temporal reminders, on the other hand, should be useful during the project execution stage as this behaviour creates urgency and ensures coordinated actions leading to adherence to the plans and deadlines established earlier. Planning sets the initial benchmark against which leaders provide reminders about interim goals and deadlines later in the project.

The proposed framework also presents the mediating role of team transition and action processes in the relationship between temporal leadership during the project and project team outcomes at the end of the project. I used Marks and colleagues (2001) two-phase model of team processes as the mediating constructs between temporal leadership and team outcomes. Specifically, leader temporal planning is hypothesised to build team

transition processes at the project initiation stage which eventually helps the team to meet deadlines and achieve task performance. Getting off on the right foot with clear temporal planning should also facilitate a pleasant and relatively conflict-free project experience, which should contribute to the social performance outcome of team cohesion at the end of the project. Leader temporal reminders is hypothesised to produce effective team action processes during the project execution stage, helping teams synchronise their efforts, and thereby contributing to the later team outcomes of task performance and cohesion. The next sections further expand these ideas. Figure 2 illustrates the conceptual framework and the hypothesised relationships between temporal leadership, team processes, and team outcomes tested in this thesis.

Leader temporal planning and team transition processes at the project initiation stage. I hypothesise that leader temporal planning at the project initiation stage contributes to team transition processes, as shown in Hypothesis 1 (H1) of Figure 2. Leader temporal planning (Janicik & Bartel, 2003) refers to the initial discussions about relevant temporal issues and constraints associated with task completion. It includes consideration of the time available for task completion, the time required for various specific tasks, when specific actions will occur, how long they will take, the sequence of interdependent tasks, and other time-related contingencies. Broadly, it is about creating a team's temporal strategy for task execution upfront, keeping in view the time restrictions and heading off potential team temporal ambiguities during the project execution stage.

In the initiation stage of a project, if the leader schedules task deadlines and allocates temporal resources for team activities, team members are more likely to develop a clear understanding from the beginning about the temporal milestones required to achieve task objectives (Marks et al., 2001; Mohammed & Nadkarni, 2011; Gevers et al., 2009). It has been reported that project teams often experience a lack of shared understanding about schedules and timelines of various task activities (McGrath, 1991), leading to temporal conflicts. Such conflicts are intragroup disagreements about temporal aspects of tasks such as the time and duration of the task, and length of time the team should spend on performing specific actions (Gevers & Peeters, 2009; Montoya-Weiss et al., 2001). Temporal conflicts are partly a result of individual differences in time preferences and pacing styles, leading to dissimilarity in the perception of task deadlines (McGrath & Kelly, 1986; McGrath & Rotchford, 1983; Waller et al., 2001). Explicit planning up front should tend to harmonise

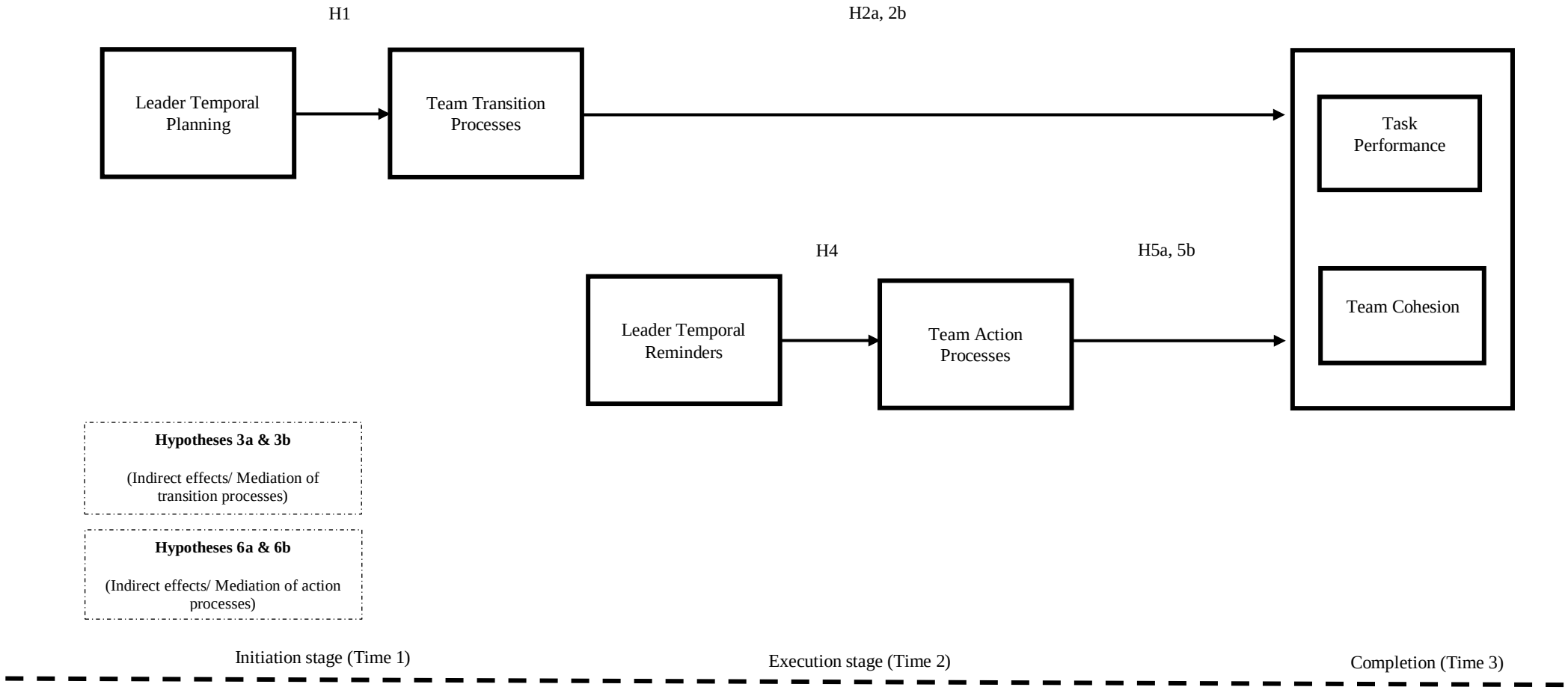


Figure 2. Adding time, type, and process to temporal leadership: An integrated framework of project teams.

these differences and create shared temporal norms (Ancona et al., 2001; Blount & Janicik, 2001; Santos et al., 2016).

Therefore, I argue that temporal planning behaviour by leaders is critical in facilitating team transition processes during the project initiation stage by establishing agreed deadlines and scheduling milestones associated with each task/sub-task. Such planning should help reduce differences in the way team members approach and pace their tasks, especially in a highly interdependent and time-pressured project environment (Maruping et al., 2015; Tyssen et al., 2013). Because of initial temporal planning, the product of team transition processes will be a precise temporal plan that presents the temporal architecture of team activities, builds a shared understanding of task deadlines and milestones, and shapes the team's commitment to their task. Wageman et al. (2009) suggested that the early stage of a team's life is the right time for leader input which specifies a compelling direction and creates an enabling team structure towards team effectiveness,

The literature on self-regulated teams makes the same point that temporal planning is highly effective in the preliminary stage of a team project (e.g., Gevers at al., 2009). For instance, Janicik and Bartel (2003) found that high levels of temporal planning contributed to the attentiveness of the team towards time-related issues such as time awareness norms. The construct of temporal planning used in this study is consistent with the definition and measure advanced by Janicik and Bartel (2003) and includes all seven of their items, adapted to describe the behaviour of a team leader. Two sample items from their scale which also appeared in Mohammed and Nadkarni's unidimensional measure are: *To what extent does your team leader prioritise tasks and allocate time to each task?* and *To what extent does your team leader set milestones to measure progress on the project?* In keeping with the episodic model of team processes, leader temporal planning behaviour and team transition processes are assessed in the initiation stage early in the project lifecycle. The conceptualisation of team transition processes was consistent with the recurring phase model of team processes (Marks et al., 2001). Two sample items measuring team transition phase processes include: *Members of my team discussed specific milestones for achieving objectives* and *Members of my team have considered alternative ways of achieving team objectives*.

H1: Leader temporal planning at the project initiation stage will be positively related to the quality of concurrent team transition processes.

Team transition processes at the project initiation stage and final project team outcomes. I propose that effective transition phase team processes facilitate final team task and social outcomes. Team transition processes are characterised by planning activities related to a team's mission, strategy, and goal specification (LePine et al., 2008; Marks et al., 2001). These early processes set the stage for later team actions and are significant for the effective team functioning throughout the project.

The teams literature provides evidence that team planning-related activities which include a well-defined mission, knowledge of the roles and responsibilities of each team member, and discussion of alternative courses of action for task completion drive high levels of task as well as social performance (Ellis, Bell, Ployhart, Hollenbeck, & Ilgen, 2005; Fisher, 2014; LePine et al., 2008). Ellis et al. (2005) noted that team members' capacity to plan and coordinate their activities is a skill which helps them resolve the challenges and difficulties of the interdependent team environment. Project work is often highly interdependent and time-bound which makes team performance very difficult without vigilant team attention to objectives and multiple strategies to achieve such objectives.

In the teams literature, planning-related activities, embodied in team transition processes, have often been associated with the effectiveness of teams. The literature has characterised team planning into two categories: teamwork planning and taskwork planning. Indicators of teamwork planning are focused on identifying team members' capabilities and specifying team member roles, whereas taskwork planning focuses on a task-specific discussion such as setting goals, performance strategies, and alternate courses of task actions. Fisher (2014) found that both categories of planning allow the team to understand team goals and individual contributions towards achieving these goals, ultimately leading to effective team performance over time. Mathieu and Rapp (2009) also demonstrated that initial team planning activities focused on both teamwork and taskwork, such as developing a team charter and deliberating on performance strategies, are helpful in effective team performance over time. Mathieu and Schulz (2006) suggested that planning processes generate information, develop alternative courses of action, and encourage team member commitment to the project plan. Planning allows team members to set the trajectory of upcoming task activities and understand the norms for pursuing the team task. Consequently, teams engaged in planning are better positioned to accomplish their goals and work as a cohesive unit. In the presence of a project deadline, careful deliberations about task demands and available temporal resources should provide a useful launch pad to teams before the execution stage.

The most relevant indicators of final team performance are task performance in the form of completion of the project on time, on budget, and meeting quality standards, and social performance in the form of residual goodwill toward fellow team members, operationalised here as team cohesion (Cole, Walter, & Bruch, 2008; Evans & Jarvis, 1980; LePine et al., 2008; Mathieu et al., 2008). Therefore, I argue that effective transition processes in the initiation stage of a project should predict both team task performance and team cohesion at the end of the project, as hypothesised in H2a and H2b of Figure 2.

H2a: Team transition processes measured at the project initiation stage will be positively related to final project team task performance.

H2b: Team transition processes measured at the project initiation stage will be positively related to team cohesion at the end of the project.

Leader temporal planning, team transition processes, and final project team outcomes. I propose that team transition processes mediate the relationship between leader temporal planning at project initiation stage and final team outcomes. When leaders identify potential temporal problems and establish team structure, task procedures, and deadlines at the beginning of a project, teams should experience less temporal conflict and develop a shared understanding of task timelines, task purpose, roles and responsibilities, and team goals (Morgeson et al, 2010; Santos et al., 2016). Temporal planning enables the execution of team transition processes allowing teams to deliberate and discuss their performance goals and strategies. Teams experiencing strong temporal planning from the leader may understand each other's task roles, deadlines, schedules, and achieve a shared vision for the steps necessary to succeed. Thus, I put forward mediation hypotheses specifying that leader temporal planning acts through its impact on team transition processes, as follows:

H3a: Team transition processes will mediate the relationship between leader temporal planning at the project initiation stage and final project team task performance.

H3b: Team transition processes will mediate the relationship between leader temporal planning at the project initiation stage and team cohesion at the end of the project.

Following the initiation stage, teams are actively engaged in the execution stage in pursuit of goal accomplishment. The plans developed in the project initiation stage via

temporal planning and transition processes are used as an input to guide the execution of tasks as the project proceeds. I argue that leader temporal reminders become most useful during the project execution stage which requires coordination, monitoring, and keeping track of the team's progress towards collective goals, as presented in Figure 2.

Leader temporal reminders and team action processes during the project execution stage. I suggest that leader temporal reminders during the project execution stage are useful in developing team action phase processes, as shown in H4 in Figure 2. Leader temporal reminders (Gevers et al., 2006) are a regulatory mechanism used to draw team attention to the temporal aspects of task accomplishment. Reminders help to regulate and synchronise the flow of team task activities, draw attention to schedules, and consequently help accomplish the task within the deadline. Besides synchronisation, such behaviour promotes a sense of urgency, which is likely to enhance effort and coordination among team members. Temporal reminders by leaders at this stage keep teams aware of task deadlines and provide an impulse to act upon them. Such temporally-considered and task-specific leader input is essential during project execution as it reminds teams about the available time resources and interim goals that are to be achieved with these remaining resources. Delivering temporal reminders will also help the leader to assess team task progress, re-energise the team to make a collective effort, and align member activities with the goals and schedules developed earlier in the project.

In the initial stage of the project cycle, Gersick (1988) found that teams do not express urgency or show concern about the pace, timeliness, and timely completion of the task and thus remain in a state of relative inertia. They delay actions until the mid-point approaches and a scarcity of temporal resource (i.e., time pressure) is developed. To avoid this delay, leader temporal reminders play an active role through the coordination and synchronisation of task activities so that the deadlines are met and time is used productively throughout the project. Gersick (1989) and Maruping et al. (2015) suggested the potential role of leaders in drawing team attention towards temporal issues when there is a lack of team activity. Thus, I suggest that temporal reminders from leaders enable teams to focus on temporal issues throughout the execution stage rather than promoting urgency only as the final deadline approaches.

Preliminary evidence from the self-regulated teams literature (Gevers et al., 2006, 2009) also shows that the continuous exchange of temporal reminders among team members regarding team tasks is positively correlated with shared perceptions of task deadlines and

effective task completion. The construct of temporal reminders used in this study is consistent with the definition and measure advanced by Gevers et al. (2006). My measure included all four of their items, adapted to the description of team leader behaviours. Two sample items, which also appear in Mohammed and Nadkarni's (2011) measure, are: *To what extent does your team leader coordinate the team to meet client deadlines?* and *To what extent does your team leader remind team members of important temporal milestones?* Consistent with the recurring phase model of team processes (Marks et al., 2001), temporal reminders and team action processes are assessed near the mid-point of the project during the execution stage. Two sample items used to measure team action phase processes include: *We observe to make sure everyone in the team meets their deadlines* and *Members of my team back each other up when a task needs to be completed*.

H4: Leader temporal reminders during the project execution stage will be positively related to the quality of concurrent team action processes.

Team action processes during the project execution stage and final project team outcomes. Team action processes involve team members monitoring each other's performance, performing backing up behaviour, and engaging in coordination, which should lead eventually to goal accomplishment (LePine et al., 2008; Marks et al., 2001). I argue that the efficient use of action processes in the execution stage has the potential to accomplish high standards of team outcomes in the form of both task performance and team cohesion, as hypothesised in H5a and H5b of Figure 2. In the project execution stage, monitoring by team members helps by keeping track of each other's progress on specified goals, whereas coordination provides feedback between team members so that they can assess and manage their effort towards task accomplishment. As a result, team members support each other in performing shared tasks by providing verbal feedback, coaching, or even completing a task on behalf of other members. Their task-related interactions would also mean that there is a better chance of building a shared perception concerning the practices, procedures, and timelines needed for task accomplishment (Kraiger & Wenzel, 1997).

Significant task progress is often unlikely early in the project. Halfway through a project cycle is a likely moment when teams tend to reorganise and reorient their processes in preparation for the second half (Gersick, 1988). However, if teams coordinate actions and monitor progress continuously, they will be able to pace their activities consistent with task schedules and interim milestones. Other team studies also report that active coordination

during the execution stage is critical in predicting multiple team-level outcomes (Cohen & Bailey, 1997; McGrath & Argote, 2001). Team scholars (e.g., Arrow, McGrath, & Berdahl, 2000; Guastello & Guastello, 1998; Zalesny, Salas, & Prince, 1995) recommend team coordination as an essential phenomenon in which team members integrate and align knowledge, action, and objectives to achieve shared goals. Moreover, various coordination mechanisms (e.g., implicit, explicit, impersonal, and administrative) in task-interdependent environments are essential for team task performance (Barrick, Bradley, Kristof-Brown, & Colbert, 2007; Rico et al., 2008; Saavedra, Earley, & Van Dyne, 1993).

Similarly, extant research supports the effect of team monitoring on goal accomplishment (e.g., Dickinson & McIntyre, 1997; Salas & Cannon-Bowers, 2001). Marks and Panzer (2004) argue that team monitoring involves channelling attention to other members' behaviours and evaluating whether member behaviours are instrumental to goal accomplishment. Monitoring may include verbal feedback, coaching, or assisting in a task so that the collective effort reaches the desired level of team performance (Carson, Tesluk, & Marrone, 2007; Dickinson & McIntyre, 1997; Marks & Panzer, 2004).

In addition to task performance, LePine et al.'s (2008) meta-analysis found that team action processes are also a strong predictor of team cohesion. Teams which are actively engaged in coordinating interdependent tasks usually develop a shared understanding on various aspects of the task with a purpose to achieve collective goals (Barrick et al., 2007; Gully, Incalcaterra, Joshi, & Beaubien, 2002). Team members supporting and coordinating each other in various aspects of the task will result in productive team interaction and greater task involvement, making them a strongly interconnected unit. They will also wish to support and work with each other in future projects since their interconnectivity helped them achieve mutual goals without too much temporal conflict or temporal ambiguity. Consistent with these findings, the literature on shared mental models suggests that team members having a shared understanding of task structure are better able to adapt their behaviours to task demands and synchronize their actions to achieve team performance (Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000; Stout, Cannon-Bowers, Salas, & Milanovich, 1999). In sum, there is a reason to expect that effective team action processes during the execution stage will facilitate both task and social performance.

H5a: Team action processes measured during the project execution stage will be positively related to final project team task performance.

H5b: Team action processes measured during the project execution stage will be positively related to team cohesion at the end of the project.

Leader temporal reminders, team action processes, and final project team outcomes. I put forward mediation hypotheses in which team leader input in the form of temporal reminders acts via team action processes to influence final team outcomes. Leader temporal reminders inform teams about approaching deadlines and encourage teams to improve the pace and flow of their work. Team members may make more effort to coordinate and monitor each other's task work and help each other out to accomplish interim milestones and deadlines. Consequently, the collective effort of the team and improved coordination and pace of work should enable teams to complete their project successfully and as a cohesive unit.

H6a: Team action processes will mediate the relationship between leader temporal reminders during the project execution stage and final project team task performance.

H6b: Team action processes will mediate the relationship between leader temporal reminders during the project execution stage and team cohesion at the end of the project.

While I emphasised that the initial work on temporal leadership has brought a fresh perspective on time to the team leadership literature, I also consider that it is critical to establish that temporal leadership represents a distinctive aspect of leader behaviour. Therefore, I explore whether temporal leadership, conceptualised here as temporal planning and temporal reminders, constitutes uniquely useful leadership constructs. The next section of this chapter presents hypotheses regarding the incremental contribution of temporal leadership constructs beyond a traditional construct of task-oriented leadership in the form of leader initiating structure.

The Relative Contributions of Temporal Leadership and Initiating Structure to Project Team Outcomes

DeRue, Nahrgang, Wellman, and Humphrey (2011) note that the leadership literature suffers from "construct proliferation." New leadership constructs are often proposed in the literature without careful evaluation of their discriminant validity relative to established ones. Such new constructs are not sufficiently scrutinised to establish their conceptual and empirical non-redundancy (Le, Schmidt, Harter, & Lauver, 2010). Conceptual non-

redundancy requires a sound theoretical rationale to consider two constructs as plausibly different conceptualisations (Singh, 1991). Empirical non-redundancy is based on the constructs not being too highly correlated and not having the same pattern of relationships with other variables. Surprisingly, as we explore the leadership literature, it becomes apparent that modern leadership constructs are often highly correlated with classical constructs, and consequently fail to be "robust predictors" when considered in conjunction with these previously established constructs (DeRue et al., 2011; Hoch, Bommer, Dulebohn, & Wu, 2018; Piccolo, Bono, Heinitz, Rowold, Duehr, & Judge, 2012). This has led to calls from leadership scholars to "raise the bar" for new leadership constructs to avoid construct proliferation (e.g., Banks, Gooty, Ross, Williams, & Harrington, 2018; DeRue et al., 2011; Hoch et al., 2018). Specifically, these scholars have called for integrative studies that compare and contrast multiple leadership approaches/constructs within a single model. The idea is to assess the incremental validity and relative importance of new constructs beyond established constructs on a standard set of criterion variables.

Therefore, the final purpose of this thesis is to establish the theoretical and empirical non-redundancy of temporal leadership. I chose to compare temporal leadership to initiating structure firstly because Mohammed and Nadkarni (2011) reported that their unidimensional measure of temporal leadership correlates moderately with initiating structure ($r = 0.47$). This makes a strong case to explore whether or not temporal leadership is a new and different leadership construct than classical leader initiating structure. Secondly, recent empirical and meta-analytic research provides evidence of the predictive validity of initiating structure for a range of leadership outcomes including group performance (Burke, Stagl, Klein, Goodwin, Salas, and Halpin, 2006).

Mohammed and Alipour (2014) argue that temporal leadership is "distinct from initiation of structure and consideration because it represents a narrower set of behaviors that highlight temporality" (p. 179). Using a student sample and a single source concurrent survey design, Myer and Mohammed (2012) found that temporal leadership accounted for significant incremental variance in willingness to follow the leader and perceived leader effectiveness beyond initiating structure. However, the primary literature does position temporal leadership as a task-focused form of leader behaviour, and therefore, it is useful to assess whether temporal leadership represents a new, useful, and distinctive aspect of leader behaviour, or is merely a repackaging and relabelling of the existing task-oriented leadership construct of initiating structure.

Although the origin of initiating structure dates to the 1950s, this construct still appears in the leadership literature. Judge, Piccolo, and Ilies (2004) noted that initiating structure was "forgotten, but not gone," and encouraged scholars to recall and revisit the usefulness of this construct, as I am doing in this thesis. Undoubtedly task-oriented leadership is likely to be useful in predicting success in project-based work situations. In the next section, I will present empirical evidence that suggests that initiating structure positively and significantly predicts team performance (e.g., Keller, 2006). This offers an opportunity to compare the relative contribution of initiating structure to temporal leadership in the prediction of project team processes and outcomes.

Figure 3 presents a compilation of the number of mentions of initiating structure in the abstracts of indexed journals in management and psychology in each decade from the mid-1960s to the present. After a steady fall between 1977 and 2006, initiating structure is once again attracting research attention with a sizable number of published studies in peer-reviewed journals. This recent trend supports my decision to choose initiating structure as the most relevant form of task-oriented leadership for comparison with temporal leadership.

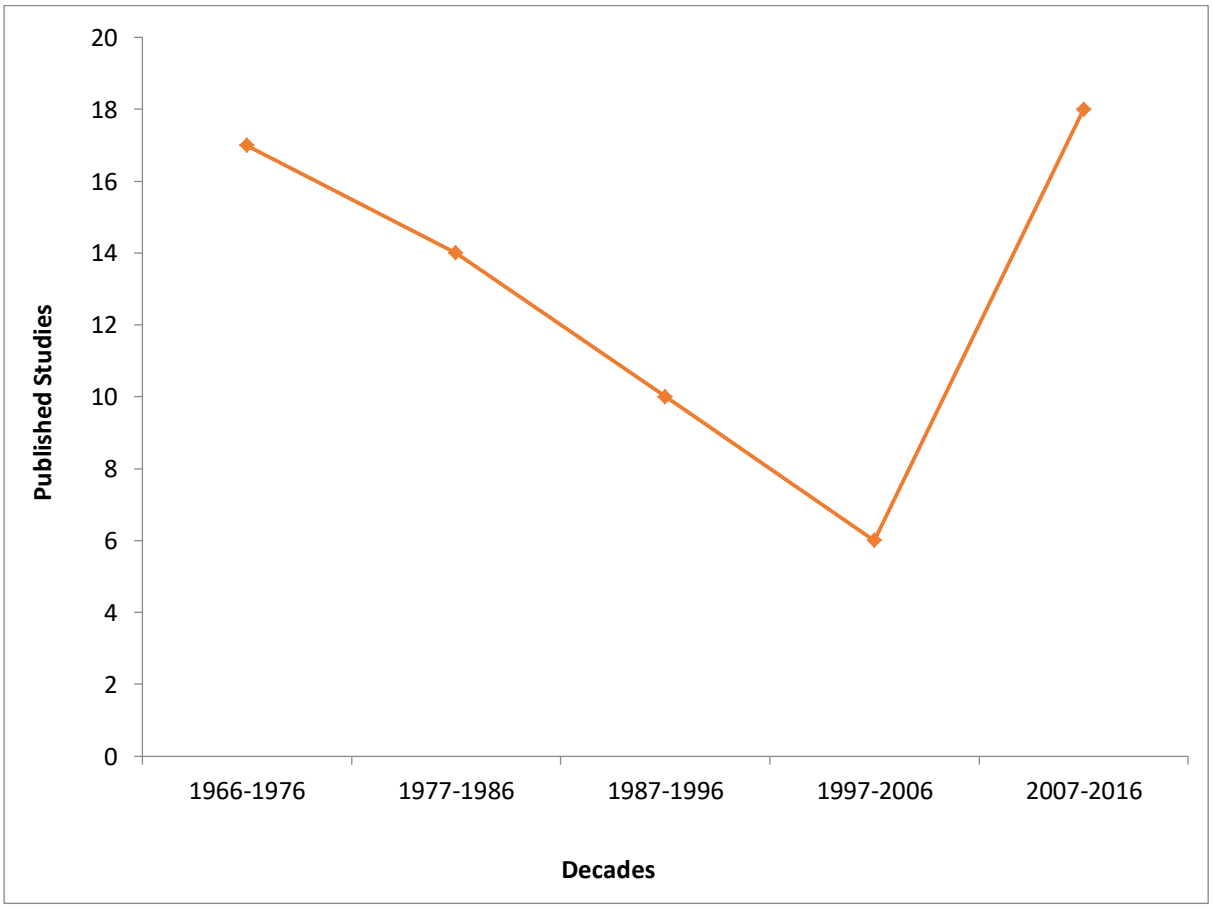


Figure 3. Number of published studies using initiating structure.

Initiating structure and team performance. The Ohio State Leadership Studies have had a lasting impact on leadership theory and research as they were primarily responsible for the two-dimensional perspective of leader behaviour: initiating structure and consideration. Fleishman and Harris (1962) defined initiating structure as

> behavior in which the supervisor organizes and defines group activities and his relation to the group. Thus, he defines the role he expects each member to assume, assigns tasks, plans ahead, establishes ways of getting things done, and pushes for production. This dimension seems to emphasise overt attempts to achieve organization goals. (pp. 43-44)

Initiating structure is a task-focused leadership style which reflects the extent to which a leader defines performance standards, sets task goals, reduces obstacles associated with achieving these goals (Fleishman, 1973; Fleishman & Harris, 1962; House, Filley, & Kerr, 1971), and directs and structures team member tasks (Bass & Stogdill, 1990; Pearce, Sims, Cox, Ball, Schnell, Smith, & Trevino, 2003). Consideration and initiating structure were heavily researched in the 1960s and 70s but subsequently fell out of favour. Judge et al. (2004) called the Ohio State leader behaviour dimensions "the forgotten ones" of historical leadership research (p. 36). They conducted a comprehensive meta-analytic review which supported the significant predictive validity of initiating structure for a range of leadership outcomes including perceived group/organisational effectiveness ($\rho = 0.30$) and rated leader effectiveness ($\rho = 0.39$). Comparable results were reported in a meta-analysis of team leadership and team performance by Burke et al. (2006), who found that task-focused leader behaviour predicted team performance and effectiveness, especially when task interdependence was high ($\rho = 0.33$).

In a recent meta-analysis, Ceri-Booms, Curşeu, and Oerlemans (2017) endorsed Burke et al.'s results by finding a moderate and positive relationship between initiating structure and perceived team performance ($\rho = 0.33$). A longitudinal study of the performance of R&D teams by Keller (2006) also found that initiating structure significantly predicted the technical quality of team outputs as well as their performance against time and cost goals. Further, it did so above and beyond the effects of transformational leadership and several hypothesised substitutes for leadership. In a study across seven samples in Germany, Rowold, Borgmann, and Bormann (2014) assessed the relative importance of initiating structure, consideration, transactional leadership, transformational leadership, laissez-faire leadership, and leader-member exchange in predicting follower self-rated performance.

Initiating structure was by far the most dominant predictor in both public and private-sector samples. In sum, the existing literature confirms that initiating structure is a vital leadership construct that exerts positive main effects on a range of leadership criteria including team performance. Below, I propose that while initiating structure may predict project outcomes (directly and through team processes), temporal leadership will account for considerable additional variance in both processes and outcomes, thus establishing the non-redundancy of temporal leadership.

Temporal planning, initiating structure, and final project team outcomes. The above literature suggests that leader initiating structure will contribute directly to team outcomes. Further, because initiating structure may include components of both planning and monitoring, it may be useful at both stages of the project lifecycle. However, initiating structure lacks the specific focus on the use of time provided by temporal leadership constructs.

Temporal planning at the start of a project should result in shared temporal cognitions which reduce later temporal conflict and ambiguity (Santos et al., 2016) and increase the chance that the team stays committed towards the shared task and completes the project on time. Temporal planning also provides an agreed standard against which progress can be judged and a basis for temporal reminders by the leader during the project execution stage. Initiating structure is a proactive, demanding, and possibly heavy-handed task-focused role for the leader in assigning tasks and holding subordinates to performance standards (Korman, 1966; Pearce et al., 2003), whereas temporal planning is focused on developing a comprehensive plan to effectively counter the challenges posed by the time-limited nature of a project. Therefore, I suggest that temporal planning will predict incremental variance in team task performance and team cohesion above initiating structure.

H7a: Leader temporal planning measured at the project initiation stage will explain variance in final project team task performance, above and beyond initiating structure measured at the same time.

H7b: Leader temporal planning measured at the project initiation stage will explain variance in team cohesion at the end of the project, above and beyond initiating structure measured at the same time.

Temporal reminders, initiating structure, and final project team outcomes. Temporal reminders trigger self-regulatory activities by increasing the salience of task deadlines (Gevers et al., 2006; Gevers & Demerouti, 2013) and by synchronising team member actions towards project completion. As such, temporal reminders should promote a sense of urgency among members and enhance collective effort towards task accomplishment, especially in the time-pressured setting of project team work (Maruping et al., 2015; Mohammed, Hamilton, Tesler, Mancuso, & McNeese, 2015). In contrast, initiating structure is aimed at monitoring the team's progress and pushing for productivity without necessarily being vigilant about temporal problems created by time pressure or managing the temporal sequencing of sub-tasks (Keller, 2006; Yukl, 2012; Burke et al., 2006). Arguably, initiating structure is also not an especially useful way to interact with highly educated team members working on complex technical projects, and provides limited assistance with the temporal demands of project work. Therefore, I suggest that temporal reminders will contribute beyond initiating structure (both measured during the project execution stage) to the prediction of team outcomes.

H8a: Leader temporal reminders measured during the project execution stage will explain variance in final project team task performance, above and beyond initiating structure.

H8b: Leader temporal reminders measured during the project execution stage will explain variance in team cohesion at the end of the project, above and beyond initiating structure.

Temporal leadership, initiating structure, and team processes. I further suggest that the role of temporal leadership behaviours in building the quality of team processes will remain positive and significant even in the presence of leader initiating structure measured at the same time points. In the initiation stage, task-focused initiating structure is likely to be important in building the quality of team transition processes. Such leadership behaviour is exemplified by developing structure, assigning roles and responsibilities, establishing clear channels of communication, and pushing for production to achieve task objectives (Bass & Stogdill, 1990; Fleishman & Harris, 1962). It also includes planning activities that direct teams through communication of roles and structures towards attaining collective goals (Neubert, Kacmar, Carlson, Chonko, & Roberts, 2008; Rowold & Borgmann, 2014; Yukl, 2012). In turn, teams acquire clarification and understanding of the task and what is expected

of them from the beginning of a project. Korman (1966) suggested that initiating structure behaviour by a leader helps direct group activities through effective planning and communicating.

Similarly, I suggest that the display of leader initiating structure enables team action processes during the project execution stage. At this stage, such task-focused behaviour would monitor the team's progress, encourage reporting of task obstacles, and push for team productivity (Pearce et al., 2003). Leaders high on initiating structure also maintain active channels of communication so that task interruptions are reduced to achieve collective goals (Neubert et al., 2008; Weissenberg & Kavanagh, 1972). As a result, teams establish coordination, track progress, and remain focused on task execution, which is essential to achieve performance during the execution stage.

However, temporal leadership is more specifically aimed at creating a temporal architecture of team activities throughout a project and ensuring that teams make steady progress on their task from the early stage of the project. Temporal planning first allows the team to understand their time specific objectives and strategies at the start of the project, and then temporal reminders monitor task progress and encourage team members to execute plans, coordinate, and back each other up later in the project. Within the time-limited project context, temporal leadership may be more fruitful in building team processes than leader initiating structure. As discussed in the previous literature, the shortage of time and the interdependent nature of tasks often trigger conflicts and slow down the pace of work. Because temporal leadership conveys a leader's sensitivity and guidance regarding time and temporality, it should facilitate transition and action processes and reduce the likelihood of disruptions and conflicts which may arise due to limited time and poor coordination. Hence, I propose that

H9a: Leader temporal planning will remain positively and significantly related to the quality of team transition processes when considered simultaneously with initiating structure measured at the project initiation stage.

H9b: Leader temporal reminders will remain positively and significantly related to the quality of team action processes when considered simultaneously with initiating structure measured during the project execution stage.

In sum, the proposed theoretical model presents leadership behaviour in the form of temporal planning and temporal reminders as antecedents of team processes which contribute to team task and social performance. Further, I anticipate that temporal leadership variables will add to the prediction of immediate team processes and later project team outcomes above and beyond the effects of initiating structure measured at the same points in the project cycle. Table 1 presents a summary of the research hypotheses.

The next chapter presents the research methodology used in this study. In Chapter 3 I describe the project-based organisational context in which the data were collected, the research participants, the measures, and the timing of data collection. Finally, I describe the analytical strategies used to test the hypotheses.

Table 1

Summary of Hypotheses

Leader temporal planning and team transition processes hypotheses (direct and indirect effects)	
H1	Leader temporal planning at the project initiation stage will be positively related to the quality of concurrent team transition processes.
H2a	Team transition processes measured at the project initiation stage will be positively related to final project team task performance.
H2b	Team transition processes measured at the project initiation stage will be positively related to team cohesion at the end of the project.
H3a	Team transition processes will mediate the relationship between leader temporal planning at the project initiation stage and final project team task performance.
H3b	Team transition processes will mediate the relationship between leader temporal planning at the project initiation stage and team cohesion at the end of the project.
Leader temporal reminders and team action processes hypotheses (direct and indirect effects)	
H4	Leader temporal reminders during the project execution stage will be positively related to the quality of concurrent team action processes.
H5a	Team action processes measured during the project execution stage will be positively related to final project team task performance.

H5b	Team action processes measured during the project execution stage will be positively related to team cohesion at the end of the project.
H6a	Team action processes will mediate the relationship between leader temporal reminders during the project execution stage and final project team task performance.
H6b	Team action processes will mediate the relationship between leader temporal reminders during the project execution stage and team cohesion at the end of the project.
	Temporal leadership vs. initiating structure (relative contribution)
H7a	Leader temporal planning measured at the project initiation stage will explain variance in final project team task performance, above and beyond initiating structure measured at the same time.
H7b	Leader temporal planning measured at the project initiation stage will explain variance in team cohesion at the end of the project, above and beyond initiating structure measured at the same time.
H8a	Leader temporal reminders measured during the project execution stage will explain variance in final project team task performance, above and beyond initiating structure.
H8b	Leader temporal reminders measured during the project execution stage will explain variance in team cohesion at the end of the project, above and beyond initiating structure.
H9a	Leader temporal planning will remain positively and significantly related to the quality of team transition processes when considered simultaneously with initiating structure measured at the project initiation stage.
H9b	Leader temporal reminders will remain positively and significantly related to the quality of team action processes when considered simultaneously with initiating structure measured during the project execution stage.

CHAPTER 3
Methodology

My proposed IPO framework presents hypotheses that are correlational, with an explicit time frame for when each variable and process is essential. This framework captures leadership behaviour over time to enable investigation of mediating team processes and ultimately final team outcomes. Therefore, this study was primarily designed around a series of surveys administered to team members and team leaders timed to coincide with three stages of the project cycle. The following section presents a description of the organisational context where the study took place, followed by a description of the study design, data collection procedures, construct measures, and analytical strategy.

Organisational Context

Data were collected in four project-based information technology (IT) companies in Pakistan. These companies provide network and software solutions to clients all over the world. In these IT companies, the clients first provide their detailed software requirements and then develop a contractual arrangement with the company outlining the functionality of the software solution as well as a specific delivery date. In such a contractual arrangement, there are penalties if the IT company fails to deliver the software by the specified date or if the software fails to satisfy the specified functional requirements.

This type of organisational context provided an excellent setting to explore the issues of leadership in a project team context over time. First, these were project-based organisations where the project leader was responsible for the performance of the team as they worked on a time-limited IT project. The core task of the leader and his/her associated team is to develop software program gaming applications for mobile phones and other handheld electronic devices. A new team is composed for each project which is expected to deliver software projects on the specified date and according to the functionality outlined in the contractual agreement with the client. The benefits, salary increments, and bonuses of team members are strongly dependent on the satisfactory achievement of each agreement. Second, team members consider themselves as a distinct collective and perform tasks that are highly interdependent. The successful execution of tasks requires team members with cross-disciplinary skills such as programming, animations, graphics, and quality testing. The composition and size of the team depend on the nature and functionality of the software to be developed. Team members are jointly responsible for the outcome of the project. Third, the

software solution has to be delivered at a specific deadline with the functionality outlined in the agreement, so teams need to establish clear standards of task performance and timely completion to succeed. In sum, this context reflects a challenging team environment where leaders and their teams must cope with project deadlines and client demands.

Within these organisations, projects are typically performed by a group of two to six team members plus one designated team leader. The time duration of projects ranged from two to twelve weeks from launch until delivery. After each project, teams typically disband, and team members move on to different projects. Teams are uniquely composed for each new project.

Design

I employed a multi-wave research design by administering surveys at three different points during real-world organisational projects. Since the proposed IPO framework hypothesised that different leadership behaviours act as an input to different team processes at different stages of the project, a time-based distribution of surveys allowed the measurement of variables when they were anticipated to take place during the project cycle. Leadership behaviours and team process variables were measured at two points before project completion, and outcome variables of task performance and cohesion were captured after project completion. This time-specific design of measuring team leadership, team processes, and team outcomes was consistent with the hypothesised causal order of the relationships (e.g., LePine et al., 2008; Maruping et al., 2015; Mathieu et al., 2008).

It is noteworthy that data collection through surveys was preceded by interviews with key stakeholders in the participating organisations. The objective of these interviews was to confirm the appropriateness of the measures, the timing of the surveys, and the procedures for survey distribution. A few team members and leaders read the survey questions during this consultation phase to verify that the items were clear and relevant to the short-term project context. The interviews also provided critical insights into the typical range of project durations, team sizes, team composition, and organisational measures used to define and assess the success of a project.

In each participating organisation, teams to be involved in the surveys were approached by their respective human resource (HR) managers first, and then by the researcher. The HR managers provided the list of teams and email addresses of team members and team leaders for survey distribution. Using Qualtrics, a web link to the questionnaire was emailed directly to respondents at their work email addresses. Questionnaires included a cover letter on

university letterhead briefly outlining the objective of the research, the contact details of the researcher, assurances of confidentiality, and a contact in the university's Human Research Ethics Committee. Participants were encouraged to contact the researcher directly if they had any questions about the study or the questionnaire.

Several steps were taken to increase the response rate by making physical visits to participating organisations every few weeks to encourage teams to respond in a timely fashion. Also, small gifts were offered as an incentive and reward for participation. Before distributing the first survey, a Bond University coffee mug was presented to all team members who would be eligible to participate to remind them about the ongoing project and create a shared team "buzz" about participation. Those who responded to the second survey were given a coffee voucher at Gloria Jeans worth approximately AUD$4.00 per individual. Participants in the third survey received a certificate of appreciation/participation from the Executive Dean of Bond Business School.

Procedure

The data collection was accomplished using online surveys of team members and their leaders at three different points during the project cycle. Projects team members responded to a questionnaire three times during the project: at project initiation (Time 1, during the first week of a new project), during project execution (Time 2, the approximately halfway between project initiation and the final project completion deadline), and after project completion (Time 3). Team leaders were surveyed once, just after project completion (Time 3), to obtain reports of their team's task performance. A team ID was given to each potential team member belonging to the same team for the identification of team membership.

At the team level, 90 teams consisting of 332 individual team members were approached to participate at the start of new projects. Out of 90 teams, 62 teams completed the data collection process. These 62 teams had a total of 244 team members who provided 225 useable surveys. Different questionnaires were administered at three stages of each project.

At Time 1 (project initiation), the first survey was administered which assessed team member perception of their leader's temporal planning behaviour and initiating structure concerning the new project, and also assessed team transition processes in the new project team. Team members also responded to questions about basic demographic information (education and experience) and their familiarity with each other. This survey was delivered on the official email addresses of team members via a Qualtrics web link. The Time 1 survey

link became inactive before the delivery of the Time 2 survey. Out of a total of 332 eligible participants, 239 team members responded to the Time 1 survey, for a response rate of 71.9%. Table 2 explains the time, measurement of variables, and respondents of surveys corresponding to the stage of the project cycle.

Table 2

Three Data Collection Points Corresponding to the Project Task Cycle

Variables measured	Respondents	Data collection points	Stage of task cycle
Temporal planning Initiating structure Team transition processes Team familiarity Education Industry Experience	Teams	Time 1	Initiation
Temporal reminders Initiating structure Team action processes	Teams	Time 2	Execution
Team cohesion	Teams	Time 3	Project completion
Team task performance	Leaders	Time 3	Project completion

At Time 2 (project execution), the second survey was administered approximately halfway between the project launch and the contractual deadline for project completion. In this survey, the team members responded to questions measuring leader temporal reminders, leader initiating structure, and team action processes in the current project. The Time 2 survey was emailed to 332 eligible participants, and 225 surveys were returned for a response rate of 67.7%. Since the statistical analysis was to be performed at the team level, it was not necessary that the same people responded each time, merely that enough members of each team responded to provide a reliable team aggregate measure.

At Time 3 (after project completion), a third survey was emailed to team members which measured their perceptions of team cohesion in the recently completed project. Also, at Time 3, team leaders were asked to rate performance on the project their team had just completed on the dimensions of *on-time, within budget project completion, and the extent to which the project output met client specifications in terms of functionality.* The leader survey was emailed to 90 project leaders. Sixty-four leaders responded to this survey for a response rate of 71.1%.

Sample Size

I retained for analysis only those projects in which all or at least two team members responded to the first two surveys[1] (T1 and T2) and the leader responded to the third survey (T3). Each team had one designated team leader with 225 team members nested under 62 leaders and specific projects. Sixty-two team projects fit the criteria. Therefore, the sample size for this study was 62 with the focus only on the team level of analysis. The average number of team members in this sample was 3.62 with a minimum of two and a maximum of six team members per team (excluding the team leader).

There were 53 cases of missing team member surveys from a total of 225 participants (T1, T2, and T3), in which a team member missed one or two of the three surveys[2]. The missing survey values were replaced using Full Information Maximum Likelihood (FIML). FIML estimation of missing values is a maximum likelihood imputation method that produces the least biased estimate of the missing value (Enders, 2001; Enders & Bandalos, 2001). This technique estimates population parameters by using all the information available within the model, thereby producing the least biased estimate of the missing value. Based on statistical findings, various researchers (e.g., Arbuckle, 1996; Byrne, 2001; Enders & Bandalos, 2001) have recommended the use of FIML rather than other ad hoc techniques such as mean value replacement or similar response pattern imputation.

Measures

All surveys were administered in English as it was the participating organisations' official language and respondents held university degrees with English as the language of instruction. Team members' individual responses were aggregated to form team scores on each variable in all three surveys. The measurement scales were selected to best represent the

[1] Final sample had: 219 useable surveys out of total 225 T1 surveys (62 teams); 212 useable surveys out of total 225 T2 surveys (62 teams); and 191 useable surveys out of total 225 T3 surveys (62 teams).

[2] 6 missing T1 surveys; 13 missing T2 surveys; 34 missing T3 surveys.

theoretical constructs of interest and their prevalence in the literature, as described below. Appendix A presents the complete set of scale items for all measures.

Independent variables: Leadership behaviours. Muhammad and Nadkarni (2011) developed their temporal leadership scale by adapting most of the items from two self-regulated team measures: team temporal planning (Janicik & Bartel, 2003) and team temporal reminders (Gevers et al., 2006). I used all seven items from Muhammad and Nadkarni's (2011) temporal leadership scale and also added the unused items in the original source scales to develop separate and more complete measures of temporal planning and temporal reminders.

Temporal planning. Team members rated their team leader's temporal planning behaviours on a 5-point scale ranging from 1 (*Not at all)* to 5 (*A great extent)*. The temporal planning scale consisted of seven items, three items from Muhammad and Nadkarni's temporal leadership scale and the four remaining items from Janicik and Bartel's (2003) original team temporal planning scale, modified to be leader specific. This scale highlights explicitly the temporal issues associated with project planning and reflects the extent to which the leader establishes task deadlines, priorities, and milestones. All respondents were given explicit instructions on the questionnaire to report their leader's behaviour on the current project. Sample items include: *"In this project, to what extent does your team leader prioritize tasks and allocate time to each task?"* and *"To what extent does your team leader set milestones to measure progress on the project?"*

Temporal reminders. Team members responded to seven items reflecting team leader temporal reminders on a 5-point scale ranging from 1 (*Not at all)* to 5 (*A great extent)*. This scale had seven items, four items from Muhammad and Nadkarni's temporal leadership scale with the three remaining items from Gevers et al.'s (2006) original team temporal reminders scale. All items were modified to describe leader behaviours. The purpose of the extended temporal reminders measure was to comprehensively assess the degree to which team leaders coordinated tasks, paced activities, and urged team members to complete tasks/sub-tasks on time during project execution. There were explicit instructions for respondents to describe their leader's current behaviour during the middle of the project. Sample items include: *"In this project, to what extent does your team leader coordinate the team to meet client deadlines?"* and *"To what extent does your team leader remind team members of important temporal milestones?"*

Leader initiating structure. Leader initiating structure was measured using the Leader Behavior Description Questionnaire (LBDQ). All fifteen items from the original LBDQ (Halpin, 1957) were used to measure leader initiating structure. These items asked team members to indicate the frequency of fifteen initiating structure behaviours displayed by their leader concerning the on-going project. Respondents answered this scale twice, at project initiation and again in the middle of the project execution stage. Sample items include: *"My leader asks that group members follow standard rules and regulations."* and *"My leader assigns group members to particular tasks."* The items were anchored on a 5-point scale ranging from 1 (*Never*) to 5 (*Always*).

Mediators: Team processes. To measure team processes, I followed Marks and colleagues' (2001) taxonomy of team processes. The sub-categories in team transition processes are mission analysis, goal specification, and strategy formulation and planning. The sub-categories in action processes are team coordination, monitoring progress, and backing up behaviour. Unfortunately, even with 2,903 Google scholar citations, the existing literature does not provide any measures that systematically assess these sub-dimensions within a single scale[3]. Therefore, I used the items from several previously published studies chosen to parallel the taxonomy of team processes carefully.

Team transition processes. Seven items were used to measure team transition processes. This scale was developed by Maruping et al. (2015) and derived from Marks and colleagues' taxonomy of transition processes. The items capture team activities to analyse team mission, specify team objectives, and set strategies to achieve these objectives. A 5-point response format was used ranging from 1 (*Strongly Disagree)* to 5 (*Strongly Agree)*. A sample item includes: *"In this project, members of my team discussed specific milestones for achieving objectives."*

***Team action processes*.** The action processes proposed in the team process taxonomy includes three sub-dimensions of team coordination, monitoring progress, and backing up behaviour. To measure team action processes, I used three different scales with a combined twelve items to capture these three sub-dimensions of action processes.

Team coordination. Team coordination was operationalised with five items using team coordination scales from Fisher (2014) and Lewis (2003). The items assessed the degree to

[3] Before data collection, a request was made to the authors of the recurring phase model of team processes (Marks et al., 2001) to share their measurement scale of team processes along with the psychometric data, if any were available. The request was declined citing the reason that a manuscript validating their team processes measure was under review. To the best of my knowledge, no such study has appeared in print since that time.

which team members coordinate activities and share information to complete their task smoothly and efficiently. A sample item is: *"In this project: my team effectively coordinated the activities of all members when working to complete the task*." A 5-point response format was used ranging from 1 (*Strongly Disagree)* to 5 (*Strongly Agree)*.

Monitoring progress. This construct was measured by using four items from Langfred's (2004) monitoring scale. The scale reflects the degree to which team members are involved in monitoring each other's progress towards meeting deadlines. A sample item is: *"In this project: we observed to make sure everyone in the team meets their deadlines."* A 5-point response format was used ranging from 1 (*Strongly Disagree)* to 5 (*Strongly Agree*).

Backing up behaviour. This construct was assessed by three items based on the description of the team backing up behaviour by Porter, Hollenbeck, Ilgen, Ellis, West, & Moon (2003). The scale is widely used in the literature and reflects the degree to which team members assist each other in completing tasks (e.g., Maruping et al., 2015; Porter, 2005). A sample item is: *"In this project: members of my team back each other up when a task needs to be completed."* A 5-point response format was used ranging from 1 (*Strongly Disagree)* to 5 (*Strongly Agree)*.

Dependent variable: Team task performance. To determine the most appropriate conceptualisation of team performance in a project-based environment, I discussed team performance parameters used by the human resource department in each IT company. I also conducted a brief review of the literature related to key performance indicators in project management. Taken together, the performance measurement of project teams involves three criteria: quality of the developed product, cost of the developed product, and completion of the project within the specified time (for a detailed review, see Keller, 2006; Liu & Wang, 2016; Olson, Walker Jr, Robert & Bonner, 2001; Patanakul, Kwak, Zwikael, & Liu, 2016; Yun, Choi, de Oliveira, & Mulva, 2016). Consistent with the theoretical model, I selected Wallace, Keil and Rai's (2004) project performance scale which reflects timely completion of the project on schedule and budget as well as the functional quality of the developed project. This scale provides a thorough measure of project team performance regarding time, cost, and product quality, and has been widely used in the project management and leadership literature (e.g., Liu & Wang, 2016; Maruping et al., 2015). Six items were used to measure team task performance with sample items as follows: "*This project met intended functional requirements*" and "*This project was completed on schedule*." Leader responses were anchored on a 5-point scale ranging from 1 (*Strongly Disagree)* to 5 (*Strongly Agree)*.

Team cohesion. An eight-item scale by Chin et al. (1986) was used to measure team cohesion as perceived by team members at the conclusion of the project. A 5-point Likert scale was used with anchors ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). A sample item is: *"I felt that I belonged to this group."*

Control variables. I also controlled for team attributes which are likely to predict team outcomes. Specifically, team human capital and initial social capital may vary between teams. The extant literature on project teams suggests that such team attributes are correlated with team processes and team performance (Chi, Chung & Tsai, 2011; Chong et al., 2011; Haleblian & Finkelstein, 1993). Human capital was operationalised as the number of team members and their demographic composition (i.e. education and experience). Initial social capital was assessed as the extent to which team members had worked together in previous projects.

In terms of human capital, Smith and colleague's (1994) demography model suggests that teams with a larger number of members may face greater issues of communication and coordination which may impede project performance. Similarly, team demographic composition, which reflects team member's demographic backgrounds such as education and length of industry experience, may be related to team processes and performance. In terms of social capital, teams that have more experience working together tend to establish robust social connectivity to achieve positive outcomes. Such teams often know each other's pre-existing routines and have shared understanding about how to coordinate their actions towards task completion (Espinosa, Slaughter, Kraut, & Herbsleb, 2007). Hence, I controlled for *team size*, *team demographic composition*, and *team familiarity* during hypothesis testing.

Team size. Team size was measured by a single item: "*the number of team members in the team,"* as reported by the team leader.

Team demographic composition. Team demographic variables included education and length of industry experience. Education was measured by asking team members about their highest degree held. Industry experience was assessed by asking team members how many years of work experience they had in the IT industry.

Team familiarity. Team familiarity was measured by asking team members to indicate: *"to what extent have they worked together in previous projects."* Responses were recorded on a five-point scale with anchors ranging from 1 (*never*) to 5 (*to a great extent*).

The final sample had an average of 3.6 participants per team with a minimum of 2 and maximum of 6 team members. Among team members, 161 were males (71.6%), and 64 were

females (28.4%). One hundred and fifty-six respondents (69.3%) held a Bachelor's degree, 63 respondents (28%) had a Master's degree, and six respondents (2.7%) had a high school education. Ninety-five respondents (42.2%) had more than four years of work experience in the IT industry, 47 respondents (20.9%) had between three and four years of experience, 35 respondents (15.6%) had between two and three years of experience, 21 respondents (9.3%) had between one and two years of experience, and 27 respondents (12%) had less than one year of experience. Among team leaders, 44 respondents (71%) were male, and 18 respondents (29%) were female. Thirty-eight of the team leaders (61.3%) had a Bachelor's degree, and 24 leaders (38.7%) had a Master's degree.

The next section will explain the steps used to prepare the data and the statistical analyses used to test the hypotheses. This section will only discuss the stages and the rationales for using the chosen statistical approach to test the hypotheses. Chapter 4 will report the statistical results of hypothesis testing.

Analytical Strategy

The statistical analysis was performed in two stages. In the first stage, data were prepared for hypothesis testing by the examination of missing values, normality, skewness, and kurtosis of all primary variables. Next, statistical tests were performed to verify the reliability of variables and establish the distinctiveness of the constructs using confirmatory factor analysis. This stage also included construct aggregation tests on the independent variables of leadership behaviours and the mediating variables of team processes provided by the individual team members (Bliese, 2000; James, Demaree, & Wolf, 1984). In the second stage, the proposed multilevel relationships (Hypotheses 1 to 6b, 9a & 9b) were tested using multilevel structural equation modelling (Lachowicz, Sterba, & Preacher, 2015; Preacher, Zyphur, & Zhang, 2010). Hypotheses 7a to 8b were tested using relative importance analysis (Johnson, 2004; Johnson & LeBreton, 2004). Below, I describe the details and rationale for choosing multilevel structural equation modelling and relative importance analysis to test the hypotheses.

Multilevel modelling. The conceptualisation and measurement of variables were performed at two different levels of analysis, as participating individuals are team members and leaders nested within project teams. There is a growing recognition that organisations are hierarchically ordered systems in which variables of interest reside at three distinct levels: individual, group, and organisation (Bliese, Chan, & Ployhart, 2007; Hofmann, 1997; Hofmann & Gavin, 1998). It is therefore vital for organisational researchers to specify the

precise level of analysis for conceptualisation and measurement of variables. The advanced statistical approach to deal with variables residing at a different level of analysis is referred to as random coefficient modelling (RCM) or hierarchical linear modelling (HLM).

RCM is particularly well-suited for analysing hierarchically nested data structures where micro-level observations (individuals) are nested within units (groups/teams) (Bliese et al., 2007; Bryk & Raudenbush, 1992; Hofmann, 1997). The primary advantage is that RCM allows researchers to simultaneously investigate relationships within, between, and across different hierarchical levels (González-Romá & Hernández, 2017; Hofmann, 1997; Hofmann & Gavin, 1998). Such models explicitly recognise that individuals belonging to the same group/team are more similar to each other than they are to individuals from other groups. RCM takes into account the partial interdependence of individuals belonging to the same group, thereby precisely modelling both individual and group level residuals. This also helps in better estimating both the individual level and group level variance in the outcome variable, while maintaining the appropriate level of analysis for the independent and mediating variables (Bliese et al., 2007; Hofmann, 1997; Hofmann & Gavin, 1998).

In this study, the leadership behaviours of temporal planning and temporal reminders, team transition processes and team action processes, and the social outcome of team cohesion were measured at the individual level (Level 1), whereas team task performance was measured at the team level (Level 2). The individual level of analysis (Level 1) refers to the individual team members, while the group level of analysis (Level 2) refers to the project team as a unit. Since participating individual team members were nested within project teams, I was interested in estimating the "bottom-up" effects where individual-level independent variables (leadership behaviours) indirectly predict team level outcomes (task performance and cohesion) via individual level mediating variables (team processes), making it a 1-1-2 design model.

RCM has a general limitation of the inability to test "bottom-up" relationships, such as modelling outcomes above the lowest level of the data hierarchy (Croon & van Veldhoven, 2007; Krull & MacKinnon, 2001; Preacher et al., 2010; Zhang, Zyphur, & Preacher, 2009). That is, the effects of individual-level variables on group-level variables, such as in 1-1-2 or 1-2-2 designs, cannot be assessed using RCM. The structure of multilevel models dictates that each link in the mediational chain may involve a variable affecting another measured at the same level or a lower level, but not at a higher level. Thus, the proposed multilevel 1-1-2

design, where the independent and mediating variable is measured at the individual and outcome variable reside at the team level, cannot be tested using traditional RCM.

This limitation has recently been overcome by combining the features of RCM and structural equation modelling to estimate 1-1-2 models using Multilevel Structural Equation Modeling (Preacher et al., 2010; Lachowicz et al., 2015; Zhang et al., 2009). This approach has been successfully applied to 1-1-2 and other MLM designs in several recent studies (Lachowicz et al., 2015; Mackinnon, Kehayes, Leonard, Fraser, & Stewart, 2017; Nohe & Michaelis, 2016; Syrek, Weigelt, Peifer, & Antoni, 2016). Using this approach, I ran a multilevel structural model to test the hypothesised direct and indirect relationships proposed in the integrated IOP framework of temporal leadership, team processes, and team outcomes (Figure 2).

Multilevel structural equation modelling (MSEM). Hypotheses 1 to 6b define an indirect relationships model in which individually reported leadership behaviours (temporal planning and temporal reminders) are linked with team level outcomes (team task performance and team cohesion) via individually reported team processes (transition processes and action processes). MSEM is the most robust technique to test such "bottom up" relationships and produce precise estimates of direct and indirect effects by treating group means as latent variables (Preacher et al., 2010). Such modelling decomposes latent variables into latent within-team and between-team components that may vary within and across teams. MSEM avoids the potential problems of conflating within and between level effects and can substantially reduce bias in between-team indirect effects as compared to traditional MLM (Lachowicz et al., 2015, 2015; Nohe & Michaelis, 2016; Preacher et al., 2010).

In this study, the bottom-up relationship is represented by the coefficient of the structural relationship between the latent team mean of the mediating variable, in this case, team processes, and the team level outcome variable, in this case, task performance and team cohesion. The indirect relationships between leadership behaviours (Level 1) and team outcomes (Level 2) via mediating team processes (Level 1) were estimated at the team level. Any indirect effect that ends with the between level outcome occurs only at the between-team level (Level 2) (Lachowicz et al., 2015; Preacher et al., 2010).

The indirect effects were calculated using the product of coefficients method (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; MacKinnon, Fairchild, & Fritz, 2007). The first coefficient is obtained by regressing the mediating variable on the

independent variable at the team level. The second coefficient is obtained by regressing the dependent variable on the mediating variable at the team level.

The multilevel analyses were performed using Mplus version 8 (Muthén & Muthén, 2012). Mplus provides statistical significance tests as well as asymmetric confidence limits of the direct and indirect effects. Asymmetric confidence limits provide the 'the best balance regarding power and Type I error rates' of the indirect effect (MacKinnon, Lockwood, & Williams, 2004; Pituch, Stapleton, & Kang, 2006). If zero lies outside the 95% confidence limit, then there is a statistically significant presence of an indirect effect. The asymmetric confidence limits method does not assume normality and hence provides a more accurate and robust test of mediation (MacKinnon et al., 2007).

Relative importance analysis. In the next step, Hypotheses 7a to 8b were tested using relative importance analysis. These hypotheses suggest that both temporal leadership behaviours would predict incremental variance in team task performance and team cohesion, above and beyond leader initiating structure. These hypotheses were tested on the team level aggregated scores of leadership behaviours as well as team cohesion. I chose this relative weight estimation technique because of its superiority over tradition hierarchical regression.

When predictors are correlated, variables that yield a significant bivariate relationship may not yield a significant incremental relationship in traditional multiple regression. Relative importance analysis enables the researcher to partition and estimate proportionate variance in the dependent variable accounted for by each predictor, especially when predictors are strongly correlated (Tonidandel & LeBreton, 2011; Tonidandel & LeBreton, 2015). Given the significant correlations between temporal leadership and initiating structure, relative importance analysis was used to measure the contribution of each leadership behaviour in predicting team outcomes. This approach has previously been used to assess the relative contributions of various leadership measures to outcomes by Rowold et al. (2014) and by DeRue et al. (2011).

In sum, I tested hypotheses 1 to 6b using MSEM, and hypotheses 7a to 8b using relative importance analysis. To test hypothesis 9a and 9b, I ran an additional structural model with the inclusion of leader initiating structure (Time 1 and Time 2) as antecedents of the respective team processes which contribute to final team task performance and team cohesion. This additional model was performed with the anticipation that leader temporal planning and temporal reminders would predict team processes and subsequent outcomes

even in the presence of initiating structure. The next chapter presents the statistical findings of the study.

CHAPTER 4
Results

This chapter provides the results of the statistical analysis in five sections. In the first section, the measurement model is evaluated by performing statistical tests to verify the reliability of the variables and establishing the distinctiveness of the constructs using confirmatory factor analysis. In the second section, evidence supporting the aggregation of individual team member reports to the team level is presented. The inter-correlations between variables are also presented and discussed in this section. In the third section, the hypotheses and the model are tested using multilevel structural equation modelling (MSEM) and relative importance analysis. Hypotheses 1 to 6b are tested using MSEM, followed by the testing of the incremental contribution of temporal leadership beyond initiating structure (Hypotheses 7a to 8b) using relative importance analysis. In the fourth section, an additional structural model testing hypotheses 9a and 9b is presented. This model assesses whether temporal leadership variables contribute to the prediction of team processes and outcomes in the presence of initiating structure. In the fifth and concluding section, I present supplemental analyses involving the relative importance of the two temporal leadership variables and team processes in predicting team performance.

Reliability and Measurement Models

In the first step, the data were explored to identify possible outliers. There was only one extreme value on initiating structure (Time 1) for possible exclusion, but it did not violate the general criterion of exceeding three standard deviations from the mean. A decision was made to retain this to ensure the maximum possible sample size. I further investigated the 5% trimmed mean of all constructs. This trimmed mean is calculated after removing the top and bottom 5% of the data cases. There were no significant differences between the means and the trimmed means, demonstrating that extreme scores had no significant influence on the sample means.

The next step was the examination of the degree of skewness and kurtosis for all the variables in this study, with results presented in Table 3. *Skewness* refers to the extent to which the distribution of a variable deviates from the distribution of a normal curve. Distributions with long tails to the right have a positive skew (few high values), and distributions with long tails to the left have a negative skew (few low values) (Park, 2008). *Kurtosis* refers to the peakedness of the frequency distribution or the thinness of distribution

tails. A positive kurtosis value indicates that the distribution is slightly peaked (clustered in the centre) with long thin tails, while a negative kurtosis value indicates a distribution that is relatively flat (too many cases in the extremes) (Park, 2008).

Table 3

Skewness and Kurtosis of Variables under Study

Variables	Skewness	Kurtosis
Temporal planning	-.47	-.99
Temporal reminders	-.55	-1.03
Initiating structure (Time 1)	-.82	2.48
Initiating structure (Time 2)	-.31	.91
Transition processes	-.80	-.55
Action processes	-.50	-.91
Task performance	-.51	-1.54
Team cohesion	-.71	-.57

A normally distributed random variable should have skewness and kurtosis values of zero (Field, 2006; Tabachnick & Fidell, 2001). Obtaining this value is an uncommon occurrence in social science (Tabachnick & Fidell, 2001). Scholars have suggested a range of acceptable skewness and kurtosis values. If the frequency distribution of a variable has a considerable skewness value (greater than 1 or less than -1) and a considerable kurtosis value (greater than 3 or less than -3), then the measure is considered to deviate from normality (Field, 2006; Tabachnick & Fidell, 2001). As presented in Table 3, all variables were well within the general skewness criterion of +1 and -1, indicating that the sample distributions did not significantly deviated from the normal distribution. Similarly, the kurtosis values of all variables were also well within the acceptable ranges of +3 and -3. Further, the analytical approach and estimation technique chosen to test the hypotheses is robust to even extreme violations of skewness and kurtosis.

Reliability. The next step was to assess the reliability and validity of all variables at the individual level (N=225). To assess reliability, Cronbach's alpha was calculated (Cronbach, 1951). This metric is based on the strength of the correlations between items measuring the same construct (Price & Mueller, 1986; Hinkin, 1998), with a high value indicating that the set of items measure the same construct. As a conventional criterion used

in the management literature, a Cronbach's alpha value of 0.80 or above is acceptable (Nunnally, 1978). As shown in Table 4, all variables meet the conventional criterion of 0.80 or above, providing evidence of sufficiently reliable measurement. Among all variables, team *task performance* has the highest scale reliability of 0.94 and *initiating structure* (Time 1) has the lowest alpha value of 0.81. It should be noted that some items from team transition processes and team action processes were later dropped after confirmatory factor analysis. However, the reliability of both measures after dropping items remained satisfactory and the scale remained true to its original intended meaning.

Table 4

Cronbach's Alpha Values of Variables under Study

Variables	α
Temporal planning	0.85
Temporal reminders	0.88
Initiating structure (Time 1)	0.81
Initiating structure (Time 2)	0.83
Transition processes	0.89
Action processes	0.92
Task performance	0.94
Team cohesion	0.87

Confirmatory factor analyses. Next, the distinctiveness of the study's constructs was established by conducting a series of confirmatory factor analyses (CFA). CFA is a multivariate statistical procedure that is used to test how well the measured variables represent the number of constructs hypothesised to occur in a model. The application of CFA begins with a theoretically parsimonious model that is hypothesised to describe expected relationships in the empirical data. Several different theoretically driven models are assessed before choosing the best measurement model based on multiple fit indices (Crowley & Fan, 1997; Hurley, Scandura, Schriesheim, Brannick, Seers, Vandenberg, & Williams, 1997).

In this study, the fit of the measurement models was evaluated using the maximum likelihood ratio test statistics, most commonly expressed as chi-square ($\chi 2$) statistics. Additional multiple fit indices with traditional cut-offs were used to evaluate model fit: the comparative fit index (CFI) with 0.90 as a lower limit of good fit and 0.95 as the preferred

cut-off, the Tucker-Lewis-Index (TLI) with the lower limit of 0.90 and 0.95 as the preferred cut-off, and the root-mean-square error of approximation (RMSEA) below 0.08, based on the recommendations of Hu and Bentler (1999) and Williams, Vandenberg and Edwards (2009). Using AMOS, CFA was conducted on leadership behaviours and team process variables measured at the individual level of analysis. Below, I describe and present the results of all CFAs used to prepare the model for hypothesis testing.

Temporal leadership. In the first step, two alternative models of temporal leadership were compared to each other. Model 1 was a standard comparison model with all the items loading on one common factor (temporal leadership). Model 2 was the proposed model of interest with two factors reflecting *temporal planning* (factor 1) and *temporal reminders* (factor 2). Path diagrams of both models with factor loadings are presented in Appendices B and C, respectively.

Results of the model evaluation are presented in Table 5. Model 1, which includes one common factor, revealed unacceptable fit indices as verified by a large and significant χ^2 statistic and poor fit according to the other fit indices. Model 2, the proposed two-factor model comprising *temporal planning* (factor 1) and *temporal reminders* (factor 2), demonstrated a significant improvement in the measurement with fit indices well above the minimum acceptable values. Despite having a significant χ^2, the model indicated excellent fit with CFI= 0.94, TLI= 0.92, and RMSEA= 0.07.

Table 5

Confirmatory Factor Analyses of Temporal Leadership: Evaluation of Alternative Models

Model	Description	χ^2	*p*	*d.f.*	CFI	TFI	RMSEA
Model 1	One-Factor	267.59	<.001	65	0.85	0.82	0.11
Model 2	Two-Factor	145.12	<.001	64	0.94	0.92	0.07

The next step was to confirm the discriminant validity of both temporal leadership scales. Discriminant validity tests whether the indicators of two constructs are different enough to conclude that they do indeed measure two separate constructs. Since temporal leadership is a relatively new construct, it was essential to assess the extent to which *temporal planning* and *temporal reminders* overlap. There was a high correlation between *temporal*

planning and *temporal reminders* both at the individual (r = 0.67, $p < 0.01$) as well as team level (r = 0.76, $p < 0.01$) of analysis. While they are different sets of behaviours provided at different points in the project lifecycle, the high correlation between the constructs is expected if some leaders are naturally more attuned to time and its use than others or if more explicit planning is a pre-condition for subsequent reminders.

One of the most common and rigorous approaches to establishing discriminant validity within the context of structural equation modelling is Bagozzi & Phillips' (1991) nested model method. The nested model approach (Bagozzi & Phillips, 1991) is based on the principle that if the correlation between the two latent constructs is precisely 1, then the two constructs are one rather than two. Using this principle, I ran two separate CFA models. In the first model, the correlation between *temporal planning* and *temporal reminders* was unconstrained. In the second model, the correlation between *temporal planning* and *temporal reminders* was constrained to precisely 1. Unconstrained and constrained CFA results are presented in Table 6.

Table 6

Unconstrained and Constrained Confirmatory Factor Analysis Results for Two Dimensions of Temporal Leadership

Model	χ^2	*d.f.*	*p*	CMIN/*d.f.*
Unconstrained Model	159.27	66	<.001	2.41
Constrained Model	279.23	67	<.001	4.16
Assuming Unconstrained Model to be correct:				
Constrained	119.96	1	<.001	

The results revealed that the unconstrained model had a χ^2 of 159.27 with 66 degrees of freedom. In contrast, the constrained model, in which the correlation was constrained to 1, had a χ^2 of 279.23 with 67 degrees of freedom. The difference gives a χ^2 of 119.92 with 1 degree of freedom and a *p-value* of <0.001. Concluding, the difference of χ^2 test showed that constraining the correlation between the constructs to 1 did not improve model fit, supporting the conclusion that planning and reminders reflect two distinct constructs. Thus, temporal leadership might best be conceived as a higher order construct made up of two lower order constructs of *temporal planning* and *temporal reminders*. This proposition will be discussed

further in Chapter 5. For the purposes of this study, both dimensions of temporal leadership were used as separate predictors in the hypothesis tests.

Team processes. In the next step, another CFA using maximum likelihood estimation was conducted on the team *transition processes* and *action processes* scales. Since both constructs had three sub-dimensions (Marks et al., 2001), I decided to first run the one-factor model for each construct separately by loading their respective scale items. The CFAs on team processes were conducted at the individual level of analysis. The team *transition processes* scale had a total of eight indicators related to mission analysis and planning, goal specification, and strategy formulation. Three items measured mission analysis and planning, two items assessed goal specification, and three items captured strategy formulation. In the *transition processes* one-factor model, three items (item 1, item 6, and item 7) were deleted to improve model fit. The deleted items showed insufficient variance and were related to mission analysis and planning and strategy formulation, respectively. The remaining five items significantly loaded on the latent construct labelled *transition processes*. Fit indices after deleting the problematic items were: chi-square (χ^2) = 26.65, *d.f.* = 5, CFI= 0.95, TLI= 0.91, and RMSEA= 0.13. The final scale remained true to the original intended meaning with items reflecting all three sub-dimensions of transition processes. Cronbach alpha after deleting these three items was also satisfactory (α= 0.86).

The team *action processes* scale had a total of thirteen items that measured team coordination, team backing-up behaviour, and team monitoring. Five items measured team coordination, three items reflected team backing-up behaviour, and five items assessed team monitoring. In the *action processes* one-factor model, six items out of thirteen (item 3, item 4, item 5, item 9, item 10, and item 11) were deleted due to insufficient variance to achieve model fit. Items 3, 4, and 5 were indicators of team coordination and items 9, 10, and 11 were related to team monitoring. The remaining seven items significantly loaded on the action processes latent construct with critical ratios greater than the minimum cut-off of *1.96*. Fit indices after deleting these items were: chi-square (χ^2) = 50.86, *d.f.* = 14, CFI= 0.95, TLI= 0.93, and RMSEA= 0.10. The final measurement scale represented all three sub-dimensions of team action processes, indicating that the nature of this construct remained the same in the hypothesis tests. Moreover, the scale's reliability after deleting these items was also acceptable (α= 0.90).

After achieving the model fit on separate one-factor models, two alternate CFA models including both team *transition processes* and *action processes* were evaluated.

Results of the model evaluation are presented in Table 7. Model 1 was a standard comparison model with all the retained items of transition and action processes loaded on a single common factor. Model 2 was the intended model comprising two team processes factors: factor 1 (*transition processes*) and factor 2 (*action processes*). Model 1 demonstrated poor fit with significant chi-square (χ^2) statistics and other fit indices beyond the acceptable values. On the contrary, Model 2, which was a two-factor model, indicated acceptable fit. Although the chi-square (χ^2) statistic was significant, the remaining fit indices indicated a good fit with CFI= 0.95, TLI= 0.94, and RMSEA= 0.07. Path diagrams of these models with factor loadings are presented in Appendices D and E, respectively.

Table 7

Confirmatory Factor Analyses of Team Processes: Evaluation of Alternative Models

Model	Description	χ^2	*p*	*d.f.*	CFI	TLI	RMSEA
Model 1	One-Factor	259.79	<.001	54	0.86	0.83	0.13
Model 2	Two-Factor	116.97	<.001	53	0.95	0.94	0.07

Temporal leadership and team processes. In the final step, I ran a series of CFAs to confirm the appropriateness of the hypothesised four-factor model comprised of leader temporal planning, leader temporal reminders, team transition processes, and team action processes. For these team member-rated variables, I compared the fit of two-factor and three-factor models to the hypothesised four-factor model. In the two-factor model, items reflecting *temporal planning* and *temporal reminders* were loaded on a single latent factor (factor 1) and items measuring *transition processes* and *action processes* were loaded on another single latent factor (factor 2).

As shown in Model 1 Table 8, the two-factor model falls below the acceptable cut-off values of fit indices. A path diagram of this model with factor loadings is presented in Appendix F. In the three-factor model, items measuring *temporal planning* and *temporal reminders* were loaded on a single latent factor (factor 1), whereas items presenting *transition processes* (factor 2) and *action processes* (factor 3) were loaded on two separate latent constructs. The results showed unacceptable model fit values, as shown in Model 2 Table 8. A path diagram of this model with factor loadings is presented in Appendix G.

Table 8

Confirmatory Factor Analyses of Temporal Leadership and Team Processes: Evaluation of Alternative Models

Model	Description	χ^2	*p*	*d.f.*	CFI	TLI	RMSEA
Model 1	Two-Factor	808.07	<.001	274	0.83	0.82	0.09
Model 2	Three-Factor	662.02	<.001	272	0.88	0.87	0.08
Model 3	Four-Factor	487.88	<.001	269	0.93	0.92	0.06

In the hypothesised four-factor model, all items were loaded on their respective latent constructs of leadership behaviours and team processes: *temporal planning* (factor 1), *temporal reminders* (factor 2), *transition processes* (factor 3), and *action processes* (factor 4). As shown in Model 3 Table 8, this was the best-fitting model with fit indices above minimum cut-off values: chi-square (χ^2) = 487.88, *d.f.* = 269, CFI= 0.93, TLI= 0.92, and RMSEA= 0.06. Additionally, the results indicated that all factor loadings were highest in the four-factor model as compared to the alternate models. Standardised factor loadings were on average 0.67 for *temporal planning*, 0.74 for *temporal reminders*, 0.76 for *transition processes*, and 0.75 for *action processes*. This model with factor loadings is presented in Appendix H. Given the highest and significant factor loadings and superior model fit indices of the hypothesised model, I concluded that all four measures capture distinct constructs. These four constructs will, therefore, be used in the subsequent analyses.

The distinctiveness of *temporal planning* from team *transition processes* and *temporal reminders* from team *action processes* was also established in two separate CFAs. Since both temporal leadership behaviours and team processes were measured concurrently and rated by the same respondents, it was essential to establish that they represent different constructs. Using Bagozzi and Phillips' 1991 nested model method, the results showed that constraining the correlation between concurrently measured variables to 1 significantly worsened the model in both cases, thus supporting discriminant validity.

Construct Aggregation

Given acceptable reliability and discriminant validity, I went on to assess construct aggregation statistics for all variables reported by team members at the individual level. The

independent variables of leadership behaviours and the mediating variables of team processes within the proposed model were measured at the individual level of analysis. Team members responding at the individual level were nested within projects at the team level. It was essential to validate that individuals nested in the same project team have highly similar or interchangeable levels of perceptions that are different and unique from individuals working in other project teams. It is a widespread practice in the teams literature for researchers to conceptualise team-level constructs by aggregating data from the individual level (House, Rousseau, & Thomas-Hunt, 1995; Klein, Conn, Smith, & Sorra, 2001; Van Mierlo, Vermunt, & Rutte, 2009). In such cases, the necessary pre-condition of reporting construct aggregation statistics must be met to demonstrate that individuals within a team have at least somewhat similar perceptions of the phenomena they are reporting.

Kozlowski and Klein (2000) discuss two approaches to bottom-up processing (where lower-level data are combined to reflect a higher-level variable): the composition and the compilation approaches. Compilation processes rest on the assumption that there are apparent differences in the aggregated and non-aggregated constructs. Lower-level data are expected to vary within groups, but when the data are aggregated, the higher-level variable is expected to demonstrate a phenomenon not evident at the lower level. Therefore, it is not essential to establish consensus before aggregation. A typical example includes average socio-economic status (SES) of teams. Homogeneity of SES within a group might not be expected, yet the average SES of the group may be a meaningful construct.

Composition processes assume that individual level responses are substantially equivalent to higher level constructs, and it is therefore necessary to have substantial agreement at the lower level. This will occur if individuals are accurately reporting on a single phenomenon that they all observe, in this case, the behaviour of their leader is an example. In the ideal scenario, all individuals' scores on any particular variable would be the same and therefore, interchangeable. In this study, individuals responding at the lower level were nested within project teams at the higher level. It was essential that individuals nested in the same project team have highly similar perceptions of their leader and team processes which are different and unique to those of individuals working in another project team.

Given the similarity-focused compositional nature of the theoretical constructs, estimates of inter-rater reliability (IRR) and inter-rater agreement (IRA) are often used to index the extent of agreement among lower-level observations. In the absence of substantial agreement, the theoretical model and corresponding aggregation will not be supported. IRR

refers to the relative consistency in ratings provided by multiple judges of multiple targets (Bliese, 2000; Kozlowski & Hattrup, 1992; LeBreton, Burgess, Kaiser, Atchley, & James, 2003). Estimates of IRR are used to address whether judges rank order targets in a manner that is relatively consistent with other judges. In contrast, estimates of IRA are used to address whether scores furnished by judges are interchangeable or equivalent regarding their absolute value (Bliese, 2000; James et al., 1984; Kozlowski & Hattrup, 1992; LeBreton et al., 2003).

In this study, two different but complementary construct aggregation statistics were used: intraclass correlation coefficients ICC (1) and ICC (2). As suggested by LeBreton and Senter (2007), the most common measures to establish IRR and IRA are the intraclass-correlation coefficients: ICC (1) and ICC (2). ICC (1) has been defined in different ways in the literature. For example, James (1982) explained ICC (1) as the extent to which raters are substitutable and recommended using it as a criterion prior to aggregation. Bryk and Raudenbush (1992) considered ICC (1) as the proportion of total variance that can be explained by the group membership. ICC (2) provides an estimate of the group mean reliability (Bartko, 1976; Bliese, 2000; James, 1982).

To calculate ICC (1), I have used the following equation recommended by Bliese (2000, p. 355)

$$ICC\ (1) = MSB - \frac{MSW}{MSB} + [(k-1) * MSW]$$

where MSB refers to mean square between, MSW refers to mean square within and k refers to the number of judges.

To calculate ICC (2), I used the following equation to obtain the values of ICC (2) recommended by Bliese (2000, p. 357)

$$ICC\ (2) = \frac{k\big(ICC(1)\big)}{1} + (K-1)ICC(1)$$

where MSB refers to mean square between, MSW refers to mean square within, and k refers to the number of teams. The results of ICC (1) and ICC (2) are presented in Table 9.

All the ICC (1) values showed that group membership explained a large proportion of the variance. Moreover, all constructs showed ICC (2) values greater than 0.70 indicating the high reliability of group mean estimates. As an indicator of both inter-rater reliability (IRR) and inter-rater agreement (IRA), these high values also indicate that there is substantial consensus and relative consistency in the ratings. Concluding, it is safe to suggest that the

individuals nested within project teams in the sample have at least somewhat similar perceptions of leadership behaviours and team processes, and that individual scores can justifiably be aggregated to form team level scores to test hypotheses 7a to 8b.

Table 9

ICC (1) and ICC (2) Values of All the Variables Measured at Level 1

Variables	ICC (1)	ICC (2)
Temporal planning (Time 1)	0.31	0.90
Temporal reminders (Time 2)	0.55	0.95
Initiating structure (Time 1)	0.31	0.90
Initiating structure (Time 2)	0.18	0.86
Transition processes (Time 1)	0.19	0.87
Action processes (Time 2)	0.46	0.93
Team cohesion (Time 3)	0.22	0.88

Inter-correlations. After justifying construct aggregation, the next step was to examine the inter-correlations between the variables at the team level. Table 10 illustrates the means, standard deviations, and Pearson inter-correlations of all the variables of this study at the team level (N= 62). Examining the control variables (1-4), *team size* was negatively correlated with team transition and action processes as well as team *cohesion*. Larger teams appear to have greater difficulty achieving effective processes and cohesion. Team *familiarity* was positively and significantly correlated with team *transition processes* at the project initiation stage and *action processes* during project execution stage[4]. Team *education* was positively correlated with the outcome variable of team *task performance*. Based on these results, these three variables will be included as controls in the subsequent analysis. However, industry *experience* had no significant correlations with any mediator and/or outcome variable and was dropped from further analyses.

[4] Team familiarity was uncorrelated with both task performance and team cohesion, so there was no reason to believe that it may moderate the relationship between leadership behaviours and team outcomes.

Table 10

Means, Standard Deviations, and Correlations of Variables at Team Level

		Means	S.D.	1	2	3	4	5	6	7	8	9	10	11	12
1	Team Size	3.62	1.14	1											
2	Team Familiarity	3.51	0.95	.26*	1										
3	Education[b]	3.26	0.30	-.14	-.01	1									
4	Industry Experience[c]	3.63	0.82	.34**	-.18	-.05	1								
5	Temporal Planning (Time 1)	3.36	0.78	-.09	.31*	.13	-.22	**1**							
6	Initiating Structure (Time 1)	3.68	0.43	.00	.29*	-.02	-.20	.47**	**1**						
7	Transition Processes (Time 1)	3.67	0.94	-.20 **	.27**	.01	.17	.78**	.45**	**1**					
8	Temporal Reminders (Time 2)	3.47	0.93	-.21	.06	.16	-.12	.76**	.48**	.65**	**1**				
9	Initiating Structure (Time 2)	3.60	0.51	-.27*	.22	.00	-.10	.31*	.67**	.37**	.50**	**1**			
10	Action Processes (Time 2)	3.48	1.00	-.27**	.13*	.05	-.11	.63**	.40**	.66**	.82**	.55**	**1**		
11	Task Performance (Time 3)	3.48	1.35	-.19	.12	.39**	-.04	.58**	.28*	.52**	.54**	.24*	.47**	**1**	
12	Cohesion (Time 3)	3.60	0.84	-.14*	.02	.12	-.13	.55**	.39**	.49**	.71**	.33**	.51**	.45**	**1**

Notes. N= 62 Project teams, 225 Team members, $^{**}p < 0.01$, $^{*}p < 0.05$, Cronbach's alpha values are presented on the diagonal, a: 1= Matriculation, 2= Intermediate, 3= Bachelors, 4= Masters, b: 1= <12 months, 2= 13-24 Months, 3= 25-36 months, 4= 37-48 Months, 5= >48 Months.

Regarding the primary variables (5-12 in Table 10), significant correlations were in line with the hypothesised relationships. The leader behaviours of *temporal planning* and *temporal reminders* were significantly correlated with team *transition processes* and team *action processes*, as expected. Similarly, both *transition processes* and *action processes* were positively associated with both outcomes of *task performance* and team *cohesion*. There was a positive correlation between *temporal planning* and *initiating structure* at Time 1 ($r = 0.47$; $p < 0.01$) and between *temporal reminders* and *initiating structure* at Time 2 ($r = 0.50$; $p < 0.01$). Both *temporal planning* and *temporal reminders* were positively and significantly related to team *task performance* and team *cohesion*. The next stage was to test the hypothesised model using multilevel structural equation modelling and relative importance analysis.

Model Testing: Temporal Leadership, Team Processes, and Outcomes

Multilevel structural equation modelling (MSEM). The bottom-up effects predicted by hypotheses 1 through 6b were tested using MSEM. These hypotheses comprise a multilevel model in which leader *temporal planning* and *temporal reminders* are linked with team-level outcomes of *task performance* and *cohesion* via the mediating variables of team *transition processes* and team *action processes*, as presented in Figure 2. The unstandardized direct and indirect coefficients obtained from MSEM are reported. The indirect effects were calculated using the product of the coefficients method (MacKinnon et al., 2002; MacKinnon et al., 2007) at the between-level. All three control variables were regressed only on the team outcome variables of *task performance* and *cohesion*. The analysis was performed using Mplus version 8. For ease of interpretation and understanding, the results of the structural model are reported in two sub-sections. The first sub-section presents the results of hypothesised direct and indirect relationships between leader *temporal planning* at the project initiation stage, team *transition processes*, and final team outcomes of *task performance* and *cohesion*. The second sub-section reports the results of direct and indirect relationships between leader *temporal reminders* during the project execution stage, team *action processes*, and final team outcomes. Table 11 shows the results of Hypotheses 1 to 6b using MSEM.

Temporal planning, team transition processes, and team outcomes (direct and indirect effects). In this sub-section, I first present the results for Hypotheses 1 through 3b. These are the proposed relationships between leadership and processes close to the beginning of new projects and final team outcomes: the direct effect of leader *temporal planning* (Time

1) on team *transition processes* (Time 1) and their subsequent direct and indirect effects on team level *task performance* and *cohesion* (Time 3). Results are presented in Table 11.

Regarding direct effects, Hypothesis 1 proposed that leader *temporal planning* behaviour at the project initiation stage is positively related to the quality of concurrent team *transition processes*. In support of Hypothesis 1, results revealed that the direct path from leader *temporal planning* to team *transition processes* was positive and significant, as indicated by the significant unstandardized coefficient ($b = 0.95$, $p < .001$). Hypothesis 2a suggested that team *transition processes* measured at the project initiation stage are positively related to final team *task performance*. This hypothesis was supported by the positive significant direct path from team *transition processes* to *task performance* ($b = 1.19$, $p < .01$), as presented in Table 11. Hypothesis 2b predicted that team *transition processes* measured at the project initiation stage are positively related to team *cohesion* at the end of the project. As presented in Table 11, results showed a positive and significant association between team *transition processes* and final team *cohesion* ($b = 0.37$, $p < .05$), supporting Hypothesis 2b.

Regarding indirect effects, Hypothesis 3a suggested an indirect relationship between leader *temporal planning* at the project initiation stage and team *task performance* via team *transition processes*. In support of Hypothesis 3a, the results revealed that *temporal planning* is indirectly related to *task performance* through team *transition processes* ($b = 1.13$, $p < .01$, 95% CI = 0.46, 1.80). Hypothesis 3b proposed an indirect effect of leader *temporal planning* at the project initiation on team *cohesion* via team *transition processes*. The results revealed a positive and significant association between *temporal planning* and team *cohesion* via team *transition process* ($b = 0.35$, $p < .05$, 95% CI = 0. 006, 0.70), supporting Hypothesis 3b.

Temporal reminders, team action processes, and team outcomes (direct and indirect effects). This sub-section presents the results of hypotheses 4 through 6b. These are the proposed relationships between leadership and processes during the execution stage of new projects and final team outcomes, specifically the direct effect of leader *temporal reminders* (Time 2) on team *action processes* (Time 2) and their subsequent direct and indirect effects on team level *task performance* and *cohesion* (Time 3). Regarding direct effects, Hypothesis 4 predicted that leader *temporal reminders* during the project execution stage would be positively related to the quality of concurrent team *action processes*. In support of Hypothesis 4, results revealed that the direct path from leader *temporal reminders* to team *action processes* was positive, as indicated by the significant unstandardized coefficient ($b = 0.89$, $p < .001$), as shown in Table 11.

Table 11

Test of Direct and Indirect Effects using MSEM (Hypotheses 1-6b)

Direct and indirect paths		Estimate	S.E.	95% CI limits
H1	Temporal planning →Team transition processes	0.95***	0.07	(0.46,1.80)
H2a	Team transition processes →Task performance	1.19**	0.33	(0.52,1.85)
H2b	Team transition processes →Team cohesion	0.37*	0.18	(0.01,0.72)
H3a	Temporal planning →Team transition processes →Task performance	1.13**	0.34	(0.46,1.80)
H3b	Temporal planning →Team transition processes →Team cohesion	0.35*	0.17	(0.006,0.70)
H4	Temporal reminders →Team action processes	0.89***	0.07	(0.74,1.03)
H5a	Team action processes →Task performance	0.02	0.28	(-0.53,0.57)
H5b	Team action processes →Team cohesion	0.44**	0.15	(0.15,0.74)
H6a	Temporal reminders →Team action processes →Task performance	0.01	0.25	(-0.48,0.51)
H6b	Temporal reminders →Team action processes →Team cohesion	0.40**	0.14	(0.11,0.69)
	Control variables			
	Education→Task performance	5.52**	1.43	(2.71,8.34)
	Education→Team cohesion	-0.21	0.86	(-1.91,1.48)
	Team familiarity→Task performance	-0.17	0.24	(-0.65,0.31)
	Team familiarity→Team cohesion	-0.21	0.14	(-0.50,0.06)
	Team size→Task performance	0.01	0.12	(-0.22,0.26)
	Team size→Team cohesion	0.07	0.08	(-0.08,0.22)

Notes. Unstandardized estimates are reported, CI = Confidence interval, S.E. = Standard errors, *$p < .05$, **$p < .01$, ***$p < .001$, ^ $p = .08$

Hypothesis 5a suggested that team *action processes* measured during the project execution stage would be positively related to final project team *task performance*. Contrary to expectations, Hypothesis 5a did not receive support due to a non-significant direct path from team *action processes* to *task performance* ($b = 0.02$, $p > .05$). Hypothesis 5b postulated that team *action processes* measured during the project execution stage would be positively related to team *cohesion* at the end of the project. Results showed a positive and significant direct path from team *action processes* to final team *cohesion* ($b = 0.44$, $p < .01$), supporting Hypothesis 5b. Regarding indirect effects, Hypothesis 6a proposed an indirect effect of *temporal reminders* during project execution on team *task performance* via team *action processes*. The results failed to support this indirect effect ($b = 0.01$, $p > .05$, 95% CI = -0.48, 0.51). Hypothesis 6b predicted an indirect effect of leader *temporal reminders* during project execution on team *cohesion* through team *action processes*. As shown in Table 11, results revealed a positive and significant indirect association between *temporal reminders* and team *cohesion* via team *action process* ($b = 0.40$, $p < .01$, 95% CI = 0.11, 0.69).

Partial vs. full mediation. To assess whether mediation by team processes was full or partial, I ran a second model with four additional direct paths from both temporal leadership behaviours to team outcomes[5]. These additional pathways were not significant in predicting each team outcome in the presence of team processes, indicating full mediation. Additionally, I performed a chi-square difference test to compare both models. The model with the direct paths from temporal leadership behaviors to team outcomes had a chi-square (χ^2) value of 129.038 with 33 degrees of freedom (*d.f.*), while the model without the direct paths having 4 additional degrees of freedom showed a chi-square (χ^2) value of 134.776 and 37 degrees of freedom (*d.f.*). Satorra and Bentler (2010) provide a two-step procedure to perform a chi-square difference test to compare two alternative models within a multilevel context. In the first step, the difference test scaling correction (cd) is calculated using the following equation:

$$cd = \frac{d0 * c0 - d1 * c1}{d0 - d1}$$

where d0 is the degrees of freedom in the nested model, c0 is the scaling correction factor for the nested model, d1 is the degrees of freedom in the comparison model, and c1 is the scaling correction factor for the comparison model. In this case, the nested model is a more restrictive model with four additional degrees of freedom than the comparison model. In the second step,

[5] i) Temporal planning -> task performance, ii) Temporal planning -> cohesion, iii) Temporal reminders -> task performance, and iv) Temporal reminders-> cohesion

the Satorra-Bentler scaled chi-square difference test (TRd) is computed using the following equation:

$$TRd = \frac{T0 * c0 - T1 * c1}{cd}$$

where the products T0 and T1 are the chi-square values for the nested and comparison model.

The results indicated that adding direct pathways from temporal leadership behaviours to team outcomes did not significantly improve the model as indicated by a non-significant chi-square difference test (difference in chi-square (χ^2) = 10.672, *cd* = 1.57, *TRd* = 6.79, *d.f.* = 4, $p > 0.05$). Therefore, the estimates were reported for the hypothesised model without the direct paths from leadership behaviours to team outcomes. In sum, team *transition processes* (Time 1) fully mediate the relationship between leader *temporal planning* (Time 1) at the project initiation stage and final team outcomes of *task performance* (Time 3) and team *cohesion* (Time 3). Additionally, team *action processes* (Time 2) fully mediate the relationship between leader *temporal reminders* (Time 2) during project execution and team *cohesion* (Time 3).

Relative importance analysis. Next, the incremental contributions of temporal leadership beyond initiating structure (Hypotheses 7a to 8b) were tested using relative importance analysis. Hypotheses 7a to 8b suggested that both facets of temporal leadership would explain incremental variance in team outcomes beyond the effect of *initiating structure* measured at the same point in the project. In testing these hypotheses, individual scores on leadership behaviours were aggregated to form a team-level score. The aggregation was justified using ICC (1) and ICC (2), as discussed and shown in Table 9.

Using RWA-Web, two sets of relative importance analyses were performed. The first analysis was conducted to partition the explained variance in the outcomes of *team performance* and *team cohesion* between leader *temporal planning* (Time 1) and leader *initiating structure* (Time 1). A second analysis was performed to partition the explained variance in team outcomes between leader *temporal reminders* (Time 2) and leader *initiating structure* (Time 2). Based on the approach recommended by Tonidandel, LeBreton, and Johnson (2009), 95% confidence intervals (CIs) for the individual relative weights (Johnson, 2004) and all corresponding significance tests were based on bootstrapping with 10,000 replications. Bias-corrected and accelerated CIs were used because of their superior coverage accuracy (Tonidandel et al., 2009). For ease of interpretation, relative weights were rescaled as a percentage of the total predictable variance in team outcomes (see Table 12). I have also

estimated standardised regression coefficients (β) by simultaneously including both predictors in the model.

Temporal planning vs initiating structure (Time 1). Hypothesis 7a stated that leader *temporal planning* explains unique variance in *team task performance*, above and beyond *initiating structure* measured at project initiation[6]. The relative importance and multiple regression results are presented in Table 12. In the relative importance analysis, the weighted linear combination of *temporal planning* and *initiating structure* explained 33.7% of the variance in team *task performance*. As shown in Model 1, Table 12, leader *temporal planning* was a stronger and highly significant predictor of *task performance*, accounting for 88% of the predicted variance. In contrast, *initiating structure* accounted for a non-significant 12% of the predicted variance in *task performance*. Similar results appeared in the multiple regression analysis. *Temporal planning* was the only significant predictor of *task performance* ($\beta = 0.57$; $p < 0.05$), while the beta weight for *initiating structure* was close to zero and non-significant ($\beta = 0.07$; $p > 0.05$). Overall, the relative importance analysis confirmed the initial findings of the multiple regression analysis by partitioning the unique variation of *temporal planning* and *initiating structure* in predicting team *task performance*.

Hypothesis 7b stated that leader *temporal planning* would explain variance in team *cohesion*, above and beyond *initiating structure*. The relative importance results are presented in Model 2 Table 12. Following the same analytical approach as for Hypothesis 7a, the relative importance analysis results revealed that together leader *temporal planning* and *initiating structure* during project execution explained a collective 33% of the variance in team *cohesion*. Leader *temporal planning* at project initiation was a stronger and significant predictor of team *cohesion*, accounting for 73% of the predicted variance. *Initiating structure* accounted for a significant 27% of the predicted variance in team *cohesion*. In contrast, the multiple regression analysis showed that *temporal planning* was the only significant predictor of team *cohesion* ($\beta = 0.47$; $p < 0.05$), while the beta weight for *initiating structure* was positive but non-significant ($\beta = 0.16$; $p > 0.05$). Collectively, these results support Hypothesis 7b by showing that *temporal planning* predicts team *cohesion* over and above the contribution of *initiating structure* measured at the same time.

[6] Three control variables (team size, team familiarity, and team education) were initially included in the regression analyses. Only education significantly predicted team outcomes, but its inclusion made no difference to the conclusions drawn. The control variables were dropped from subsequent analyses.

Table 12

Relative Importance of Temporal Planning (Time 1) and Initiating Structure (Time 1) in Predicting Task Performance and Team Cohesion (Time 3) (Hypotheses 7a & 7b)

	Model 1 Task performance					Model 2 Team cohesion				
Predictors	β	RW	CI-L	CI-U	RS-RW (%)	β	RW	CI-L	CI-U	RS-RW (%)
Temporal planning	0.57***	0.29*	0.07	0.54	88.07	0.47***	0.24*	0.06	0.44	72.91
Initiating structure (Time 1)	0.07	0.04	-.00	0.16	11.92	0.16	0.08*	0.009	0.24	27.08
	(R^2 = .33, F (2, 59) = 16.942, p <.05)					(R^2 = .33, F (2, 59) = 14.554, p <.05)				

Notes. β = standardized regression weight, RW = raw relative weight, CI-L = lower bound of confidence interval used to test the statistical significance of raw weight, CI-U = upper bound of confidence interval used to test the statistical significance of raw weight, RS-RW = relative weight rescaled as a percentage of predicted variance in the criterion variable attributed to each predictor, *p < .05, **p < .01, ***p < .001

Temporal reminders vs initiating structure (Time 2). Hypothesis 8a stated that leader *temporal reminders* would explain variance in team *task performance*, above and beyond *initiating structure* measured simultaneously during project execution. The relative importance and multiple regression results are presented in Table 13. In the relative importance analysis, the weighted linear combination of *temporal reminders* and *initiating structure* during project execution explained 30% of the variance in team *task performance*. As shown in Model 1 Table 13, *temporal reminders* were the only significant predictor of *task performance*, accounting for 90% of the predicted variance. In contrast, *initiating structure* during project execution accounted for a non-significant 10% of the predicted variance in *task performance*. Consistently, in the multiple regression analysis, *temporal reminders* were the only significant predictor of *task performance* ($\beta = 0.57$; $p < 0.05$), while the beta weight for *initiating structure* was close to zero and non-significant ($\beta = -0.04$; $p > 0.05$). In sum, *temporal reminders* predict team *task performance* over and above the contribution of leader *initiating structure*, supporting Hypothesis 8a.

Hypothesis 8b predicted that leader *temporal reminders* would explain variance in team *cohesion*, above and beyond *initiating structure* during project execution. The results are presented in Model 2 Table 13. In relative importance analysis, the weighted linear combination of *temporal reminders* and *initiating structure* during project execution explained 50% variance in final team *cohesion*. *Temporal reminders* were more important to team cohesion, accounting for a significant 89% of the predicted variance, followed by leader *initiating structure* which explained a significant 11% of the predicted variance in team *cohesion*. In multiple regression analysis, *temporal reminders* significantly predicted team *cohesion* ($\beta = 0.73$; $p < 0.05$), whereas the beta weight of leader *initiating structure* in predicting team *cohesion* was close to zero and non-significant ($\beta = 0.03$; $p > 0.05$).

MSEM with the Inclusion of Initiating Structure

In the next step of hypothesis testing, I estimated the direct and indirect relationships between temporal leadership behaviours, team processes, and team outcomes and assessed whether these relationships held up when *initiating structure* was included in the structural model (Hypothesis 9a & 9b). To test these effects, I ran an additional MSEM which included two additional direct paths: one from leader *initiating structure* (Time 1) to *transition processes* (Time 1) and second from *initiating structure* (Time 2) to *action processes* (Time 2). The results of MSEM with the inclusion of *initiating structure* are presented in Table 14.

Table 13

Relative Importance of Temporal Reminders (Time 2) and Initiating Structure (Time 2) in Predicting Task Performance and Team Cohesion (Time 3) (Hypotheses 8a & 8b)

	Model 1 Task performance					Model 2 Team cohesion				
Predictors	β	RW	CI-L	CI-U	RS-RW (%)	β	RW	CI-L	CI-U	RS-RW (%)
Temporal reminders	0.57***	0.27*	0.04	0.50	89.88	0.73***	0.45*	0.22	0.64	89.01
Initiating structure (Time 2)	-0.04	0.03	-.06	0.10	10.11	0.03	0.05*	0.01	0.15	10.98
	(R^2 = .30, F (2, 59) = 12.842, p <.05)					(R^2 = .50, F (2, 59) = 20.408, p <.05)				

Notes. β = standardized regression weight, RW = raw relative weight, CI-L = lower bound of confidence interval used to test the statistical significance of raw weight, CI-U = upper bound of confidence interval used to test the statistical significance of raw weight, RS-RW = relative weight rescaled as a percentage of predicted variance in the criterion variable attributed to each predictor, *p < .05, **p < .01, ***p < .001

Leadership behaviours at project initiation, team transition processes, and team outcomes (direct and indirect effects). This section presents the simultaneous direct effects of leader *temporal planning* (Time 1) and *initiating structure* (Time 1) on team *transition processes* (Time 1), and their indirect effect on team *task performance* (Time 3) and *cohesion* (Time 3). The results from MSEM revealed a positive and significant direct path from leader *initiating structure* to team *transition processes* ($b = 0.26$, $p < .05$), as presented in Table 14. More importantly, the direct effect of leader *temporal planning* on team *transition processes* also remained positive and significant ($b = 0.88$, $p < .001$), even in the presence of leader *initiating structure* in the model. Collectively, these results support Hypothesis 9a. Using the product of coefficients method (MacKinnon et al., 2002; MacKinnon et al., 2007), I also computed the indirect effects of *initiating structure* on team outcomes via concurrent team *transition processes* and team *action processes*.

In terms of indirect effects, the path from *initiating structure* to team *task performance* through team *transition processes* did not meet the conventional significance criterion of 0.05 ($b = 0.31$, $p = .08$, 95% CI = -0.04, 0.68). However, the results revealed that *temporal planning* remained significant and indirectly related to *task performance* through team *transition processes* ($b = 1.08$, $p < .01$, 95% CI = 0. 43, 1.73), even with the inclusion of *initiating structure* in the structural model. In addition, the indirect effect of leader *initiating structure* measured at project initiation on team *cohesion* via team *transition processes* was small and non-significant ($b = 0.10$, $p > .05$, 95% CI = -0.03, 0.23). In contrast, the indirect path from leader *temporal planning* to team *cohesion* via team *transition processes* remained positive and significant ($b = 0.34$, $p < .05$, 95% CI = 0. 01, 0.67), even in the presence of leader *initiating structure*. These results support the conclusion that temporal planning at the project initiation stage has a unique and important role to play in the prediction of project team outcomes, above and beyond the effects of traditional task-focused leadership in the form of initiating structure offered at the same time.

Leadership behaviours during project execution, team action processes, and team outcomes (direct and indirect effects). This section assesses the simultaneous direct effects of leader *temporal reminders* (Time 2) and *initiating structure* (Time 2) during the project execution stage on team *action processes* (Time 2), their indirect effect on team *task performance* (Time 3) and *cohesion* (Time 3). As shown in Table 14, the results showed a positive and significant direct path from leader *initiating structure* to team *action processes* ($b = 0.48$, $p < .05$). Notably, the direct effect of leader *temporal reminders* on team *action processes* also remained positive and significant ($b = 0.77$, $p < .001$), accepting Hypothesis 9b

Table 14

Test of Direct and Indirect Effects using MSEM (Temporal Leadership vs Initiating Structure)

Direct and indirect paths	Estimate	S.E.	95% CI limits
Temporal planning →Team transition processes	0.88***	0.09	(0.71,1.06)
Initiating structure →Team transition processes	0.26*	0.13	(0.01,0.53)
Team transition processes →Task performance	1.21**	0.34	(0.55,1.88)
Team transition processes →Team cohesion	0.38*	0.18	(0.03,0.74)
Temporal planning →Team transition processes→Task performance	1.08**	0.33	(0.43,1.73)
Temporal planning →Team transition processes→Team cohesion	0.34*	0.16	(0.01,0.67)
Initiating structure →Team transition processes→Task performance	0.31^	0.17	(-.04,0.68)
Initiating structure→Team transition processes→Team cohesion	0.10	0.06	(-.03,0.23)
Temporal reminders →Team action processes	0.77***	0.10	(0.57,0.97)
Initiating structure →Team action processes	0.48*	0.21	(0.07,0.89)
Team action processes →Task performance	0.00	0.28	(-.56,0.56)

Team action processes →Team cohesion	0.44**	0.15	(0.14,0.74)
Temporal reminders →Team action processes→Task performance	0.00	0.22	(-.43,0.43)
Temporal reminders →Team action processes→Team cohesion	0.34*	0.13	(0.07,0.60)
Initiating structure →Team action processes→Task performance	0.00	0.14	(-.27,0.27)
Initiating structure→Team action processes→Team cohesion	0.21*	0.10	(0.09,0.42)
Control variables			
Education→Task performance	5.51**	1.42	(2.73,8.30)
Education→Team cohesion	-0.16	0.85	(-.85,1.50)
Team familiarity→Task performance	-0.17	0.24	(-.65,0.30)
Team size→Task performance	0.01	0.12	(-.23,0.26)
Team size→Team cohesion	0.07	0.08	(-.07,0.23)

Notes. Unstandardized estimates are reported, CI = Confidence interval, S.E. = Standard errors, *$p < .05$, **$p < .01$, ***$p < .001$, ^ $p = .08$

In terms of indirect effects, results showed that the indirect path from *initiating structure* to team *task performance* via team *action processes* was non-significant (b = 0.00, p > .05, 95% CI = -0.27, 0.27). Similarly, the mediating role of team *action processes* in the relationship between leader *temporal reminders* and *task performance* remained non-significant (b = 0.00, p >.05, 95% CI = -0.43, 0.43). Furthermore, I anticipated that leader *initiating structure* during project execution would indirectly predict team *cohesion* via team *action processes*. Results showed that the indirect effect of *initiating structure* on team *cohesion* via team *action processes* is significant (b = 0.21, p < .05, 95% CI = 0.09, 0.42). Importantly, the indirect path from leader *temporal reminders* to team *cohesion* through team *action processes* remained positive and significant (b = 0.34, p < .05, 95% CI = 0.07, 0.60), even in the presence of leader *initiating structure*. Temporal reminders during project execution have a unique and important role to play in the prediction of team cohesion, above and beyond the effects of traditional task-focused leadership in the form of initiating structure offered at the same time.

Supplementary Relative Importance Analysis

Temporal planning vs temporal reminders. In the fifth and last step of the analyses, I present supplemental analyses involving the relative importance of the two temporal leadership and two team processes variables in predicting team *task performance* and *cohesion*. Since both *temporal planning* (Time 1) and *temporal reminders* (Time 2) were more important in predicting team outcomes than *initiating structure*, I decided to estimate their relative importance when included in the same model. This additional analysis was used to partition the variance in team outcomes predicted by both *temporal planning* and *temporal reminders*.

In the first model, *temporal planning* and *temporal reminders* were included as predictors, while team *task performance* was the criterion variable. As shown in Model 1 Table 15, the findings indicated that a weighted linear combination of *temporal planning* and *temporal reminders* explained 36% of the variance in team *task performance*. Further examination of relative weights revealed that *temporal planning* explained 55% of the predicted variance, while *temporal reminders* explained the remaining significant 45% of the predicted variance in *task performance*. In contrast, the multiple regression results suggested that only *temporal planning* had a significant beta coefficient in predicting team *task performance*.

Table 15

Relative Importance Analysis of Temporal Planning (Time 1) and Temporal Reminders (Time 2) to Predict Team Task Performance (Time 3) and Team Cohesion (Time 3)

	Model 1 Task performance					Model 2 Team cohesion				
Predictors	β	RW	CI-L	CI-U	RS-RW (%)	β	RW	CI-L	CI-U	RS-RW (%)
Temporal planning	0.38*	0.20*	0.04	0.37	54.94	0.13	0.15*	0.04	0.27	30.45
Temporal reminders	0.25	0.16*	0.04	0.31	45.05	0.68*	0.35*	0.17	0.52	69.54
	(R^2 = .36, F (2, 59) = 16.942, p <.05)					(R^2 = .50, F (2, 59) = 30.325, p <.05)				

Notes. β = standardized regression weight, RW = raw relative weight, CI-L = lower bound of confidence interval used to test the statistical significance of raw weight, CI-U = upper bound of confidence interval used to test the statistical significance of raw weight, RS-RW = relative weight rescaled as a percentage of predicted variance in the criterion variable attributed to each predictor

In the second model, *temporal planning* and *temporal reminders* were once again predictors, whereas team *cohesion* was the criterion variable. As shown in Model 2 Table 15, *temporal planning* and *temporal reminders* together explain significant variance in team *cohesion*. Collectively, the weighted linear combination of *temporal planning* and *temporal reminders* explained 50% of the variance in team *cohesion*. In this case, *temporal reminders* were a better predictor of team *cohesion* (70% of the predicted variance) than *temporal planning* (30% of the predicted variance). In sum, the results from Model 1 and Model 2 suggest that both facets of temporal leadership are important in predicting team *task performance* and team *cohesion*. *Temporal planning* at the project initiation stage is more useful than *temporal reminders* in predicting final *task performance*, whereas *temporal reminders* during the project execution stage are more useful than *temporal planning* in predicting team *cohesion*.

Transition processes vs action processes. Next, I estimated the relative importance of team *transition processes* (Time 1) and team *action processes* (Time 2) in predicting team *task performance* (Time 3). Since the MSEM results suggested that team *action processes* did not predict team *task performance*, the relative importance analysis provides an alternate approach to assess the significance of both dimensions of team processes in achieving team *task performance*. Following the previously explained procedure, team *transition processes* and team *action processes* were both included as predictor variables, and team *task performance* was the criterion variable. The findings indicated that both dimensions of team processes were important and collectively explained 39% variance in team *task performance*. As shown in Table 16 Model 1, team *transition processes* are relatively more important (60% of the predicted variance) than team *action processes* (40% of the predicted variance).

In the last model, I included team *transition processes* (Time 1) and team *action processes* (Time 2) as predictors and team *cohesion* (Time 3) as a criterion variable. Since both dimensions of team processes were significantly correlated, the relative importance analysis will assess their unique contribution in predicting team *cohesion*. The results suggested that both *transition processes* and *action processes* explain significant and unique variance in team *cohesion*. Collectively, both dimensions of team processes explained 42% variance in team *cohesion*. Individually, as shown in Table 16 Model 2, team *action processes* were relatively more important (56% of the predicted variance) than team *transition processes* (44% of the predicted variance). Based on the statistical findings, the next chapter presents an overall summary of findings, followed by implications and directions for future research.

Table 16

Relative Importance Analysis of Transition Processes (Time 1) and Action Processes (Time 2) to Predict Team Task Performance (Time 3) And Team Cohesion (Time 3)

	Model 1 Task performance					Model 2 Team cohesion				
Predictors	β	RW	CI-L	CI-U	RS-RW (%)	β	RW	CI-L	CI-U	RS-RW (%)
Transition processes	0.48*	0.24*	0.09	0.37	60.29	0.25	0.18*	0.04	0.31	43.74
Action processes	0.18	0.15*	0.07	0.29	39.70	0.43*	0.23*	0.07	0.39	56.25
	(R^2 = .39, F (2, 59) = 19.549, p <.05)					(R^2 = .42, F (2, 59) = 21.748, p <.05)				

Notes. β = standardized regression weight, RW = raw relative weight, CI-L = lower bound of confidence interval used to test the statistical significance of raw weight, CI-U = upper bound of confidence interval used to test the statistical significance of raw weight, RS-RW = relative weight rescaled as a percentage of predicted variance in the criterion variable attributed to each predictor.

CHAPTER 5
Discussion

In this chapter, I review the results of my hypothesis tests, draw conclusions from my findings, and discuss the potential implications and limitations of this research. The chapter is divided into three sections. The first section presents an overall summary of findings with a list of all the hypotheses and their outcomes. In the second section, I discuss important theoretical and managerial implications of this study based on the statistical findings. The third section explores the theoretical and methodological limitations of this study, followed by recommendations for future research regarding temporal leadership and team process models.

Summary of Findings

I proposed and tested an input-process-outcome (IPO) framework of temporal leadership that predicted direct relationships between two aspects of temporal leadership and team outcomes as well as indirect relationships via team processes. First, I presented an extended conceptualisation of temporal leadership including temporal planning and temporal reminders and measured each at the most appropriate project stage to assess their utility in predicting final team outcomes. Second, I positioned each aspect of temporal leadership as an antecedent of a team process in the initiation or execution stage of a new project. The framework presented team processes as mediating mechanisms for temporal leadership inputs at different project stages that positively affect team outcomes. Finally, I assessed the unique contributions of both aspects of temporal leadership compared to the classical task-focused leadership style of initiating structure.

The data were collected from 62 app development teams working on time-limited projects. The study was performed in project-based organisations where teams were new, tasks were interdependent, and the deadline was explicit, providing a reasonable context to assess the proposed IPO model. I implemented a time-based multi-wave survey design to collect data from team members at three critical times in the project lifecycle: at project initiation, at the mid-point of project execution, and at project completion. Team leaders responded once, just after project completion to provide a report of team performance against project goals. Hypotheses were tested with the team as the unit of analysis, using multilevel structural equation modelling (MSEM) and relative importance analysis.

The first six hypotheses (hypothesis 1 to 6b) were concerned with the direct and indirect multilevel relationships between aspects of temporal leadership, team processes, and

team outcomes. The results of the structural model supported most of the hypothesised direct and indirect relationships. Table 17 presents a summary of the results of the hypothesis tests.

Table 17

Summary of Hypotheses and Results

Leader temporal planning and team transition processes hypotheses (direct and indirect effects)		
H1	Leader temporal planning at the project initiation stage will be positively related to the quality of concurrent team transition processes.	✓
H2a	Team transition processes measured at the project initiation stage will be positively related to final project team task performance.	✓
H2b	Team transition processes measured at the project initiation stage will be positively related to team cohesion at the end of the project.	✓
H3a	Team transition processes will mediate the relationship between leader temporal planning at the project initiation stage and final project team task performance.	✓
H3b	Team transition processes will mediate the relationship between leader temporal planning at the project initiation stage and team cohesion at the end of the project.	✓
Leader temporal reminders and team action processes hypotheses (direct and indirect effects)		
H4	Leader temporal reminders during the project execution stage will be positively related to the quality of concurrent team action processes.	✓
H5a	Team action processes measured during the project execution stage will be positively related to final project team task performance.	×
H5b	Team action processes measured during the project execution stage will be positively related to team cohesion at the end of the project.	✓
H6a	Team action processes will mediate the relationship between leader temporal reminders during the project execution stage and final project team task performance.	×
H6b	Team action processes will mediate the relationship between leader temporal reminders during the project execution stage and team	✓

	cohesion at the end of the project.	
	Temporal leadership vs. initiating structure (relative contribution)	
H7a	Leader temporal planning measured at the project initiation stage will explain variance in final project team task performance, above and beyond initiating structure measured at the same time.	✓
H7b	Leader temporal planning measured at the project initiation stage will explain variance in team cohesion at the end of the project, above and beyond initiating structure measured at the same time.	✓
H8a	Leader temporal reminders measured during the project execution stage will explain variance in final project team task performance, above and beyond initiating structure.	✓
H8b	Leader temporal reminders measured during the project execution stage will explain variance in team cohesion at the end of the project, above and beyond initiating structure.	✓
H9a	Leader temporal planning will remain positively and significantly related to the quality of team transition processes when considered simultaneously with initiating structure measured at the project initiation stage.	✓
H9b	Leader temporal reminders will remain positively and significantly related to the quality of team action processes when considered simultaneously with initiating structure measured during the project execution stage.	✓

With respect to the direct effects of leadership on team processes, the results showed that both aspects of temporal leadership are positively associated with team processes at their respective project stages. Leader temporal planning at project initiation and leader temporal reminders during project execution predict the quality of team transition phase processes and team action phase processes, respectively. In regards to the relationship between team processes and team outcomes, the findings of this study suggest that effective execution of team processes at respective project stages have a significant direct effect on team task and/or social performance. Transition phase team processes at the project initiation stage were directly associated with leader-rated task performance as well as team-rated cohesion at project completion. Team action phase processes during project execution stage predicted

team cohesion at project completion. In contrast to the anticipated relationship, the direct effect of team action processes on task performance was not significant.

Regarding indirect effects, the results of the structural model supported most of the relationships that predicted team processes as mediators in the relationship between temporal leadership and the team outcomes of task performance and cohesion. Specifically, leader temporal planning at the project initiation stage was positively associated with team transition processes which, in turn, positively predicted team task performance and team cohesion at project completion. Leader temporal reminders during the project execution stage were positively associated with team action processes which, subsequently, predicted team cohesion at project completion. However, contrary to expectations, the findings did not provide support for the mediating role of team action processes in the association between leader temporal reminders and team task performance.

The lack of support for H5a (action processes to task performance) and 6a (temporal reminders to task performance via action processes) in the MSEM may be due to the sizable correlation between transition processes and action processes. Supplementary relative importance analyses revealed that team transition processes and team action processes both add significantly to the prediction of team task performance. Collectively, the mediating variables of team processes predict 39% of the variance in leader-rated task performance. While transition processes were the better predictor among the two by explaining 60% of the predicted variance, action processes did explain a significant 40% of the predicted variance. Notably, when team transition processes were not included in the structural model, the direct effect of team action processes on team task performance was large and significant.

It is plausible to believe that besides transition processes having a direct effect on task performance, they also work through action processes to accomplish project completion. Lack of initial team planning and misspecification of objectives within the transition phase may lead to a scenario wherein team members have no idea how to coordinate tasks and help each other, especially when the time is short and the project completion deadline is approaching. However, when teams have clear objectives and know the strategy and time limits to achieve those objectives, they stand a better chance of working out individual subtasks, coordinating their collective efforts, and helping each other out when needed.

Transition processes weigh more than action processes in accomplishing on-time task performance which appears to be consistent with the assertion that initial planning-related processes set the stage for later task action process to achieve team objectives in a new project. Also, the correlation of 0.66 between transition processes and action processes may

be read as the former setting the stage for the latter. In sum, the study suggests that effective execution of relevant processes at the respective project stage is the key to completing the project on time and quality with a high degree cohesiveness among team members.

Hypotheses 7a to 8b predicted direct relationships between temporal leadership behaviours and team outcomes beyond the effects of initiating structure delivered in the same project stages. This set of hypotheses was tested using relative importance analysis. Based on the results of this analysis, temporal planning at the project initiation stage is more predictive than initiating structure measured at the same time in explaining team task performance and cohesion. Similarly, temporal reminders delivered during the project execution stage is more useful than leader initiating structure at the same time in predicting both task performance and cohesion.

Both aspects of temporal leadership are useful as well as distinguishable in predicting team task and social outcomes. As shown in the additional relative importance analysis, temporal planning and temporal reminders each explain significant variation in team task performance and team cohesion when considered simultaneously. Collectively, temporal planning and temporal reminders explained 36% of the variance in leader-rated team task performance. Individually, temporal planning explained 55% of this variance, slightly more than temporal reminders which explained 45% of the overall explained variance. Turning to the social outcome of team cohesion, temporal planning and temporal reminders together explained 50% of the variance, although temporal reminders accounted for 70% of the overall explained variance as compared to temporal planning which explained a significant 30% of the total variance.

The comparison between temporal leadership and initiating structure also provided support for this nascent leadership theory. Both temporal planning and temporal reminders showed significant positive direct effects on the quality of team transition processes and team action processes, respectively, even after taking into account leader initiating structure at the same two points. Also, initiating structure failed to explain significant variance in team task performance and cohesion after temporal leadership behaviours were considered. Overall, these results justify the conceptualisation and use of temporal planning and temporal reminders as two separate, albeit correlated predictors of team outcomes. In the section below, I provide theoretical and practical implications of this research.

Theoretical Implications

My thesis provides several theoretical contributions to the literature on time, leadership, and project teams. First, I added "type of temporal leadership" the existing conceptualisation of temporal leadership. This addition decoupled temporal planning and temporal reminders, the two underlying aspects of the temporal leadership construct. Second, I added "time of temporal leadership input" and suggested when each type of temporal leadership is most useful for project team outcomes. Third, I integrated the expanded conceptualisation of temporal leadership with team processes at two project stages. This integration helped to explain how temporal leader behaviour facilitates the quality of different team processes and works through those processes to accomplish team task and social objectives. Fourth, I extended the criterion space of team outcomes by including team cohesion as an indicator of team social performance. This extension helped to assess the utility of temporal leadership in predicting the social aspect of project success, beyond conventional criteria of time, cost, and quality goals. Lastly, I examined the relative importance of temporal leadership as compared to the existing task-focused leadership construct of initiating structure. These results established the empirical and conceptual non-redundancy of temporal leadership. I discuss each of these contributions and their implications in detail in the section that follows.

Type of temporal leadership behaviours. The first contribution of this study is incorporating "type of temporal leader behaviour" into the previously unidimensional theorisation of temporal leadership. All initial studies conceptualised the construct of temporal leadership by combining two foundation measures of temporal planning and temporal reminders. Previous studies used this unidimensional construct and measured temporal leadership only once in a project cycle. In this study, I expanded the temporal leadership construct to being composed of two underlying categories of leader behaviour: temporal planning and temporal reminders. Temporal planning relates to leader scheduling, prioritising, and discussing possible temporal constraints in a new project (Janicik & Bartel, 2003), whereas temporal reminders include reminding teams about initial plans, interim deadlines, and monitoring progress against established performance goals (Gevers et al., 2006).

Time has frequently been referred to as a missing variable in the leadership literature. Leadership scholars have repeatedly called for the development of theories that integrate time and leadership within team and project environments (Alipour et al., 2017; Bluedorn & Jaussi, 2008; Halbesleben et al., 2003; Kozlowski et al., 2016; Shamir, 2011). For instance, Kozlowski and Bell (2003) stated that time is "perhaps the most neglected critical issue" in

team leadership theory (p. 364). Bluedorn and Jaussi (2008) suggest that "the formal use of temporal variables in leadership research has been scarce and scattered," even though "it is difficult, if not impossible, to consider leadership without time playing a role" (p. 657).

Time of temporal leadership inputs. The second theoretical contribution is adding "time of temporal leadership input" to provide a more nuanced investigation of when specific temporal leadership behaviours are particularly relevant in the project cycle. Specifically, leader temporal planning was found to be effective at the project initiation stage, and temporal reminding behaviour was found to be useful during the project execution stage. Each set of temporal leader behaviours coincides with the needs of the team at a specific project stage. Consistent with the functional leadership approach (Fleishman et al., 1991; Zaccaro et al., 2001), the empirical findings substantiated my proposition that temporal planning and temporal reminders are different, useful, and significant at two different project stages for achieving team task and social performance in a new project. The display of two different types of temporal behaviour suggests different mechanisms that first create timelines, priorities, and milestones, and then monitor and regulate the on-going flow of team activities toward eventual project completion while also preserving the team's social environment.

The correlation of 0.76 between temporal planning and temporal reminders suggests relatively stable leader preferences for time-oriented behaviour across both stages of a project. The consistent display of temporal behaviours indicates that team leaders who plan upfront about schedules and priorities often exchange later reminders about meeting planned deadlines and milestones. Such initial temporal planning may allow teams to utilise their time effectively, work out a plan, and devise a strategy to cope with the task and temporal challenges which often arise as the team comes closer to the deadline. Without initial planning, teams will be less able to establish later coordination and may, therefore, face difficulties in completing the task within the specified time frame.

The findings from the relative importance analyses support the conclusion that temporal planning is slightly more influential than temporal reminders in achieving eventual time, cost, and quality goals. Starting off on the right foot in a new project is especially important as effective planning will set a well-understood pattern of time-based activities for the team to follow throughout the project. Following initial temporal planning, team leaders should be better able to remind team members about the planned pace and the necessity of meeting deadlines and schedules discussed early in the project, making their mid-project temporal reminders more effective and acceptable. This is consistent with Janicik and Bartel's (2003) findings that team time-oriented planning creates time awareness norms which help to

coordinate activities and achieve successful performance. While I did not measure temporal ambiguity or temporal conflict in this study, it seems plausible that teams that experienced more temporal planning during the initiation stage may have suffered less from uncertainty or conflict during the execution stage (Santos et al., 2016). Notably, both temporal planning and temporal reminders are distinct constructs which add independently to the prediction of team task performance.

I found that temporal reminders during the project execution stage are relatively more useful than temporal planning at project initiation in predicting team cohesion. A possible explanation for this is that temporal reminders by leaders encourage teams to pick up their pace in performing shared tasks/subtasks and urge them to meet interim deadlines, so are relatively more important in building a supportive social environment where team members make a cohesive effort and strive to help each other in accomplishing collective goals.

In contrast, initial temporal planning is more oriented towards setting the pattern of team activities through scheduling and prioritising. This does build the team's commitment and understanding of future courses of action, but it does not provide an explicit mechanism to build a supportive social environment early in the team's life. Possibly, the team needs some time to work together before reminders about schedules are effective in collective task effort. Consistent with this suggestion, Gevers et al. (2006) noted that the exchange of temporal reminders between team members became effective in achieving shared perceptions of time and interim deadlines only when teams reached the project mid-point, rather than early in the project.

In sum, temporal leadership seems to be an effective team leadership approach. This theory of leadership appears to help teams adjust their pacing so that their task-focused planning and execution activities are aligned with clear timelines and milestones. While time remained a missing piece of team leadership literature, the addition of "type of temporal leadership behaviour" and "time of temporal leadership inputs" to the existing conceptualisation of team temporal leadership is at least part of the answer to the concerns raised by leadership scholars.

Team processes. The third theoretical contribution is the integration of type and time of temporal leadership with a two-phase model of team processes and subsequent team outcomes. This integration provides detailed insight on how aspects of temporal leadership facilitate team task and social performance by enabling mediating team transition and action processes. In this study, I used Marks et al.'s (2001) recurring phase model of team processes to theorise the mediators of the relationship between aspects of temporal leadership and team

outcomes. This model considers that teams are engaged in different processes in two different stages of the project cycle, the initial transition stage processes followed by the later action stage processes.

There is a long history of theoretical models based on the logic of input-processes-outcomes framework. Such frameworks consider inputs as antecedents to team processes. Despite the long-standing recognition of various aspects of such antecedents (e.g., individual team member and team level characteristics, leadership behaviours, and organisational and contextual factors), Druskat and Wheeler (2003) observed that "external leaders appear to be a forgotten group" amongst various antecedents and that "scholars have provided little theory to clarify their role" (p. 455). Burke et al. (2017) and Mathieu et al. (2008) noted that there are very few research articles that have framed and empirically tested team leadership as an antecedent to team processes, and the nature of leadership behaviours that work through these processes to accomplish team effectiveness.

To this end, the functional leadership approach at least theoretically makes it clear that the team leader has a role to play in enabling team processes and team outcomes (Fleishman et al., 1991; Zaccaro et al., 2002). The functional approach suggests that the team leader has the responsibility to fulfil team needs with the aim of achieving team effectiveness (Fleishman et al., 1991; McGrath, 1962; Zaccaro et al., 2001). This team leadership approach considers ". . . leader as completer . . . the best a leader can do is to observe which functions are not being performed by a segment of the group and enable this part to accomplish them" (Schutz, 1961, p. 61). Despite this recognition, the existing literature is surprisingly silent on the role of team leader behaviours as antecedents of team processes over time in ensuring team success, especially within the dynamic project context (Mathieu et al., 2008; Morgeson et al., 2010).

While the functional leadership approach indeed provides a theoretical foundation to study leadership as an antecedent to team processes, scholars have also emphasised the need to examine temporal dynamics in such leadership process models (e.g., Castillo & Trinh, 2018; Shamir, 2011). Several studies have called to integrate time as content in team leadership constructs as well as to study how the association between leadership inputs, team processes, and outcomes are time-dependent (Burke et al., 2017; Shamir, 2011; van der Erve, 2004). For instance, Wageman et al. (2009) advocated that the essence of effective team leadership is knowing when and how to intervene during different team stages and building team processes at every step to help accomplish goals. Fischer et al. (2017) emphasised the importance of adequately capturing temporal dynamics and the need to develop a time-

sensitive model of leadership processes. Mohammed and Alipour (2014) argued that "it is important to consider the process by which leaders manage multiple time frames, synchronise member contributions, and coordinate work so that deadlines are met" (p.178). Lord and Dinh (2014) highlighted the importance of considering indirect leadership effects on team performance that are distributed across time and level of analysis. Earlier, Halbesleben et al. (2003) suggested that the leader's awareness and understanding of temporal complexity (e.g., time frames, tempo, synchronisation, and sequence) is a critical competency that is important to effectively lead people in creative projects. As Mathieu et al. (2008) rightly pointed out, "there remains much to be learned about the nature of the external leader's influence on teams" (p. 450).

My IPO model and subsequent empirical support resonate with this large body of literature which has emphasised the need to capture temporal dynamics in the association between effective leadership and team progress over time. The IPO model makes a significant contribution by positioning aspects of temporal leadership as antecedents to the transition phase and action phase team processes, which subsequently predict task and social performance. Findings suggest that temporal leadership serves as an explicit coordination mechanism which enables project stage-relevant team transition or action processes. Initial leader temporal planning allows teams to deliberate on their objectives and focus on their strategies to attain task as well as social goals (transition processes), whereas later leader temporal reminders create urgency and encourage members to coordinate and back each other up in becoming a cohesive and effective unit (action processes). I suggested that team needs change over time which requires changing leadership behaviours and the testing of my model largely substantiated these predictions. My findings are consistent with the functional approach to team leadership which underlines the importance of time in team leadership as well as other teams literature that called for considering team leadership theories as antecedents to team activity models (Castillo & Trinh, 2018; Fleishman et al., 1991; Mathieu et al., 2008; Morgeson et al., 2010).

Another related and useful contribution of this study is to consider two team processes constructs (i.e. transition and action processes) within the proposed IPO framework. Mathieu et al.'s (2008) review of the studies using Marks et al.'s (2001) recurring phase model of team processes discovered a minimal number of studies that have conceptualised and empirically tested more than one dimension of team processes (i.e. transition, action, and interpersonal processes). While I considered a short-term project as being an episode and measured transition processes and action processes when they are anticipated to occur within a real-

world organisational project, such time-sensitive measurement of team processes that largely coincides with the original theory is less evident in the literature.

Both transition phase team processes and action phase team processes measured at their respective project stages made contributions to final team goal attainment. Team transition processes at the project initiation stage were significant in ensuring that the project was completed on time, budget, and with high quality and cohesion, whereas team action processes during project execution stage helped in preserving the socio-emotional environment and facilitated team cohesion at the completion of the project. Thus, this study reaffirms that the smooth execution of team processes is vital for the effectiveness of temporary project teams, supporting the recurring phase model of team processes (Marks et al., 2001).

Expanding the criterion space. In this study, I expanded the criterion space to include the social outcome of team cohesion in addition to objective time and task-specific measures of project success. Project management researchers have called for the inclusion of team social processes as an essential dimension of project success (Shenhar & Dvir, 2007; Turner & Zolin, 2012). These scholars understand that many projects fail because of team members' lack of commitment and morale weakening the socio-emotional environment of the team. A similar view emerges from the mainstream time and teams literature which often reports conflicts and disagreements within the social and interpersonal sphere of team functioning (e.g., Tuckman, 1965; Marks et al., 2001). Especially within the context of short-term projects, poor team social environment in the form of time conflicts, task conflicts, and relationship conflicts have a detrimental effect on team effectiveness (De Dreu & Weingart, 2003; Jansen & Kristof-Brown, 2005; Mohammed & Harrison, 2013). This suggests that success should not only be conceived from a traditional view of task completion but should also include the team's subjective experience that can go well beyond the completion of the immediate project.

Within short-term projects, temporal leadership helps in nurturing and sustaining the team's social environment, resulting in team cohesion. Strong temporal leadership behaviours first provide teams with a structure and timeline of subtasks which enable each member to understand their role in the smooth flow of task execution, and then motivate them to complete their subtasks within the set timelines which protects them from possible backlogs, escalating time pressure, and conflicts that often arise later in the project. The effective utilisation of available time may help teams to remain unaffected by time pressure and enjoy a pleasant experience of working with their teammates. My findings are consistent with

Mohammed and Nadkarni (2011) and Santos et al. (2016) who suggested that temporal leadership harmonises diverse time perspectives, establishes temporal norms, reduces temporal conflicts and ambiguities, and enhances the chances that team members stay committed to their tasks and complete work on time. Fewer unpleasant interpersonal conflicts, as well as more shared success, should serve to enhance end-of-project team cohesion.

Temporal leadership as a distinct construct. Finally, this study contributes to the leadership literature by comparing the effectiveness of temporal leadership with the classical leadership construct of initiating structure. The comparison supports temporal leadership as a distinct and more effective leadership style for project teams than the task-focused leadership construct of initiating structure. Scholars have noted that new constructs are often introduced to the literature without careful evaluation of their conceptual and empirical non-redundancy (Le et al., 2010). New leadership constructs are often highly correlated with classical constructs and consequently, fail to be "robust predictors" when considered in conjunction with them (Hoch et al., 2018; Piccolo et al., 2012).

In the past few years, we have seen the emergence of leadership studies which compare different leadership theories and their relative importance in predicting a common set of outcomes (e.g., Banks et al., 2018; Hoch et al., 2018; Piccolo et al., 2012). Scholars understand that it is crucial to compare leadership constructs across paradigms and when possible to integrate them to understand leadership processes and outcomes better. DeRue et al. (2011) pointed out the important concern that "the leadership literature suffers from construct proliferation…many supposedly distinct leadership traits and behaviors overlap theoretically and empirically…certain leader traits and behaviors lose much of their predictive validity when considered in conjunction with other leadership traits and behaviors" (p. 37-38).

It is especially important to explore the incremental contribution because Mohammed and Nadkarni (2011) reported that their unidimensional measure of temporal leadership correlated moderately strongly with initiating structure ($r = 0.47$, $p < 0.01$) at the team level. In this study, I found similar correlations between temporal planning and initiating structure ($r = 0.47$, $p < 0.01$) and between temporal reminders and initiating structure ($r = 0.50$, $p < 0.01$) at the team level of analysis. Therefore, I tested the conceptual and empirical non-redundancy of temporal leadership compared to initiating structure.

Both temporal planning and temporal reminders at their respective project stages added incremental variance in the prediction of final task performance and team cohesion, above and beyond leader initiating structure measured at the same two times. These findings suggest that temporal leadership is a unique leadership approach and plays a much more

significant role than initiating structure in achieving project team outcomes. As suggested by Mohammed and Alipour (2014), temporal leadership is a new leadership perspective because it focuses on time-specific leader behaviour in a way that existing leadership constructs do not.

The findings are consistent with previous research by Myer and Mohammed (2012) who found that temporal leadership contributed above and beyond initiating structure and consideration to rated willingness to follow the leader in a cross-sectional self-report study of classroom teams. My work advances their work in several ways. First, I used two aspects of temporal leadership assessed at different points in real-world projects, with initiating structure also measured at those two time points. Second, my criterion variables were broader, involving a leader-rated objective measure of task performance in the form of on-time, within budget, and high-quality project output as well as the team-rated socio-emotional aspect of team cohesion. Predictor and criterion variables were measured at separate times and appropriate project stages. In sum, this study confirms the uniqueness and usefulness of the temporal leadership construct compared to initiating structure, effectively rebutting concerns about "construct proliferation" highlighted by leadership scholars (e.g., Banks et al., 2018; DeRue et al., 2011; Hoch et al., 2018).

While the evidence is clear that initiating structure is positively related to team performance in general (Burke et al., 2006), it does not seem to be the most effective leadership style to adopt in time-sensitive project-based contexts where greater temporal emphasis is needed. Initiating structure lacks the degree of focus on the essential component of time management as a determinant of team performance and includes other aspects of performance pressure and rule-oriented leader behaviour. The previous literature (e.g., Pearce et al., 2003) argued that initiating structure comprises two sub-dimensions: directive leadership and autocratic leadership. Directive leadership involves the assignment of tasks, building a structure for group activities, and pushing for productivity. Autocratic leadership includes ruling with an iron hand and making decisions without group consultation (Schriesheim, House, & Kerr, 1976). These dimensions lack the essential component of time scheduling and management which are critical for goal accomplishment within a project-based environment.

Taken together, both aspects of temporal leadership were found to play a useful role in facilitating team outcomes directly as well as indirectly via team processes. It is now safe to suggest that temporal leadership is a unique team leadership approach as compared to existing

leadership theories. The encouraging findings of this study have important implications for project leaders and decision makers which I will discuss in the next section.

Managerial Implications

This research provides useful lessons for team leaders and project-based organisations. The research was conducted in project-based organisations with real project teams working in a high time pressure context. The measure of task performance, defined as bringing the project in on time, within budget, and meeting functional requirements, is common and highly relevant in project-based organisations. The appropriate context and statistical findings are helpful to guide leaders about their temporal behaviours across project stages and the influence of such behaviours in building team norms and understanding about time.

First, temporal leadership is a beneficial approach to leading time-discrete project teams towards completion and cohesion. The role of the project leader is crucial and should be proactively oriented to using time well to complete tasks effectively. Given their higher level understanding of the task environment and task resources, leaders may be better positioned than team members themselves to determine how limited temporal resources should be managed (Morgeson & DeRue, 2006). It is the responsibility of the team leader to keep their team informed about time constraints and deadlines and to foster the development of effective team processes throughout the project.

Second, project leaders should be encouraged to use both of the two types of temporal leadership behaviours to structure team activities at the appropriate stage of short-term projects. Notably, it is invaluable to get off on the right foot with up front time and task planning. As the teams literature (e.g., Gersicks, 1988) and findings of my study suggest the beginning of the project is a crucial time for teams to avoid slow progress and conflicts and work out a way to reach the end goal. Therefore, project leaders are advised to take the lead and set the team on track towards achieving project goals. Specifically, project leaders are advised to emphasise temporal constraints and interim deadlines to their teams very early in the project. This will ensure that teams understand their task and work according to their mission, goals, and strategy. During the execution stage of a project, leaders should ask team members about progress, remind teams about task/sub-tasks milestones and approaching deadlines, and actively coordinate tasks.

Leadership input is a necessary but not sufficient condition to ensure success. Besides effective leadership, team processes have a role to play in team success. Project leaders should be trained to understand and monitor team processes (i.e. transition processes and

action processes) at appropriate project stages. Their leadership input should be tailored to stimulate team processes and focused on building a conducive environment in which teams self-regulate their task planning and performing activities. It is crucial that teams respond to leader input by developing time norms and understanding throughout the project life. Team members need to understand that when they set a clear agenda, coordinate and help each other in fulfilling this agenda and realise the importance of meeting timelines, the results will be timely project completion as well as a pleasant team experience. Importantly, success or failure in a project context is attributed to the team as a unit rather than to individual team members.

Third, training and development programs designed for leaders in project-based contexts should include a temporal component which builds leader capability to manage effectively in time-pressured environments. Leaders should be taught to view time, a somewhat intangible resource, as critically important to project success. Without effective management of time throughout the project the other resources of team member skills and budget may be squandered. Social capital among team members may also be threatened if poor temporal leadership allows temporal conflict and ambiguity to occur.

Fourth, in addition to teaching the two types of temporal leadership behaviours and how and when to use them, and how to monitor and encourage appropriate team processes, project leader training may also include instruction on using project management tools and techniques (PMTT) for scheduling and monitoring project progress in a project cycle (Jugdev, Perkins, Fortune, White, & Walker, 2013; Patanakul, Iewwongcharoen, & Milosevic, 2010; PMI, 2013). Since each stage of the project lifecycle has its own characteristics, the appropriate use of specific PMTT in these stages are known to contribute towards the outcomes required for each phase. During the project initiation stage, project managers recommend the use of PMTT such as the Critical Path Method and hierarchical schedule (Patanakul et al., 2010). The Critical Path Method helps to identify the sequence of activities that are critical to the project schedule, while the hierarchical schedule is used to communicate the project schedule to teams and clients. In the project execution stage, milestone analysis is a recommended project management tool which helps to monitor project time and cost status against planned progress objectives (Jugdev et al., 2013; Patanakul et al., 2010). Using an explicit and appropriate PMTT may help project leaders perform temporal leadership better. These PMTT may also serve as a coordinating mechanism on their own, making the team less reliant on “live” leader reminders once initial temporal planning has

been done. Next, I present the limitations of this study and future research directions on temporal leadership and team processes.

Limitations and Future Research

Overall, this study has several theoretical and methodological strengths. Theoretically, my proposed IPO framework specified two distinct temporal leadership behaviours and their value across project stages. It also provided a convincing reflection of how leadership inputs serve through team processes over time to accomplish team objectives in the task as well as the social sphere. Methodologically, this study also has several strengths. The sampled teams were working in a real-world project context with extensive time challenges. The data were collected from these teams using a time-based survey design, measuring the independent and dependent variables from two different respondents. Moreover, leadership and team processes variables were assessed when they were expected to occur in the project cycle. Third, the statistical techniques of MSEM and relative importance analysis are two of the most advanced, robust, and appropriate techniques to test multilevel (i.e., 1-1-2 study design) and incremental variance hypotheses, respectively.

Despite several strengths, there are limitations to the present research that call for attention in interpreting the results. Notably, these limitations will guide the need for future research on temporal leadership and team processes. The limitations are concerned with the measurement of variables and the design adopted to test the framework.

Measurement. The first limitation is related to the measures used. While all scales met standards of reliability and performed well in CFAs, there is room for improvement and further development of some measures. I will discuss issues of measuring temporal leadership and team processes, then comment on the measure of initiating structure used in this thesis.

***Temporal planning and temporal reminders*.** I used two foundation measures of temporal planning and temporal reminders to conceptualise temporal leadership. Both measures appear in the teams literature and were adapted to reflect leader behaviour. This extended conceptualisation and measurement more comprehensively capture team temporal leadership as compared to the prior literature (Mohammed & Nadkarni, 2011). Also, the reliability of measurement and utility of both measures in predicting outcomes were satisfactory. However, because each aspect of temporal leadership was measured only at the hypothesised relevant project stage, it is unclear how distinct the two aspects would be if team members reported on both temporal planning and temporal reminders at the same time.

Team processes. I drew on Marks et al.'s (2001) recurring phase model of team processes as the source of the mediating team processes in this study. Their taxonomy of team processes is comprised of three higher-order dimensions: transition phase processes, action phase processes, and interpersonal processes. Transition phase processes have three sub-dimensions which include mission analysis and planning, goal specification, and strategy formulation. Action phase processes are also comprised of three subordinate dimensions which include team coordination, team backing-up behaviour, and team monitoring.

In this study, the transition phase processes measure initially had eight items reflecting all three subordinate dimensions. Based on CFA results, three items were deleted. However, the final five-item scale remained true to the original intended meaning with items reflecting all three sub-dimensions of transition processes. For action phase processes, I began with thirteen items that measured its three sub-dimensions. Six items of these items were excluded in the final analysis following CFA. Again, the remaining seven items reflected all three sub-dimensions of team action processes. Although I have used the best available items to measure all subordinate team processes underlying higher-order transition phase and action phase constructs, dropping a large number of items is a potential limitation in regards to the measurement of variables.

Marks and colleagues' team processes framework is a very popular and highly cited model but lacks established measures of the hypothesised team processes. Their pioneering work synthesised earlier time and team activity models and made an essential initial contribution in delineating team processes from emergent states. Unfortunately, no study has systematically developed a scale to measure transition and action team processes. Studies which have theorised and measured these processes have used different scale items to reflect three higher-order dimensions. Therefore, there is a need to develop comprehensive and reliable scales to measure these team process constructs.

Initiating structure. There are possible issues with the measurement of initiating structure. Two well-developed measures of this construct exist. I used the older version of Leader Behavior Description Questionnaire (LBDQ) by using all 15 items from the original LBDQ developed by Halpin (1957). In 1963, Stogdil revised Halpin's questionnaire to create the LBDQ – Form XII. This later version from Stogdil (1963) used 10 items selected mainly from the original 15 item scale of Halpin (1957). Most recent leadership studies have used the updated LBDQ- Form XII (e.g., Holtz & Harold, 2013).

Nine of the 15 items I used also appear in the modern ten items LBDQ- Form XII by Stogdil (1963). A score based on these nine items correlated strongly with Halpin's (1957)

full 15-items LBDQ scale used for the analysis at both project stages. Correlations between the nine-item scale and full LBDQ measure were 0.93 at project initiation and 0.89 at project execution. I conclude that both scales capture the initiating structure construct well. When I repeated the analyses using the shortened measure which is most similar to the LBDQ- Form XII, the pattern and significance of results did not change.

Study design. The second limitation is related to the single-source measurement of leadership behaviours and team processes at two project stages. Leadership behaviour and team processes variables were rated concurrently by team members at each stage of the project, potentially giving rise to common-source bias (Podsakoff, Mackenzie, Lee, & Podsakoff, 2003). If the sampled teams had large sizes, I could have addressed this concern by dividing respondents in each team randomly in two halves, using one half to describe leader behaviour and the other half to report team processes. However, this was not possible due to the relatively small average team size.

Being mindful of this concern, the conceptual distinctiveness between temporal leadership and team processes was established by using a series of confirmatory factor analyses (CFA). First, the results of the four-factor hypothesised model were found to be superior to the alternate two-factor and three-factor model. Second, support for the conceptual distinctiveness between leader temporal planning and team transition processes at project initiation as well as between leader temporal reminders and team action processes during project execution was also found using two separate CFAs. Third, I also used Bagozzi and Phillips' (1991) nested model method to verify the discriminant validity of temporal leadership behaviours and team processes measured concurrently at two points in the project. Taken together, the results present a reasonably compelling case for the conceptual and empirical distinction between leadership behaviours and team processes measured simultaneously, though I acknowledge that common source bias remains a potential limitation of this study.

Concerns about common source bias recede when outcome variables are considered. The outcome of team cohesion was rated by team members at a different point in time than the leadership and process variables. In addition, the outcome variable of team task performance was rated by a different source altogether (the team leader), and the variable operationalisation may be seen as more objective in nature.

Another related limitation concerns the lack of conclusive evidence that temporal leadership causes team processes which subsequently aid in accomplishing team outcomes. As noted previously, temporal leadership behaviours and team processes were measured

concurrently at respective project stages. With this design, I recognise that the causal relationship between leadership behaviours and team processes cannot be directly established. However, the proposed theorisation of framing team processes as the mediator of the relationship between leadership behaviours and team outcomes is consistent with the well-established input-process-outcome logic and other teams literature (e.g., Mathieu et al., 2008). The statistical results of the study also re-affirmed my parsimonious theorisation that both temporal planning and temporal reminders work via team processes to accomplish team outcomes. Nevertheless, I consider this as a potential limitation of this study which opens the avenue for future research.

Lastly, another design problem relates to the one-time measurement of temporal planning and temporal reminders at two separate project stages. With this design, it was not possible to conclusively determine that temporal planning is *most* relevant at the initiation of the project and temporal reminders is *most* effective during the middle of the project. Research that concurrently measures both aspects of temporal leadership at multiple points in the project would be helpful in verifying exactly when different types of temporal leadership are most useful. Having noted the limitation of this study, I now describe the avenue of future research which paves the way to incrementally build and establish temporal leadership and team processes theory in the future research.

Future research. I have identified three critical areas for future research: i) additional mediators of the effects of temporal leadership on team outcomes, ii) moderators/boundary conditions of the impact of temporal leadership on team outcomes, particularly team, task, or organizational characteristics which could magnify or neutralize this relationship, and iii) efficacy of temporal leadership training. Next, I describe in detail these three directions for future research.

Mediators of the effects of temporal leadership on team outcomes. My findings provided evidence of the mediating role of team processes in the relationship between temporal leadership and team outcomes. Future studies could build on this by exploring the mediating role of other team constructs, such as team emergent states. Marks and colleagues (2001) note that emergent states tap shared qualities of a team represented by team members' attitudes, values, cognition, and motivations. They further delineated emergent states from team processes by describing the former as "constructs that characterise properties of the team that are typically dynamic in nature and vary as a function of team context, inputs, processes, and outcomes" (p. 357). A few examples of emergent states that have received attention in the team literature are team efficacy, team climate, and collective cognition (e.g.,

shared temporal cognitions, shared mental models) (Gevers et al., 2009; Kozlowski & Ilgen, 2006; Pirola-Merlo, Hartel, Mann, & Hirst, 2002).

Temporal leadership should facilitate helpful emergent states which mediate between temporal leader behaviours and project outcomes. For instance, temporal planning may positively nurture a shared team perspective about the management of task priorities and timelines in a project (i.e. shared temporal cognitions), which subsequently helps team members to self-regulate toward their deadlines. Similarly, temporal reminders might enhance a team's collective belief in their capability to structure and follow the required course of action (i.e., team efficacy), which subsequently helps them to accomplish project goals and timelines. Future findings regarding other mediators would be helpful in training team leaders in not just how to lead, but in how to monitor these desirable emergent states as a consequence of their leader behaviour.

Moderators of the effects of temporal leadership on team outcomes. The IPO framework did not consider situational moderators which might magnify or neutralise the impact of temporal leadership on team processes or team outcomes. Future research could explore possible moderators/boundary conditions which may affect the relationships between temporal leadership, team processes, and project success. This potential line of research may draw from two inter-related streams of research including the substitutes for leadership model (Kerr & Jermier, 1978) and situational perspectives on leadership (Fiedler, 1971; Kerr, Schriesheim, Murphy, & Stogdill, 1974).

Kerr and Jermier's (1978) "substitutes for leadership" model identified a host of situational variables that can either substitute for, neutralise, or enhance the effects of a leader's behaviour on individual and team outcomes. Included among those variables are four team/subordinate characteristics (team ability; need for independence; professional orientation; and indifference to organizational rewards), three task characteristics (task feedback; routine, methodologically invariant tasks; and intrinsically satisfying tasks), and six organisational characteristics (organisational formalisation; organisational inflexibility; group cohesiveness; amount of advisory/staff support; rewards outside the leader's control; and the degree of spatial distance between supervisors and subordinates). Moreover, Kerr and Jermier (1978) posited that team specific characteristics such as the team's ability (i.e., experience, training, and knowledge), need for independence, professional orientation, and indifference to organisational rewards would tend to neutralise task-oriented leadership.

Although the substitutes for leadership model has received mixed support in the literature (Dionne, Yammarino, Atwater, & James, 2002), there exists empirical and

theoretical justification for considering substitute variables or situational moderators in the leadership of project teams. Theoretically, Rico et al. (2008) proposed that team performance is sometimes driven by team implicit coordination mechanisms reflected in the self-organising nature of team coordination rather than by explicit coordination mechanisms. Implicit coordination mechanisms capture the ability of a team to perform by anticipating the needs of the task and other team members and adjusting behaviour accordingly, without the need for explicit communication (Espinosa et al., 2004, Fiore, Salas, & Cannon-Bowers, 2001, Rico et al., 2008). Implicit coordination mechanisms are unlike explicit coordination mechanisms, which require extensive communication between team members to articulate a plan, define responsibilities, seek information, and negotiate on deadlines. Amongst other factors, implicit coordination between team members is often driven by the length of time team members have been working together as a team, their social interactions, and knowledge about each other's expertise (Espinosa et al., 2004; Rico et al., 2008). These task-specific factors often help teams to successfully adjust and integrate their behaviours during common tasks, requiring minimal explicit leadership inputs to structure and facilitate task flow towards goals attainment.

Empirically, Keller (2006) provided some evidence of the incremental effect of team ability (experience, training, and knowledge) and intrinsic satisfaction in predicting project team performance over time, even in the presence of transformational leadership and initiating structure. Very recently, Santos et al. (2016) found that team high shared temporal cognition provides an implied coordination mechanism that allows members to have similar understandings about the use of time and to establish temporal norms about time and task objectives; hence such teams did not require temporal leadership to complete their project on time. Maruping et al. (2015) showed that the interaction between temporal leadership and time pressure had a positive main effect on team performance, such that temporal leadership was especially important to maintain team processes and facilitate performance when time pressure was moderate or high.

In this study, following Mohammed and Nadkarni (2011), the temporal leadership measures used to assess leader temporal planning and leader temporal reminders were adapted from the self-regulated teams literature (Gevers et al., 2006; Janicik & Bartel, 2003). Both measures were designed to capture team member behaviour in proactively managing the team's use of project time. There may be some team, task, or organisational characteristics which condition whether team processes and outcomes can be produced by more

spontaneous/egalitarian/self-regulated team member contributions without substantial input from a leader.

Regarding team characteristics, the team's ability (i.e., experience and training) may substitute for or minimise the need for temporal leadership input in team processes and outcomes. It is likely that when team members have prior experience of successfully executing similar projects and are highly skilful and knowledgeable, their standard time management and task execution methods may suffice to produce project success. Such teams may know the importance of time in short-term projects as well as know about when and how to plan and coordinate subtasks during a project cycle. Hence, the pace, timing, and flow of interdependent activities towards project goals may be driven largely by their collective ability rather than requiring explicit leader input.

Regarding task characteristics, task interdependence could moderate the relationship between temporal leadership and team outcomes such that this relationship is stronger in the presence of highly interdependent tasks. Task interdependence is the degree to which group members must share and synchronise their task input (e.g., knowledge, information and resources) to achieve task accomplishment. It refers to the mutual interaction and interconnections related to group tasks (Van Der Vegt, Emans, & Van De Vliert, 1998; Shea & Guzzo, 1987) and is considered one of the key features of task work that influences team processes and performance (Saavedra, Earley, & Van Dyne, 1993). In short-term creative projects, team members have different task roles and task expertise; each contributes to the various parts of the same task in a flexible order. The successful completion and performance of the task require strong coordination among team members (Saveedra et al., 1993).

Drawing on situational perspectives on leadership (Fiedler, 1971; Kerr, Schriesheim, Murphy, & Stogdill, 1974), it can be expected that temporal leadership and the team processes which it builds will be more important for team task and social performance when teams are engaged in highly and reciprocally interdependent tasks. In the situation of high task interdependence, temporal leadership should help teams understand their collective goals, the time available to achieve those goals, the timing of specific actions, and the priorities of tasks throughout the task cycle. As a result, team ambiguities surrounding the timelines, milestones and task sequence are reduced or eliminated, which helps them in achieving their goals within the specified deadline.

Highly interdependent project teams need effective planning, scheduling, and specification of task goals. They are required to be more focused on prioritising tasks and identifying roles/responsibilities since the tasks performed by one team member are highly

dependent on the quality and timeliness of task output by another. In contrast, when interdependence is low, every team member can work at his or her own pace since the performance is less likely to be derailed by one team member missing an interim deadline. The literature suggests that interdependent teams need to have a shared and accurate understanding of situations that may impede team performance (e.g., Edmondson, 2003; Espinosa, Lerch, Kraut, Salas, & Fiore, 2004; Larson & Schauman, 1993). Team mental model studies show that teams having a shared understanding of task knowledge, work situations, task equipment, task procedures, and working relationships are more effective (e.g., Mathieu et al., 2000; Mohammed & Dumville, 2001; Stout et al., 1999).

Temporal leadership schedules, coordinates, and synchronises interdependent team activities so that the negative aspects of team members' temporal individual differences are reduced (Mohammed & Nadkarni, 2011). It brings consensus to the way teams manage the pace, flow, and rhythm of their task. When teams experience strong temporal leadership, their goal-setting processes and coordinated actions should allow them to avoid task delays and conflicts caused by the interdependent nature of work. Hence, it is expected that task interdependence presents a context where there is an increased need for temporal leadership to build team processes necessary to pave the way for team performance.

Regarding organisational characteristics, future studies may investigate and compare the effectiveness of temporal leadership in stable versus temporary teams working in traditional organisational settings and project settings, respectively. Logic suggests that temporal leadership may be least critical in long-established, stable teams that are not working in a project environment and experience few explicit time constraints. Experienced teams pursuing continuing activities rather than episodic projects may develop an understanding of roles and how time is to be used which is on-going and self-regulating, rather than needing regular leader intervention at the start of each novel project with unfamiliar teammates. The teams in my sample were working on short-term projects with explicit completion dates, making temporal leadership particularly very useful. The relative advantage of temporal leadership compared to other leadership behaviours such as initiating structure may be somewhat smaller in conventional organisational structures with more open-ended time frames.

On a related note, there is a need to test the impact of temporal leadership on project success within a sample of teams working in a western country. Cultural factors such as preferences for leader-subordinate power distance may influence leadership processes (House, Hanges, Javidan, Dorfman, & Gupta, 2004). Although teams within my sample were

comprised of individuals with considerable skills and experience of working in short-term projects, they were located in Pakistan which is culturally a high-power distance country (Hofstede, 1980). Even the initial studies from Mohammed and Nadkarni (2011) and Maruping et al. (2015) had project teams working in the business outsourcing and software industry in India, which once again presents a culturally high-power distance country. Yuan and Lo (2018) collected their data in Taiwan. In such high-power distance cultures, subordinates are more likely to accept hierarchy and unilateral direction and expect guidance from their superiors (Daniels & Greguras, 2014). Excessive structuring by a leader may be rejected in a more egalitarian western culture. It would be interesting for future studies to assess the utility of temporal leadership in teams from low-power distance western countries. It is possible that in low-power distance work cultures, teams will plan and monitor their own task processes and progress and may be less reliant on temporal behaviours by their leaders. On the other hand, the individualism more common in many western nations may derail team efforts requiring coordination and cooperation without leader intervention, whereas the collectivism and willingness to accommodate to team needs often found in Asian nations may partially substitute for temporal guidance from a leader.

Lastly, future studies could investigate the interaction between temporal planning and temporal reminders on team outcomes. While I found that temporal planning is more important than temporal reminders in predicting task performance, the impact of temporal reminders on team performance might depend on the level of temporal planning (low vs. high). With low initial temporal planning, the leader will not be able to remind about task timelines and establish later coordination as convincingly. In turn, temporal reminders may be less useful in producing team performance. The interaction between temporal planning and temporal reminders might predict additional variance in team outcomes.

Causality and the efficacy of temporal leadership training. Given that I conducted a multi-wave field study of naturally occurring temporal leadership, future researchers may wish to use experimental designs. As an emerging leadership theory, there is a need for more rigorous experimental tests to 1) establish a causal relationship between temporal leadership and team performance outcomes and 2) develop and refine effective training on temporal leadership. A first step may be a laboratory experiment involving short-term team projects in which some leaders are not trained and others are trained in one or both aspects of temporal leadership. Subsequent laboratory studies may manipulate task interdependence, team ability, and other possible moderators of the impact of temporal leadership.

Concluding Remarks

"Time" in the leadership literature is noted as a missing feature, time and time again. To their credit, Mohammed and Nadkarni's (2011) study of temporal leadership took the initiative and set the stage for other scholars to build on their theory. The purpose of this thesis was to contribute by answering the questions of when, how and whether temporal leadership matters to the success of project teams. The strong theoretical foundation followed by the encourging statistical findings of this study provide much-needed answers to these questions. My research has taken temporal leadership theory one step forward as well as generating practical advice for project team leaders. However, as Mathieu et al. (2008) pointed out, "there remains much to be learned about the nature of the external leader's influence on teams" (p. 450). While we now know more about temporal leadership, team processes, and project success, more remains to be learned.

References

Alipour, K. K., Mohammed, S., & Martinez, P. N. (2017). Incorporating temporality into implicit leadership and followership theories: Exploring inconsistencies between time-based expectations and actual behaviors. *The Leadership Quarterly, 28*(2), 300-316.

Ancona, D. G., Goodman, P. S., Lawrence, B. S., & Tushman, M. L. (2001). Time: A new research lens. *Academy of Management Review, 26*(4), 645-663.

Arbuckle, J. L. (1996). Full information estimation in the presence of incomplete data. In G. A. Marcoulides & R. E. Schumacker (Eds.), *Advanced structural equation modeling* (pp. 243–277). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Arrow, H. (1997). Stability, bistability, and instability in small group influence patterns. *Journal of Personality and Social Psychology, 72*(1), 75-85.

Arrow, H., McGrath, J. E., & Berdahl, J. L. (Eds.) (2000). *Small groups as complex systems: Formation, coordination, development, and adaptation*. Thousand Oaks, CA: Sage.

Bagozzi, R. P., Yi, Y., & Phillips, L. W. (1991). Assessing construct validity in organizational research. *Administrative Science Quarterly, 36*(3), 421-458.

Bakker, R. M. (2010). Taking stock of temporary organizational forms: A systematic review and research agenda. *International Journal of Management Reviews, 12*(4), 466-486.

Bakker, R. M., Boroş, S., Kenis, P., & Oerlemans, L. A. (2013). It's only temporary: Time frame and the dynamics of creative project teams. *British Journal of Management, 24*(3), 383-397.

Banks, G. C., Gooty, J., Ross, R. L., Williams, C. E., & Harrington, N. T. (2018). Construct redundancy in leader behaviors: A review and agenda for the future. *The Leadership Quarterly, 29*(1), 236-251.

Barrick, M. R., Bradley, B. H., Kristof-Brown, A. L., & Colbert, A. E. (2007). The moderating role of top management team interdependence: Implications for real teams and working groups. *Academy of Management Journal, 50*(3), 544-557.

Bartko, J. J. (1976). On various intraclass correlation reliability coefficients. *Psychological Bulletin, 83*(5), 762-765.

Bass, B. M., & Stogdill, R. M. (Eds.) (1990). *Bass & Stogdill's handbook of leadership: Theory, research, and managerial applications* (3rd ed.). New York: Free Press.

Bliese, P. D. (2000). Within-group agreement, non-independence, and reliability: Implications for data aggregation and analysis. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 349-381). San Francisco, CA, US: Jossey-Bass.

Bliese, P. D., & Hanges, P. J. (2004). Being both too liberal and too conservative: The perils of treating grouped data as though they were independent. *Organizational Research Methods, 7*(4), 400-417.

Bliese, P. D., Chan, D., & Ployhart, R. E. (2007). Multilevel methods: Future directions in measurement, longitudinal analyses, and non-normal outcomes. *Organizational Research Methods, 10*(4), 551-563.

Blount, S., & Janicik, G. A. (2001). When plans change: Examining how people evaluate timing changes in work organizations. *Academy of Management Review, 26*(4), 566-585.

Bluedorn, A. C., & Jaussi, K. S. (2008). Leaders, followers, and time. *The Leadership Quarterly, 19*(6), 654-668.

Bollen, K. A., & Hoyle, R. H. (1990). Perceived cohesion: A conceptual and empirical examination. *Social Forces, 69*(2), 479-504.

Bonebright, D. A. (2010). 40 years of storming: A historical review of Tuckman's model of small group development. *Human Resource Development International, 13*(1), 111-120.

Bryk, A. S., & Raudenbush, S. W. (Eds.) (1992). *Hierarchical linear models*. Newbury Park, CA: Sage.

Burke, C. M., Georganta, E., & Hernandez, C. (2017). The importance of time in team leadership research. In E. Salas, W. B. Vessey, & L. B. Landon (Eds.), *Team dynamics over time: Advances in psychological theory, methods and practice* (Vol. 18, pp. 95-122). Emerald Publishing Limited.

Burke, C. M., & Morley, M. J. (2016). On temporary organizations: A review, synthesis and research agenda. *Human Relations, 69*(6), 1235-1258.

Burke, C. S., Stagl, K. C., Klein, C., Goodwin, G. F., Salas, E., & Halpin, S. M. (2006). What type of leadership behaviours are functional in teams? A meta-analysis. *The Leadership Quarterly, 17*(3), 288-307.

Burnam, M. A., Pennebaker, J. W., & Glass, D. C. (1975). Time consciousness, achievement striving, and the type A coronary-prone behavior pattern. *Journal of Abnormal Psychology, 84*(1), 76-79.

Byrne, B. M. (2001). Structural equation modeling: Perspectives on the present and the future. *International Journal of Testing, 1*(4), 327-334.

Carson, J. B., Tesluk, P. E., & Marrone, J. A. (2007). Shared leadership in teams: An investigation of antecedent conditions and performance. *Academy of Management Journal, 50*(5), 1217-1234.

Casimir, G. (2001). Combinative aspects of leadership style: The ordering and temporal spacing of leadership behaviours. *The Leadership Quarterly, 12*(3), 245-278.

Cassidy, K. (2007). Tuckman revisited: proposing a new model of group development for practitioners. *Journal of Experiential Education, 29*(3), 413-417.

Castillo, E. A., & Trinh, M. P. (2018). In search of missing time: A review of the study of time in leadership research. *The Leadership Quarterly, 29*(1), 165-178.

Ceri-Booms, M., Curşeu, P. L., & Oerlemans, L. A. (2017). Task and person-focused leadership behaviors and team performance: A meta-analysis. *Human Resource Management Review, 27*(1), 178-192.

Chang, A., Bordia, P., & Duck, J. (2003). Punctuated equilibrium and linear progression: Toward a new understanding of group development. *Academy of Management Journal, 46*(1), 106-117.

Chen, J., & Nadkarni, S. (2017). It's about time! CEOs' temporal dispositions, temporal leadership, and corporate entrepreneurship. *Administrative Science Quarterly, 62*(1), 31-66.

Chi, N. W., Chung, Y. Y., & Tsai, W. C. (2011). How do happy leaders enhance team success? The mediating roles of transformational leadership, group affective tone, and team processes. *Journal of Applied Social Psychology, 41*(6), 1421-1454.

Chin, W. W., Salisbury, W. D., Pearson, A. W., & Stollak, M. J. (1999). Perceived cohesion in small groups: Adapting and testing the perceived cohesion scale in a small-group setting. *Small Group Research, 30*(6), 751-766.

Chong, D. S., Van Eerde, W., Chai, K. H., & Rutte, C. G. (2012). A double-edged sword: The effects of challenge and hindrance time pressure on new product development teams. *IEEE Transactions on Engineering Management, 58*(1), 71-86.

Cohen, S. G., & Bailey, D. E. (1997). What makes teams work: Group effectiveness research from the shop floor to the executive suite. *Journal of Management, 23*(3), 239-290.

Cole, M. S., Walter, F., & Bruch, H. (2008). Affective mechanisms linking dysfunctional behaviour to performance in work teams: A moderated mediation study. *Journal of Applied Psychology*, *93*(5), 945.

Conte, J. M., Landy, F. J., & Mathieu, J. E. (1995). Time urgency: Conceptual and construct development. *Journal of Applied Psychology*, *80*(1), 178.

Croon, M. A., & van Veldhoven, M. J. (2007). Predicting group-level outcome variables from variables measured at the individual level: A latent variable multilevel model. *Psychological Methods, 12*(1), 45-57.

Crowley, S. L., & Fan, X. (1997). Structural equation modeling: Basic concepts and applications in personality assessment research. *Journal of Personality Assessment, 68*(3), 508-531.

Daniels, M. A., & Greguras, G. J. (2014). Exploring the nature of power distance: Implications for micro-and macro-level theories, processes, and outcomes. *Journal of Management, 40*(5), 1202-1229.

De Dreu, C. K., & Weingart, L. R. (2003). Task versus relationship conflict, team performance, and team member satisfaction: a meta-analysis. *Journal of Applied Psychology, 88*(4), 741-749.

DeRue, D. S., Nahrgang, J. D., Wellman, N. E. D., & Humphrey, S. E. (2011). Trait and behavioral theories of leadership: An integration and meta-analytic test of their relative validity. *Personnel Psychology, 64*(1), 7-52.

de Waard, E. J., & Kramer, E. H. (2008). Tailored task forces: Temporary organizations and modularity. *International Journal of Project Management, 26*(5), 537-546.

Dickinson, T. L., & McIntyre, R. M. (1997). A conceptual framework for teamwork measurement. In M. T. Brannick, E. Salas, & C. Prince (Eds.), *Team performance and measurement: Theory, methods, and applications* (pp. 19-43). Mahwah, NJ: Lawrence Erlbaum Associates.

Dobbins, G. H., & Zaccaro, S. J. (1986). The effects of group cohesion and leader behavior on subordinate satisfaction. *Group & Organization Management, 11*(3), 203-219.

Druskat, V. U., & Wheeler, J. V. (2003). Managing from the boundary: The effective leadership of self-managing work teams. *Academy of Management Journal, 46*(4), 435-457.

Durham, C. C., Locke, E. A., Poon, J. M., & McLeod, P. L. (2000). Effects of group goals and Time Pressure on group efficacy, information-seeking strategy, and performance. *Human Performance, 13*(2), 115-138.

Edmondson, A. C. (2003). Speaking up in the operating room: how team leaders promote learning in interdisciplinary action teams. *Journal of Management Studies, 40*(6), 1419-1452.

Ellis, A. P., Bell, B. S., Ployhart, R. E., Hollenbeck, J. R., & Ilgen, D. R. (2005). An evaluation of generic teamwork skills training with action teams: Effects on cognitive and skill-based outcomes. *Personnel Psychology, 58*(3), 641-672.

Enders, C. K. (2001). The performance of the full information maximum likelihood estimator in multiple regression models with missing data. *Educational and Psychological Measurement, 61*(5), 713-740.

Enders, C. K., & Bandalos, D. L. (2001). The relative performance of full information maximum likelihood estimation for missing data in structural equation models. *Structural Equation Modeling, 8*(3), 430-457.

Espinosa, J. A., Lerch, J., & Kraut, R. 2004. Explicit vs. implicit coordination mechanisms and task dependencies: One size does not fit all. In E. Salas & S. M. Fiore (Eds.), *Team cognition: Understanding the factors that drive process and performance* (pp. 107-129). Washington, DC, US: American Psychological Association.

Espinosa, J. A., Slaughter, S. A., Kraut, R. E., & Herbsleb, J. D. (2007). Familiarity, complexity, and team performance in geographically distributed software development. *Organization Science, 18*(4), 613-630.

Evans, N. J., & Jarvis, P. A. (1980). Group cohesion: A review and reevaluation. *Small Group Behavior, 11*(4), 359-370.

Field, A. (Ed.). (2006). *Discovering statistics using SPSS for windows: Advanced techniques for beginners*. London: Sage.

Fiedler, F. E. (1971). Validation and extension of the contingency model of leadership effectiveness: A review of empirical findings. *Psychological Bulletin, 76*(2), 128-148.

Fisher, D. M. (2014). Distinguishing between task work and teamwork planning in teams: Relations with coordination and interpersonal processes. *Journal of Applied Psychology, 99*(3), 423-436.

Fischer, T., Dietz, J., & Antonakis, J. (2017). Leadership process models: A review and synthesis. *Journal of Management, 43*(6), 1726-1753.

Fleishman, E. A. (1973). Twenty years of consideration and structure. In E.A. Fleishman & J. G. Hunt (Eds.), *Current developments in the study of leadership* (pp. 1–40). Carbondale, IL: Southern Illinois University Press.

Fleishman, E. A., & Harris, E. F. (1962). Patterns of leadership behaviour related to employee grievances and turnover. *Personnel Psychology, 15*(1), 43-56.

Fleishman, E. A., Mumford, M. D., Zaccaro, S. J., Levin, K. Y., Korotkin, A. L., & Hein, M. B. (1991). Taxonomic efforts in the description of leader behavior: A synthesis and functional interpretation. *The Leadership Quarterly, 2*(4), 245-287.

Flyvbjerg, B., & Budzier, A. (2011). Why your it project may be riskier than you think. *Harvard Business Review, 89*(9), 601-603.

Gersick, C. J. (1988). Time and transition in work teams: Toward a new model of group development. *Academy of Management Journal, 31*(1), 9-41.

Gersick, C. J. (1989). Marking time: Predictable transitions in task groups. *Academy of Management Journal, 32*(2), 274-309.

Gevers, J. M., & Claessens, B. J. (2008). Pacing styles, personality and performance. In R. A. Roe, M. J. Waller, & S. R. Clegg (Eds.), *Time in organizational research* (pp. 102-124). Routledge.

Gevers, J. M., & Peeters, M. A. G. (2009). A pleasure working together? The effects of dissimilarity in team member conscientiousness on team temporal processes and individual satisfaction. *Journal of Organizational Behavior, 30*(3), 379-400.

Gevers, J. M., Rutte, C. G., & Van Eerde, W. (2006). Meeting deadlines in work groups: implicit and explicit mechanisms. *Applied Psychology, 55*(1), 52-72.

Gevers, J. M., Van Eerde, W., & Rutte, C. G. (2009). Team self-regulation and meeting deadlines in project teams: Antecedents and effects of temporal consensus. *European Journal of Work and Organizational Psychology, 18*(3), 295-321.

González-Romá, V., & Hernández, A. (2017). Multilevel modeling: Research-based lessons for substantive researchers. *Annual Review of Organizational Psychology and Organizational Behavior, 4*, 183-210.

Guastello, S. J., & Guastello, D. D. (1998). Origins of coordination and team effectiveness: A perspective from game theory and nonlinear dynamics. *Journal of Applied Psychology, 83*(3), 423-443.

Gully, S. M., Incalcaterra, K. A., Joshi, A., & Beaubien, J. M. (2002). A meta-analysis of team-efficacy, potency, and performance: Interdependence and level of analysis as moderators of observed relationships. *Journal of Applied Psychology, 87*(5), 819-832.

Halpin, A. W. (1957). The leader behavior and effectiveness of aircraft commanders. In R. M. Stogdill & A. E. Coons (Eds.), *Leader behavior: Its description and measurement* (pp. 52–64). Columbus, OH: Bureau of Business Research.

Halbesleben, J. R., Novicevic, M. M., Harvey, M. G., & Buckley, M. R. (2003). Awareness of temporal complexity in leadership of creativity and innovation: A competency-based model. *The Leadership Quarterly, 14*(4), 433-454.

Haleblian, J., & Finkelstein, S. (1993). Top management team size, CEO dominance, and firm performance: The moderating roles of environmental turbulence and discretion. *Academy of Management Journal, 36*(4), 844-863.

Hinkin, T. R. (1998). A brief tutorial on the development of measures for use in survey questionnaires. *Organizational Research Methods, 1*(1), 104-121.

Hoch, J. E., Bommer, W. H., Dulebohn, J. H., & Wu, D. (2018). Do ethical, authentic, and servant leadership explain variance above and beyond transformational leadership? A meta-analysis. *Journal of Management, 44*(2), 501-529.

Hofmann, D. A. (1997). An overview of the logic and rationale of hierarchical linear models. *Journal of Management, 23*(6), 723-744.

Hofmann, D. A., & Gavin, M. B. (1998). Centering decisions in hierarchical linear models: Implications for research in organizations. *Journal of Management, 24*(5), 623-641.

Hofstede, G. (Ed.). (1980). *Culture's consequences: International differences in work-related values*. Beverly Hills, Sage.

Holtz, B. C., & Harold, C. M. (2013). Effects of leadership consideration and structure on employee perceptions of justice and counterproductive work behavior. *Journal of Organizational Behavior, 34*(4), 492-519.

House, R. J., Filley, A. C., & Kerr, S. (1971). Relation of leader consideration and initiating structure to R and D subordinates' satisfaction. *Administrative Science Quarterly,* 19-30.

House, R. J., Hanges, P. J., Javidan, M., Dorfman, P. W., & Gupta, V. (Eds.). (2004). *Culture, leadership, and organizations: The GLOBE study of 62 societies*. Thousand Oaks, CA: Sage.

House, R., Rousseau, D., & Thomas-Hunt, M. (1995). The third paradigm: Meso organizational research comes to age. *Research in Organizational Behaviour, 17,* 71-114.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1-55.

Humphrey, S. E., & Aime, F. (2014). Team microdynamics: Toward an organizing approach to teamwork. *The Academy of Management Annals, 8*(1), 443-503.

Hurley, A. E., Scandura, T. A., Schriesheim, C. A., Brannick, M. T., Seers, A., Vandenberg, R. J., & Williams, L. J. (1997). Exploratory and confirmatory factor analysis: Guidelines, issues, and alternatives. *Journal of Organizational Behavior, 18*, 667-683.

Jacobsson, M., Burström, T., & Wilson, T. L. (2013). The role of transition in temporary organizations: linking the temporary to the permanent. *International Journal of Managing Projects in Business, 6*(3), 576-586.

James, L. R. (1982). Aggregation bias in estimates of perceptual agreement. *Journal of Applied Psychology, 67*(2), 219-229.

James, L. R., Demaree, R. G., & Wolf, G. (1984). Estimating within-group interrater reliability with and without response bias. *Journal of Applied Psychology, 69*(1), 85-98.

Janicik, G. A., & Bartel, C. A. (2003). Talking about time: Effects of temporal planning and time awareness norms on group coordination and performance. *Group Dynamics: Theory, Research, and Practice, 7*(2), 122-138.

Janowicz-Panjaitan, M., Bakker, R. M., & Kenis, P. (2009). Research on temporary organizations: The state of the art and distinct approaches toward 'temporariness'. In P. Kenis, M. Janowicz, & B. Cambré (Eds.), *Temporary organizations: Prevalence, logic and effectiveness* (pp. 56-85). Edward Elgar Publishing.

Jansen, K. J., & Kristof-Brown, A. L. (2005). Marching to the beat of a different drummer: Examining the impact of pacing congruence. *Organizational Behavior and Human Decision Processes, 97*(2), 93-105.

Jehn, K. A., & Mannix, E. A. (2001). The dynamic nature of conflict: A longitudinal study of intragroup conflict and group performance. *Academy of Management Journal, 44*(2), 238-251.

Johnson, J. W., & LeBreton, J. M. (2004). History and use of relative importance indices in organizational research. *Organizational Research Methods, 7*(3), 238-257.

Judge, T. A., Piccolo, R. F., & Ilies, R. (2004). The forgotten ones? The validity of consideration and initiating structure in leadership research. *Journal of Applied Psychology, 89*(1), 36-51.

Jugdev, K., Perkins, D., Fortune, J., White, D., & Walker, D. (2013). An exploratory study of project success with tools, software and methods. *International Journal of Managing Projects in Business, 6*(3), 534-551.

Jung, D. I., & Sosik, J. J. (2002). Transformational leadership in work groups: The role of empowerment, cohesiveness, and collective-efficacy on perceived group performance. *Small Group Research, 33*(3), 313-336.

Keller, R. T. (2006). Transformational Leadership, initiating structure, and substitutes for leadership: A longitudinal study of research and development project team performance. *Journal of Applied Psychology, 91*(1), 202-210.

Kerr, S., & Jermier, J. M. (1978). Substitutes for leadership: Their meaning and measurement. *Organizational Behavior and Human Performance, 22*(3), 375-403.

Kerr, S., Schriesheim, C. A., Murphy, C. J., & Stogdill, R. M. (1974). Toward a contingency theory of leadership based upon the consideration and initiating structure literature. *Organizational Behaviour and Human Performance, 12*(1), 62-82.

Klein, K. J., Conn, A. B., Smith, D. B., & Sorra, J. S. (2001). Is everyone in agreement? An exploration of within-group agreement in employee perceptions of the work environment. *Journal of Applied Psychology, 86*(1), 3-16.

Korman, A. K. (1966). “Consideration,” “initiating structure” and organizational criteria- A review. *Personnel Psychology, 19*(4), 349-361.

Kozlowski, S. W., & Bell, B. S. (2003). Work groups and teams in organizations. In W. C. Borman, D. R. Ilgen, & R. J. Klimoski (Eds.), *Handbook of psychology* (Vol. 12, pp. 333–375). Hoboken, NJ: John Wiley & Sons.

Kozlowski, S. W., & Hattrup, K. (1992). A disagreement about within-group agreement: Disentangling issues of consistency versus consensus. *Journal of Applied Psychology, 77*(2), 161-167.

Kozlowski, S. W., & Ilgen, D. R. (2006). Enhancing the effectiveness of work groups and teams. *Psychological Science in the Public Interest, 7*(3), 77-124.

Kozlowski, S. W., & Klein, K. J. (2000). A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. In K. J. Klein & S. W. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 3-90). San Francisco, CA, US: Jossey-Bass.

Kozlowski, S. W., Mak, S., & Chao, G. T. (2016). Team-centric leadership: An integrative review. *Annual Review of Organizational Psychology and Organizational Behavior, 3*, 21-54.

Kraiger, K., & Wenzel, L. H. (1997). Conceptual development and empirical evaluation of measures of shared mental models as indicators of team effectiveness. In M. T. Brannick, E. Salas, & C. W. Prince (Eds.), *Team performance assessment and measurement: Theory, methods, and applications* (pp. 63-84). Mahwah, NJ: Erlbaum.

Krull, J. L., & MacKinnon, D. P. (2001). Multilevel modeling of individual and group level mediated effects. *Multivariate Behavioral Research, 36*(2), 249-277.

Labianca, G., Moon, H., & Watt, I. (2005). When is an hour not 60 minutes? Deadlines, temporal schemata, and individual and task group performance. *Academy of Management Journal, 48*(4), 677-694.

Lachowicz, M. J., Sterba, S. K., & Preacher, K. J. (2015). Investigating multilevel mediation with fully or partially nested data. *Group Processes & Intergroup Relations, 18*(3), 274-289.

Landy, F. J., Rastegary, H., Thayer, J., & Colvin, C. (1991). Time urgency: The construct and its measurement. *Journal of Applied Psychology, 76*(5), 644-657.

Langfred, C. W. (2004). Too much of a good thing? Negative effects of high trust and individual autonomy in self-managing teams. *Academy of Management Journal, 47*(3), 385-399.

Larson Jr, J. R., & Schaumann, L. J. (1993). Group goals, group coordination, and group member motivation. *Human Performance, 6*(1), 49-69.

Le, H., Schmidt, F. L., Harter, J. K., & Lauver, K. J. (2010). The problem of empirical redundancy of constructs in organizational research: An empirical investigation. *Organizational Behavior and Human Decision Processes, 112*(2), 112-125.

LeBreton, J. M., Burgess, J. R., Kaiser, R. B., Atchley, E. K., & James, L. R. (2003). The restriction of variance hypothesis and interrater reliability and agreement: Are ratings from multiple sources really dissimilar?. *Organizational Research Methods, 6*(1), 80-128.

LeBreton, J. M., & Senter, J. L. (2008). Answers to 20 questions about interrater reliability and interrater agreement. *Organizational Research Methods, 11*(4), 815-852.

Lee-Kelley, L., & Sankey, T. (2008). Global virtual teams for value creation and project success: A case study. *International Journal of Project Management, 26*(1), 51-62.

LePine, J. A., Piccolo, R. F., Jackson, C. L., Mathieu, J. E., & Saul, J. R. (2008). A meta-analysis of teamwork processes: Tests of a multidimensional model and relationships with team effectiveness criteria. *Personnel Psychology, 61*(2), 273-307.

Lewis, K. (2003). Measuring transactive memory systems in the field: scale development and validation. *Journal of Applied Psychology, 88*(4), 587-604.

Lindner, F., & Wald, A. (2011). Success factors of knowledge management in temporary organizations. *International Journal of Project Management, 29*(7), 877-888.

Liu, S., & Wang, L. (2016). Influence of managerial control on performance in medical information system projects: The moderating role of organizational environment and team risks. *International Journal of Project Management, 34*(1), 102-116.

Lord, R. G., & Dinh, J. E. (2014). What have we learned that is critical in understanding leadership perceptions and leader-performance relations?. *Industrial and Organizational Psychology, 7*(2), 158-177.

Lundin, R. A., Arvidsson, N., Brady, T., Ekstedt, E., Midler, C., & Sydow, J. (Eds.) (2015). Managing in project society. In *Managing and working in project society: Institutional challenges of temporary organizations*. Cambridge: Cambridge University Press.

Lundin, R. A., & Söderholm, A. (1995). A theory of the temporary organization. *Scandinavian Journal of Management, 11*(4), 437-455.

MacKinnon, D. P., Fairchild, A. J., & Fritz, M. S. (2007). Mediation analysis. *Annual Review of Psychology, 58*, 593-614.

Mackinnon, S. P., Kehayes, I. L. L., Leonard, K. E., Fraser, R., & Stewart, S. H. (2017). Perfectionistic concerns, social negativity, and subjective well-being: A test of the social disconnection model. *Journal of Personality, 85*(3), 326-340.

MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods, 7*(1), 83-104.

MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research, 39*(1), 99-128.

Marks, M. A., Mathieu, J. E., & Zaccaro, S. J. (2001). A temporally based framework and taxonomy of team processes. *Academy of Management Review, 26*(3), 356-376.

Marks, M. A., & Panzer, F. J. (2004). The Influence of team monitoring on team processes and performance. *Human Performance, 17*(1), 25-41.

Maruping, L. M., Venkatesh, V., Thatcher, S. M., & Patel, P. C. (2015). Folding under pressure or rising to the occasion? Perceived time pressure and the moderating role of team temporal leadership. *Academy of Management Journal*, *58*(5), 1313-1333.

Mathieu, J. E., Heffner, T. S., Goodwin, G. F., Salas, E., & Cannon-Bowers, J. A. (2000). The influence of shared mental models on team process and performance. *Journal of Applied Psychology*, *85*(2), 272-283.

Mathieu, J. E., Maynard, M. T., Rapp, T., & Gilson, L. (2008). Team effectiveness 1997-2007: A review of recent advancements and a glimpse into the future. *Journal of Management, 34*(3), 410-476.

Mathieu, J. E., & Rapp, T. L. (2009). Laying the foundation for successful team performance trajectories: The roles of team charters and performance strategies. *Journal of Applied Psychology, 94*(1), 90.

Mathieu, J. E., & Schulze, W. (2006). The Influence of team knowledge and formal plans on episodic team process-performance relationships. *Academy of Management Journal, 49*(3), 605-619.

McGrath, J. E. (1962). *Leadership behavior: Some requirements for leadership training*. Washington, DC: U.S. Civil Service Commission, Office of Career Development.

McGrath, J. E. (1964). *Social psychology: A brief introduction*. Holt, Rinehart and Winston.

McGrath, J. E. (1991). Time, interaction, and performance (TIP): A theory of groups. *Small Group Research, 22*(2), 147-174.

McGrath, J. E., & Argote, L. (2001). Group processes in organizational contexts. In M. A. Hogg & R. S. Tindale (Eds.), *Blackwell handbook of social psychology: Group processes (*pp. 603-627). Oxford, UK: Blackwell.

McGrath, J. E., & Kelly, J. R. (1986). *The Guilford social psychology series. Time and human interaction: Toward a social psychology of time.* New York, US: Guilford Press.

McGrath, J. E., & Tschan, F. (Ed.) (2004). Temporal matters in social psychology: Examining the role of time in the lives of groups and individuals. Washington, DC, US: American Psychological Association.

Mohammed, S., & Alipour, K. K. (2014). It's time for temporal leadership: individual, dyadic, team, and organizational effects. *Industrial and Organizational Psychology*, *7*(2), 178-182.

Mohammed, S., & Dumville, B. C. (2001). Team mental models in a team knowledge framework: Expanding theory and measurement across disciplinary boundaries. *Journal of Organizational Behaviour, 22*(2), 89-106.

Mohammed, S., Hamilton, K., & Lim, A. (2009). The incorporation of time in team research: Past, current, and future. In E. Salas, G. F. Goodwin, & C. S. Burke (Eds.), *Team effectiveness in complex organizations: Cross-disciplinary perspectives and*

approaches (Society for Industrial and Organizational Psychology Frontier Series). Mahwah, NJ: Erlbaum.

Mohammed, S., Hamilton, K., Tesler, R., Mancuso, V., & McNeese, M. (2015). Time for temporal team mental models: Expanding beyond "what" and "how" to incorporate "when". *European Journal of Work and Organizational Psychology, 24*(5), 693-709.

Mohammed, S., & Harrison, D. A. (2013). The clocks that time us are not the same: A theory of temporal diversity, task characteristics, and performance in teams. *Organizational Behavior and Human Decision Processes, 122*(2), 244-256.

Mohammed, S., & Nadkarni, S. (2011). Temporal diversity and team performance: The moderating role of team temporal leadership. *Academy of Management Journal, 54*(3), 489-508.

Montoya-Weiss, M. M., Massey, A. P., & Song, M. (2001). Getting it together: Temporal coordination and conflict management in global virtual teams. *Academy of Management Journal, 44*(6), 1251-1262.

Morgeson, F. P., & DeRue, D. S. (2006). Event criticality, urgency, and duration: Understanding how events disrupt teams and influence team leader intervention. *The Leadership Quarterly, 17*(3), 271-287.

Morgeson, F. P., DeRue, D. S., & Karam, E. P. (2010). Leadership in teams: A functional approach to understanding leadership structures and processes. *Journal of Management, 36*(1), 5-39.

Mumford, M. D., & Licuanan, B. (2004). Leading for innovation: Conclusions, issues, and directions. *The Leadership Quarterly, 15*(1), 163-171.

Muthén, L. K., & Muthén, B. O. (2010). 1998–2010 Mplus user's guide. Muthén and Muthén.

Myer, A. T., & Mohammed, S. (2012). *Team temporal leadership: Construct development and validation.* A poster presented to the 27th Annual Conference of the Society for Industrial and Organizational Psychology, San Diego, CA.

Neubert, M. J., Kacmar, K. M., Carlson, D. S., Chonko, L. B., & Roberts, J. A. (2008). Regulatory focus as a mediator of the influence of initiating structure and servant leadership on employee behavior. *Journal of Applied Psychology, 93*(6), 1220-1233.

Nohe, C., & Michaelis, B. (2016). Team OCB, leader charisma, and organizational change: A multilevel study. *The Leadership Quarterly, 27*(6), 883-895.

Nunnally, J. (Ed.) (1978). *Psychometric Methods.* New York: McGraw-Hill.

Okhuysen, G. A., & Waller, M. J. (2002). Focusing on midpoint transitions: An analysis of boundary conditions. *Academy of Management Journal, 45*(5), 1056-1065.

Olson, E. M., Walker, O. C., Ruekert, R. W., & Bonner, J. M. (2001). Patterns of cooperation during new product development among marketing, operations and R&D: Implications for project performance. *Journal of Product Innovation Management, 18*(4), 258-271.

Packendorff, J. (1995). Inquiring into the temporary organization: new directions for project management research. *Scandinavian Journal of Management, 11*(4), 319-333.

Park, H.M. (2008). *Report on univariate analysis and normality test using SAS, Stata, and SPSS. Prepared for the University Information Technology Services (UITS), Center for Statistical and Mathematical Computing, Indiana University, USA.* Retrieved from http://www.cef-cfr.ca/uploads/Reference/sasNORMALITY.pdf

Patanakul, P., Iewwongcharoen, B., & Milosevic, D. (2010). An empirical study on the use of project management tools and techniques across project life-cycle and their impact on project success. *Journal of General Management, 35*(3), 41-66.

Patanakul, P., Kwak, Y. H., Zwikael, O., & Liu, M. (2016). What impacts the performance of large-scale government projects? *International Journal of Project Management, 34*(3), 452-466.

Pearce, C. L., Sims Jr, H. P., Cox, J. F., Ball, G., Schnell, E., Smith, K. A., & Trevino, L. (2003). Transactors, transformers and beyond: A multi-method development of a theoretical typology of leadership. *Journal of Management Development, 22*(4), 273-307.

Piccolo, R. F., Bono, J. E., Heinitz, K., Rowold, J., Duehr, E., & Judge, T. A. (2012). The relative impact of complementary leader behaviors: Which matter most?. *The Leadership Quarterly, 23*(3), 567-581.

Pirola-Merlo, A., Härtel, C., Mann, L., & Hirst, G. (2002). How leaders influence the impact of affective events on team climate and performance in R&D teams. *The Leadership Quarterly, 13*(5), 561-581.

Pituch, K. A., Stapleton, L. M., & Kang, J. Y. (2006). A comparison of single sample and bootstrap methods to assess mediation in cluster randomized trials. *Multivariate Behavioral Research, 41*(3), 367-400.

PMI. (2013). *A guide to the project management body of knowledge*. Newtown Square, PA: Project Management Institute.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879-903.

Porter, C. O. (2005). Goal orientation: Effects on backing up behaviour, performance, efficacy, and commitment in teams. *Journal of Applied Psychology, 90*(4), 811-818.

Porter, C. O., Hollenbeck, J. R., Ilgen, D. R., Ellis, A. P., West, B. J., & Moon, H. (2003). Backing up behaviors in teams: The role of personality and legitimacy of need. *Journal of Applied Psychology, 88*(3), 391.

Preacher, K. J., Zyphur, M. J., & Zhang, Z. (2010). A general multilevel SEM framework for assessing multilevel mediation. *Psychological Methods, 15*(3), 209-233.

Price, J. L., & Mueller, C. W. (Eds.) (1986). *Handbook of organizational measures.* Marshfield, MA: Pittman.

Rickards, T., & Moger, S. (2000). Creative leadership processes in project team development: An alternative to Tuckman's stage model. *British journal of Management, 11*(4), 273-283.

Rico, R., Sánchez-Manzanares, M., Gil, F., & Gibson, C. (2008). Team implicit coordination processes: A team knowledge–based approach. *Academy of Management Review, 33*(1), 163-184.

Rowold, J., & Borgmann, L. (2014). Interpersonal affect and the assessment of and interrelationship between leadership constructs. *Leadership, 10*(3), 308-325.

Rowold, J., Borgmann, L., & Bormann, K. (2014). Which leadership constructs are important for predicting job satisfaction, affective commitment, and perceived job performance in profit versus non-profit organizations? *Nonprofit Management and Leadership, 25*(2), 147-164.

Runkel, P. J., Lawrence, M., Oldfield, S., Rider, M., & Clark, C. (1971). Stages of group development: An empirical test of Tuckman's hypothesis. *The Journal of Applied Behavioral Science, 7*(2), 180-193.

Saavedra, R., Earley, P. C., & Van Dyne, L. (1993). Complex interdependence in task-performing groups. *Journal of Applied Psychology, 78*(1), 61.

Salas, E., & Cannon-Bowers, J. A. (2001). The science of training: A decade of progress. *Annual Review of Psychology, 52*(1), 471-499.

Santos, C. M., Passos, A. M., Uitdewilligen, S., & Nübold, A. (2016). Shared temporal cognitions as substitute for temporal leadership: An analysis of their effects on temporal conflict and team performance. *The Leadership Quarterly, 27*(4), 574-587.

Satorra, A., & Bentler, P. M. (2010). Ensuring positiveness of the scaled difference chi-square test statistic. *Psychometrika, 75*(2), 243-248.

Schriesheim, C. A., House, R. J., & Kerr, S. (1976). Leader initiating structure: A reconciliation of discrepant research results and some empirical tests. *Organizational Behavior and Human Performance, 15*(2), 297-321.

Schutz, W. C. (1961). The ego, FIRO theory and the leader as completer. In L. Petrullo & B. M. Bass (Eds.), *Leadership and interpersonal behaviour* (pp. 48-65). New York: Holt, Rinehart & Winston.

Seers, A., & Woodruff, S. (1997). Temporal pacing in task forces: Group development or deadline pressure?. *Journal of Management, 23*(2), 169-187.

Shamir, B. (2011). Leadership takes time: Some implications of (not) taking time seriously in leadership research. *The Leadership Quarterly, 22*(2), 307-315.

Shenhar, A. J., & Dvir, D. (2007). Project management research—The challenge and opportunity. *Project Management Journal, 38*(2), 93-99.

Shipp, A. J., & Cole, M. S. (2015). Time in individual-level organizational studies: What is it, how is it used, and why isn't it exploited more often?. *Annual Review of Organizational Psychology & Organizational Behavior, 2*(1), 237-260.

Singh, J. (1991). Redundancy in constructs: Problem, assessment, and an illustrative example. *Journal of Business Research, 22*(3), 255-280.

Smith, K. G., Smith, K. A., Olian, J. D., Sims Jr, H. P., O'Bannon, D. P., & Scully, J. A. (1994). Top management team demography and process: The role of social integration and communication. *Administrative Science* Quarterly, *39*, 412-438.

Sonnentag, S. (2012). Time in organizational research: Catching up on a long neglected topic in order to improve Theory. *Organizational Psychology Review, 2*(4), 361-368.

Standifer, R. L., Raes, A. M., Peus, C., Passos, A. M., Santos, C. M., & Weisweiler, S. (2015). Time in teams: Cognitions, conflict and team satisfaction. *Journal of Managerial Psychology, 30*(6), 692-708.

Stogdill, R. M. (1963). *Manual for the Leader Behavior Description Questionnaire, Form XII*. Columbus, OH: Bureau of Business Research, Ohio State

Stout, R. J., Cannon-Bowers, J. A., Salas, E., & Milanovich, D. M. (1999). Planning, shared mental models, and coordinated performance: An empirical link is established. *Human Factors: The Journal of the Human Factors and Ergonomics Society, 41*(1), 61-71.

Syrek, C. J., Weigelt, O., Peifer, C., & Antoni, C. H. (2017). Zeigarnik's sleepless nights: How unfinished tasks at the end of the week impair employee sleep on the weekend through rumination. *Journal of Occupational Health Psychology, 22*(2), 225.

Tabachnick, B. G., & Fidell, L. S. (Eds.) (2001). *Using multivariate statistics* (4th ed.). New York: Harper Collins.

The Standish Group. (2015). *Project smart: Prepared for the standish group report (CHAOS)*. Retrieved from https://www.projectsmart.co.uk/white-papers/chaos-report.pdf

Tonidandel, S., & LeBreton, J. M. (2011). Relative importance analysis: A useful supplement to regression analysis. *Journal of Business and Psychology, 26*(1), 1-9.

Tonidandel, S., & LeBreton, J. M. (2015). RWA web: A free, comprehensive, web-based, and user-friendly tool for relative weight analyses. *Journal of Business and Psychology, 30*(2), 207-216.

Tonidandel, S., LeBreton, J. M., & Johnson, J. W. (2009). Determining the statistical significance of relative weights. *Psychological Methods, 14*(4), 387.

Tuckman, B. W. (1965). Developmental sequence in small groups. *Psychological Bulletin, 63*(6), 384-399.

Tuckman, B. W., & Jensen, M. A. C. (1977). Stages of small-group development revisited. *Group & Organization Management, 2*(4), 419-427.

Turner, J. R., & Müller, R. (2003). On the nature of the project as a temporary organization. *International Journal of Project Management, 21*(1), 1-8.

Turner, R., & Zolin, R. (2012). Forecasting success on large projects: developing reliable scales to predict multiple perspectives by multiple stakeholders over multiple time frames. *Project Management Journal, 43*(5), 87-99.

Tyssen, A. K., Wald, A., & Spieth, P. (2013). Leadership in temporary organizations: A review of leadership theories and a research agenda. *Project Management Journal, 44*(6), 52-67.

van der Erve, M. (2004). Temporal leadership. *European Business Review, 16*(6), 605-617.

Van Mierlo, H., Vermunt, J. K., & Rutte, C. G. (2009). Composing group-level constructs from individual-level survey data. *Organizational Research Methods, 12*(2), 368-392.

Wageman, R., Fisher, C. M. & Hackman, J. R. (2009). Leading teams when the time is right: Finding the best moments to act. *Organizational Dynamics, 38*(3), 192–203.

Wallace, L., Keil, M., & Rai, A. (2004). How software project risk affects project performance: An investigation of the dimensions of risk and an exploratory model*. *Decision Sciences, 35*(2), 289-321.

Waller, M. J., Conte, J. M., Gibson, C. B., & Carpenter, M. A. (2001). The effect of individual perceptions of deadlines on team performance. *Academy of Management Review, 26*(4), 586-600.

Waller, M. J., Zellmer-Bruhn, M. E., & Giambatista, R. C. (2002). Watching the clock: Group pacing behavior under dynamic deadlines. *Academy of Management Journal, 45*(5), 1046-1055.

Weissenberg, P., & Kavanagh, M. J. (1972). The independence of initiating structure and consideration: A review of the evidence. *Personnel Psychology, 25*(1), 119-130.

Williams, L. J., Vandenberg, R. J., & Edwards, J. R. (2009). 12 structural equation modeling in management research: a guide for improved analysis. *Academy of Management Annals, 3*(1), 543-604.

Woolley, A. W. (1998). Effects of intervention content and timing on group task performance. *The Journal of Applied Behavioral Science, 34*(1), 30-46.

Yarnold, P. R., & Grimm, L. G. (1982). Time urgency among coronary-prone individuals. *Journal of Abnormal Psychology, 91*(3), 175.

Yuan, C. C., & Lo, S. H. (2018). Relationship among team temporal leadership, competency, followership, and performance in Taiwanese pharmaceutical industry leaders and employees. *Journal of Career Development, 45*(3), 227-238.

Yukl, G. (2012). Effective leadership behavior: What we know and what questions need more attention. *The Academy of Management Perspectives, 26*(4), 66-85.

Yun, S., Choi, J., de Oliveira, D. P., & Mulva, S. P. (2016). Development of performance metrics for phase-based capital project benchmarking. *International Journal of Project Management, 34*(3), 389-402.

Zaccaro, S. J., Rittman, A. L., & Marks, M. A. (2002). Team leadership. *The Leadership Quarterly, 12*(4), 451-483.

Zalesny, M. D., Salas, E., & Prince, C. (1995). Conceptual and measurement issues in coordination: Implications for team behavior and performance. *Research in Personnel and Human Resources Management, 13*, 81-115.

Zhang, Z., Zyphur, M. J., & Preacher, K. J. (2009). Testing multilevel mediation using hierarchical linear models: Problems and solutions. *Organizational Research Methods, 12*(4), 695-719.

Appendix A

List of Scale Items for All Measures

Leader Temporal Planning	
Item 1	To what extent does your team leader prioritize tasks and allocate time to each task?*
Item 2	To what extent does your team leader discuss any deadlines?
Item 3	To what extent does your team leader prepare and build-in time for contingencies, problems, and emerging issues?*
Item 4	To what extent does your team leader discuss how often the team is going to meet?
Item 5	To what extent does your team leader discuss how long each particular task would take?
Item 6	To what extent does your team leader set milestones to measure progress on the project?*
Item 7	To what extent does your team leader compare team member's personal schedules for meetings, project-related tasks, etc.?

*Note. Items adapted to the leadership context from Janicik and Bartel's (2003) seven-item Temporal Planning scale. *Items also appearing in Mohammed and Nadkarni's (2011) Temporal Leadership scale*

Leader Temporal Reminders	
Item 1	To what extent does your team leader remind team members of important temporal milestones?
Item 2	To what extent does your team leader urge team members to finish subtasks on time?*
Item 3	To what extent does your team leader prompt team members to stick to agreements about deadlines?
Item 4	To what extent does your team leader make enquiries about task progress?
Item 5	To what extent does your team leader remind team members of important deadlines?*
Item 6	To what extent does your team leader pace the team so that work is finished on time?*
Item 7	To what extent is your team leader effective in coordinating the team to meet client deadlines?*

Note. Items 1 to 4 were adapted to the leadership context from Gevers et al. (2009). Item 2 and items 5 to 7 are from Mohammed and Nadkarni's (2011) Temporal Leadership scale

Initiating Structure	
Item 1	My leader makes his attitudes clear to the group
Item 2	My leader tries out his new ideas with the group.
Item 3	My leader rules with an iron hand.
Item 4	My leader criticizes poor work.
Item 5	My leader speaks in a manner not to be questioned.
Item 6	My leader assigns group members to particular tasks.
Item 7	My leader schedules the work to be done.
Item 8	My leader maintains definite standards of performance.
Item 9	My leader emphasizes the meeting of deadlines.
Item 10	My leader encourages the use of uniform procedures.
Item 11	My leader makes sure that his part in the organization is understood by all group members.
Item 12	My leader asks that group members follow standard rules and regulations.
Item 13	My leader lets group members know what is expected of them.
Item 14	My leader sees to it that group members are working up to capacity.
Item 15	My leader sees to it that the work of group members is coordinated.

Team Transition Processes	
Members of this team have…	
Item 1	spent a lot of time discussing how to go about the task.
Item 2	decided specific milestones for achieving team objectives.
Item 3	agreed on specific timelines for accomplishing team tasks.
Item 4	prioritized goals and sub-goals to accomplish team work.
Item 5	achieved a clear understanding of the team's objectives.
Item 6	considered alternative ways of achieving team objectives.
Item 7	developed an understanding of which team members could be turned to for specific types of tasks.
Item 8	developed an understanding of how to meet our goals and deadlines.

Team Action Processes

Members of this team have…	
Item 1	effectively coordinated the activities of all members when working to complete the task.
Item 2	provided task-related information to each other without being asked.
Item 3	experienced very few misunderstandings about what to do.
Item 4	accomplished the task smoothly and efficiently.
Item 5	effectively adapted their behaviour to the actions of other members.
Item 6	helped each other out with completing tasks.
Item 7	given each other feedback on task performance.
Item 8	backed each other up when a task needs to be completed.
Item 9	checked to make sure that other team members continue to work on project.
Item 10	monitored each other's progress on the project.
Item 11	checked whether everybody is meeting their obligation to the team.
Item 12	watched to make sure everyone in the team meets their deadlines.
Item 13	let each other know if we are encountering delays, problems, or falling behind schedule.

Team Cohesion	
Item 1	I felt that I belonged to this team.
Item 2	I felt happy to be part of this team.
Item 3	I saw myself as part of this team.
Item 4	This team is one of the best anywhere.
Item 5	I felt content to be part of this team.
Item 6	I look forward to being with the members of this team in a future project.

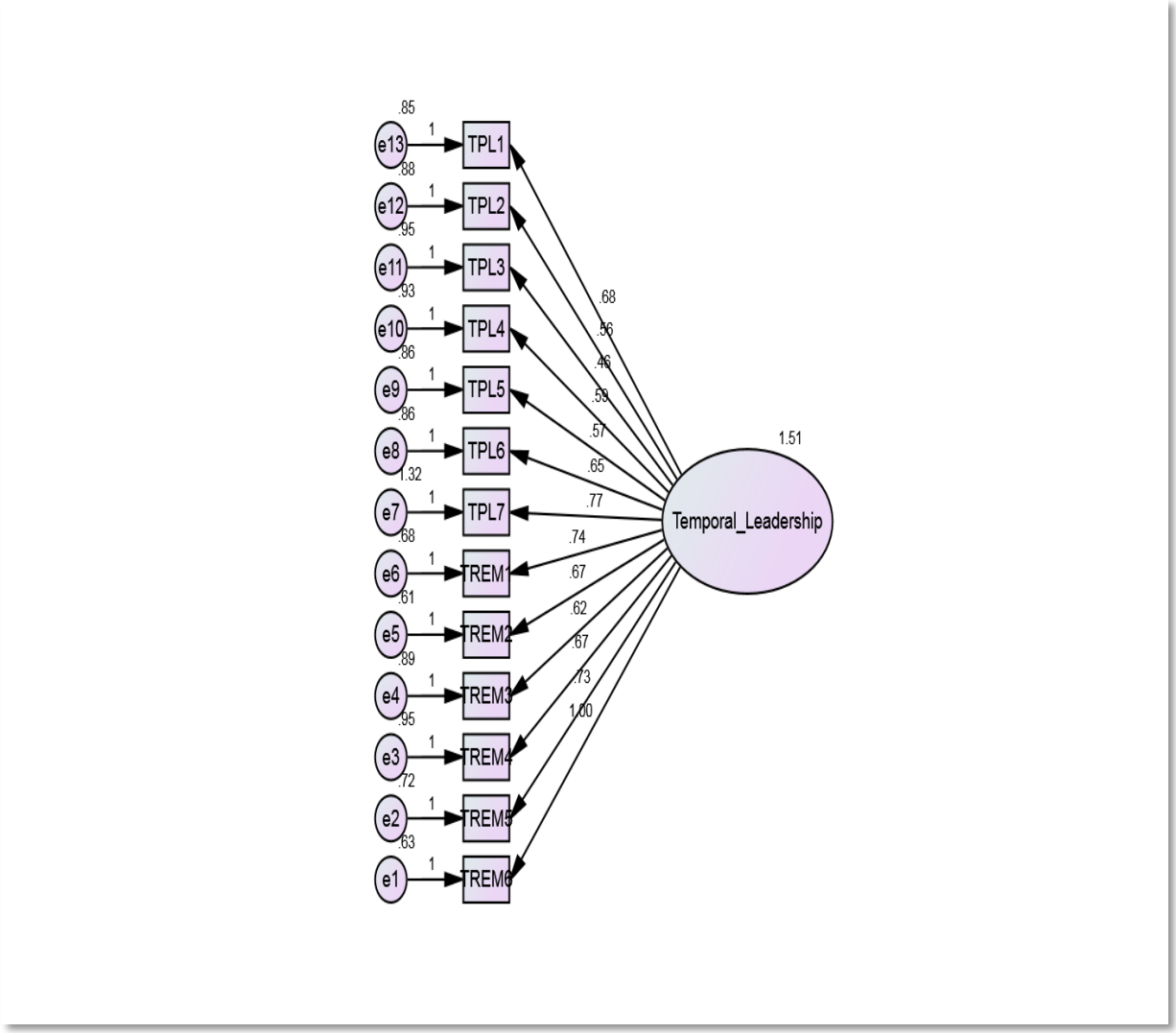
Task Performance	
Item 1	The project met intended functional requirements.
Item 2	The project met its objectives.
Item 3	The project far exceeds expectations with respect to quality
Item 4	The overall quality of the developed project is high.

Item 5 The project was completed within budget.

Item 6 The project was completed on schedule.

Appendix B

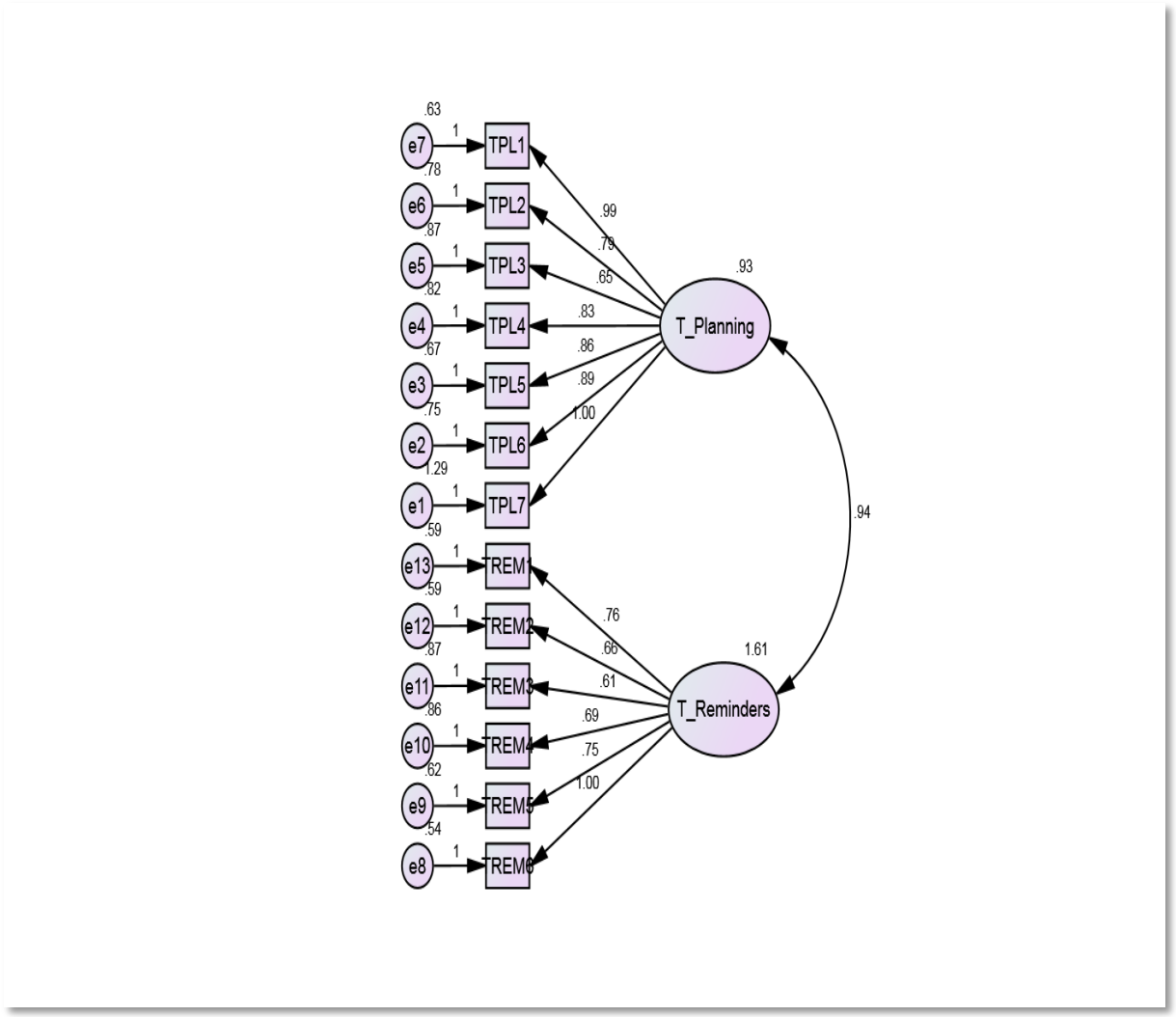
Model 1: Temporal Planning and Temporal Reminders Common Factor Model



Fit Indices: chi-square χ^2 = 267.59; *d.f.* = 65; CFI=0.85; TLI= 0.82; RMSEA= 0.11

Appendix C

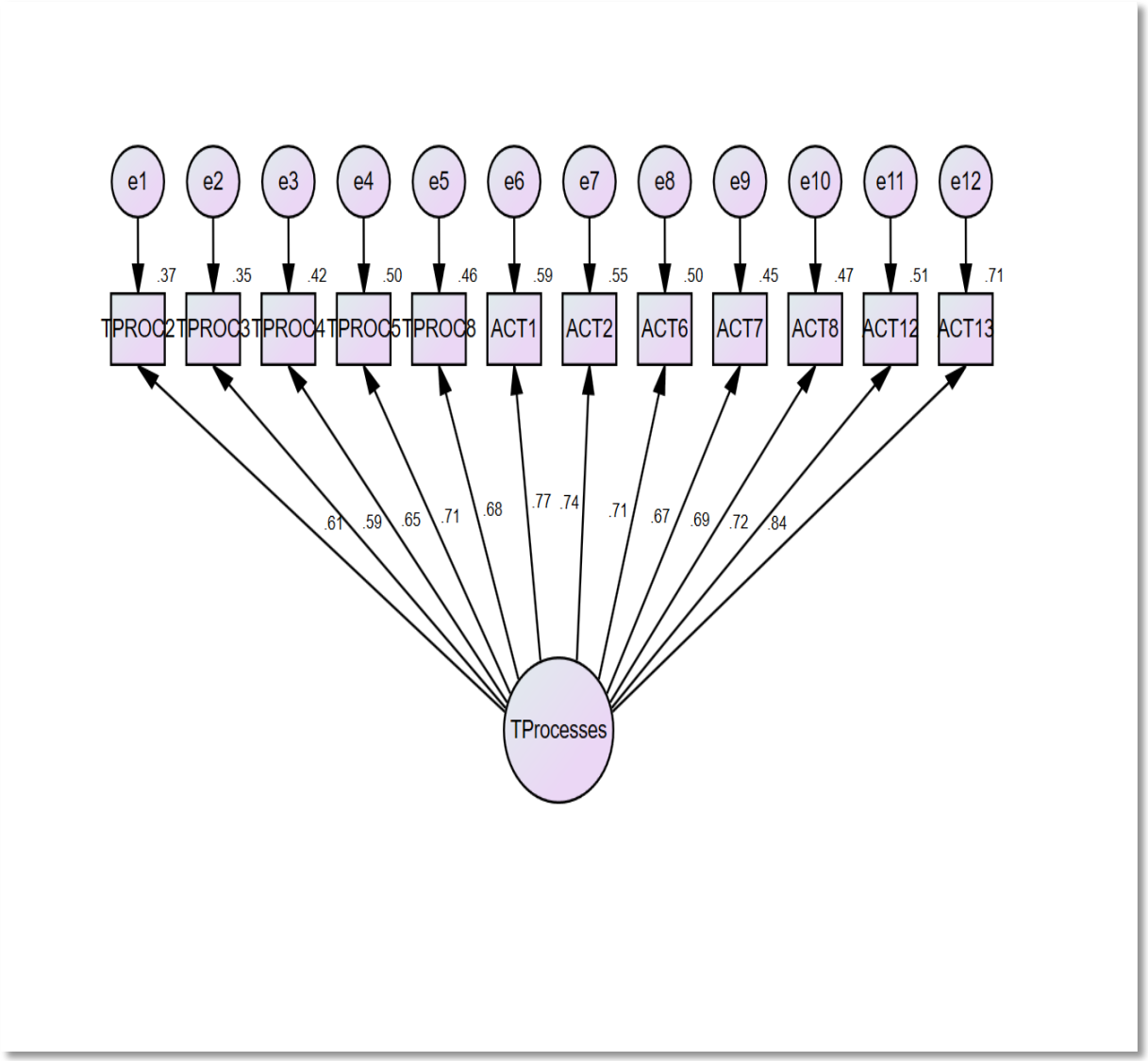
Model 2: Two-Factor Model of Temporal Leadership



Fit Indices: chi-square χ^2= 145.12; *d.f.* = 64; CFI= 0.94; TLI=0.92; RMSEA= 0.07

Appendix D

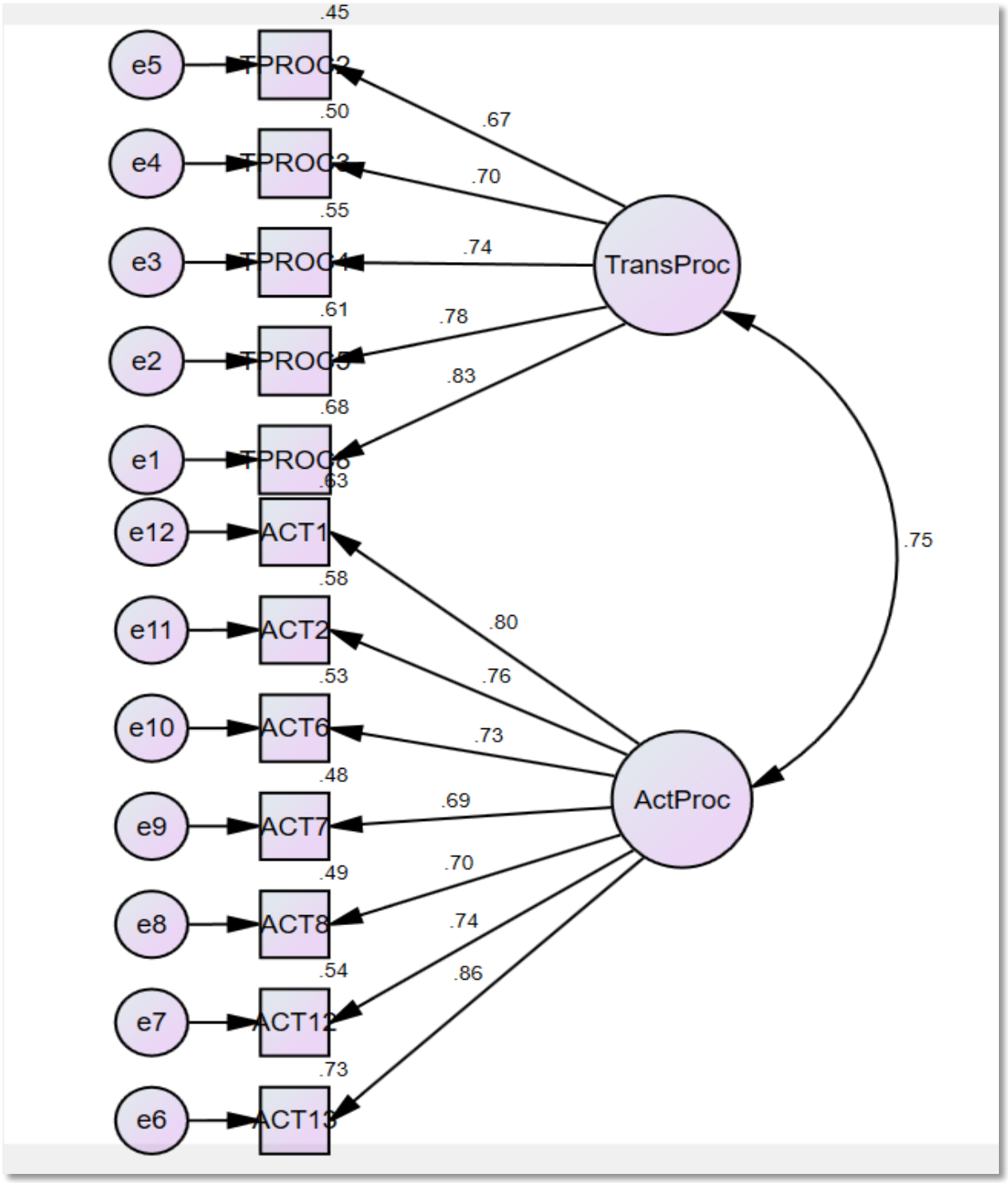
Model 1: Transition and Action Processes Common Factor Model



Fit Indices: chi-square χ^2= 259.79; *d.f.* = 54; CFI= 0.86; RMSEA= 0.133

Appendix E

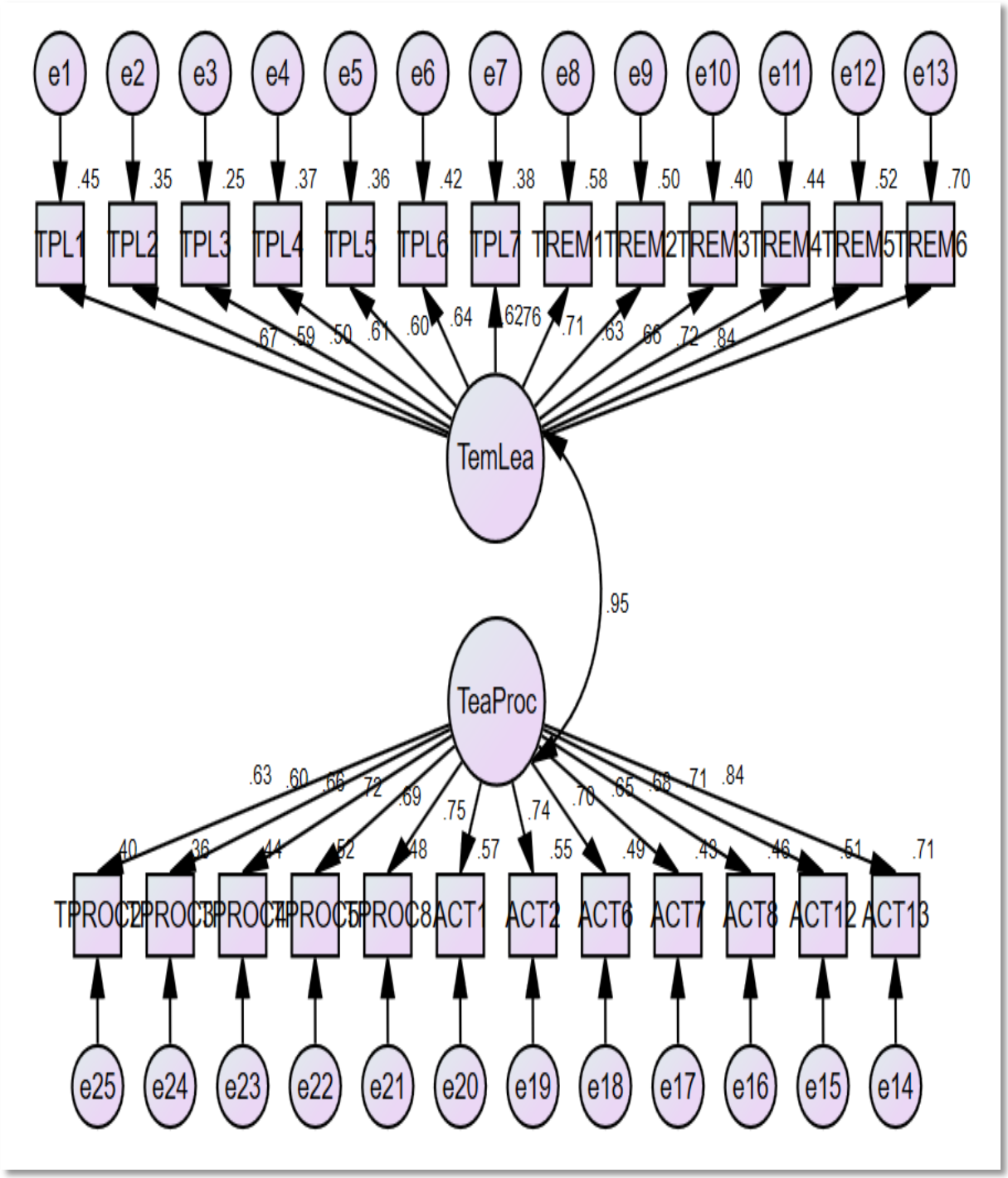
Model 2: Two-Factor Model of Team Processes



Fit Indices: chi-square χ^2 = 116.97; *d.f.*= 53; CFI= 0.95; TLI=0.94; RMSEA= 0.07

Appendix F

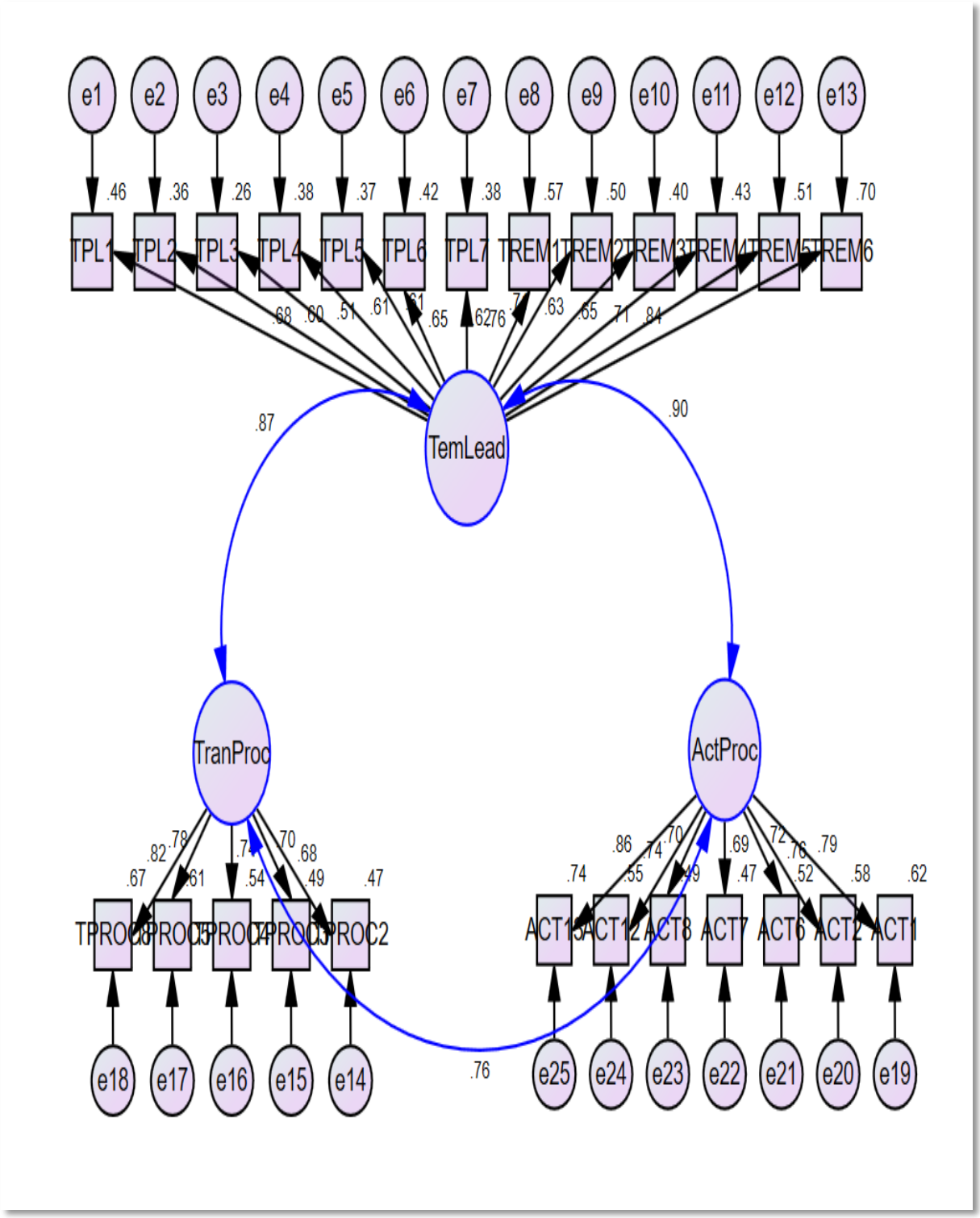
Model 1: Two-Factor Model of Temporal Leadership and Team Processes



Fit Indices: chi-square χ^2 = 808.07; *d.f.*= 274; CFI= 0.83; TLI=0.82; RMSEA= 0.09

Appendix G

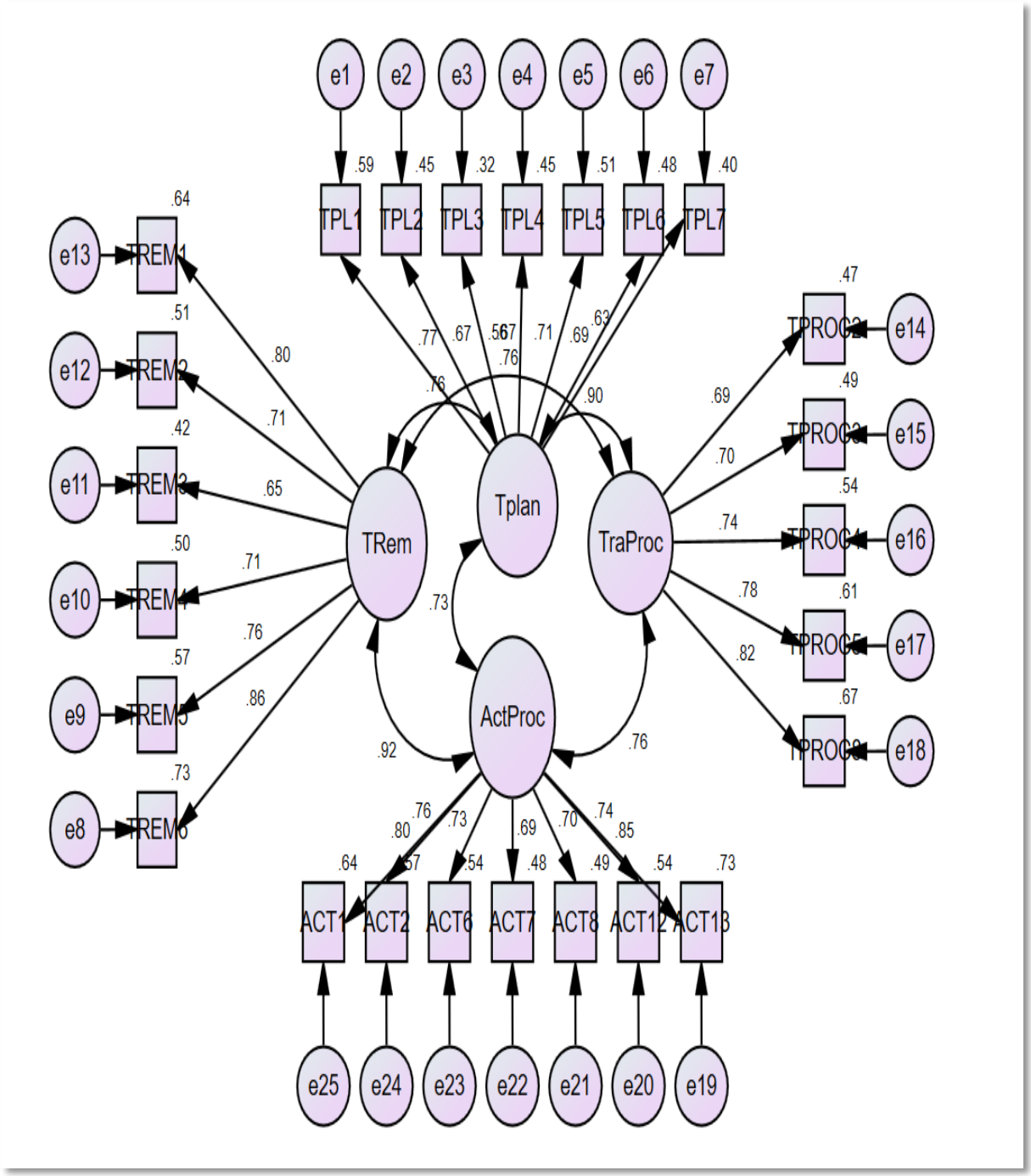
Model 2: Three-Factor Model of Temporal Leadership and Team Processes



Fit Indices: chi-square χ^2 = 662.02; *d.f.*= 272; CFI= 0.88; TLI=0.87; RMSEA= 0.08

Appendix H

Model 3: Hypothesized Four-Factor Model of Temporal Leadership and Team Processes



Fit Indices: chi-square χ^2 = 487.88; *d.f.*= 269; CFI= 0.93; TLI=0.92; RMSEA= 0.06