

**DYNAMIC PERSON, CONTEXT, AND EVENT DETERMINANTS
OF INDIVIDUAL MOTIVATION IN TEAMS**

A Dissertation
Presented to
The Academic Faculty

by

Samuel Joseph Posnock

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy in the
School of Psychology

Georgia Institute of Technology
August 2015

COPYRIGHT © 2015 BY SAMUEL POSNOCK

**DYNAMIC PERSON, CONTEXT, AND EVENT DETERMINANTS
OF INDIVIDUAL MOTIVATION IN TEAMS**

Approved by:

Dr. Ruth Kanfer, Advisor
School of Psychology
Georgia Institute of Technology

Dr. Howard Weiss
School of Psychology
Georgia Institute of Technology

Dr. Leslie DeChurch
School of Psychology
Georgia Institute of Technology

Dr. Rick Thomas
School of Psychology
Georgia Institute of Technology

Dr. Stephen Zaccaro
School of Psychology
George Mason University

Date Approved: April 9th, 2015

To Edward, who motivates me to be better

ACKNOWLEDGEMENTS

I would first like to thank my graduate advisor, Dr. Ruth Kanfer, for her tireless support and endless patience. I am deeply grateful for her constant professionalism during this challenging and at times emotional process. She pushed me to do my best at everything I did, and this approach has culminated in a dissertation I am very proud of completing. I would also like to thank the members of my committee: Leslie DeChurch, Steve Zaccaro, Rick Thomas, and Howard Weiss, for their deep insight into theory and methods, and their many suggestions toward refining my final document. Leslie and Steve in particular were instrumental in facilitating the experimental process from which my thesis data was drawn. I am very grateful to the National Science Foundation for funding the project which enabled this thesis to come to fruition. Their contributions and support are invaluable for future scientists across the nation.

I could not have completed this dissertation without the intellectual and emotional support provided by Vlad Pop, Victor Ellingsen, Kathy Schnure, Nathna Wiita, and Erin Marie Conklin. Each of them never hesitated to provide a sympathetic ear or sage advice. I would also like to thank my lab mates Matt Betts, Ilya Gokhman, Ben Perrodin, Gina Bufton, and Chelsea Vance for keeping things in perspective. I would especially like to thank my Research Assistant Megan Houlihan for her excellent assistance during my project. Her diligence and attention to detail helped me more than she knows. It was a pleasure working with her to get my data prepared for analysis, and I know she can succeed at anything she attempts.

Finally, I would like to thank my family and friends for tolerating me during my most unlovable moments. To my father, Dr. Eugene Posnock, I try every day to live up to the example he sets for me. His generosity, patience, and success have shown me how I want to live my life, and I'm honored to be the third Doctor Posnock in as many generations. I hope I've made him proud, and I cannot thank him enough. To my mother Christine, she has always known the right words to say. I am deeply grateful for her constant love and kindness. To all the friends I have made in Atlanta, it has been a pleasure and an honor. There are simply too many to name here. To my fraternity brothers, ESPONDA! Finally, to Jennifer Hackney, I offer my greatest appreciation for her deep intellectual curiosity and endless love.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	v
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF SYMBOLS AND ABBREVIATIONS	xii
SUMMARY	xiii
<u>CHAPTER</u>	
1 INTRODUCTION	1
1.1 The present study	4
1.2 Time	6
1.3 Emergent states	11
1.4 Ambient stimuli	15
1.5 Traits	16
1.6 Discretionary stimuli	19
1.7 Exploratory hypotheses	21
2 METHOD	26
2.1 Procedure	26
2.1.1 Sample	27
2.1.2 Phase I project task paradigm	30
2.1.2.1 Deliverable 1 (Joint)	30
2.1.2.2 Deliverable 2 (Psychology)	30
2.1.2.3 Deliverable 2 (Ecology)	31
2.1.2.4 Deliverable 3 (Psychology)	31

2.1.2.5 Deliverable 3 (Ecology)	32
2.1.2.6 Deliverable 4 (Joint)	32
2.1.3 Phase I Materials	33
2.2 Measures	33
2.2.1 Time 0 (pre-task)	35
2.2.2 Weekly survey content	36
2.2.3 Mid- and post-task survey content	40
2.2.4 Task demands	44
2.3 Analysis strategy	44
2.3.1 Growth effects	46
2.3.2 Cross-level effects	49
2.3.3 Individual-level effects	51
2.3.4 Exploratory analyses	52
2.3.5 Power analysis	53
3 RESULTS	54
3.1 Descriptive statistics	54
3.2 Within-person trends in resource allocation	57
3.3 Between-team factors	61
3.3.1 Team emergent states	61
3.3.2 Team feedback	63
3.4 Between-person factors	64
3.4.1 Traits	64
3.4.2 Interpersonal events	67
3.5 Exploratory results	69
3.5.1 Team embeddedness	70

3.5.2 Trait effects	71
4 DISCUSSION	73
4.1 Within-person effects of project demands	74
4.2 Motivational effects originating from the team	79
4.3 Individual characteristics influencing motivation	81
4.4 Exploratory findings	84
4.5 Implications	85
4.5.1 Implications for motivation research	85
4.5.2 Implications for team research	88
4.5.2.1 Implications of the episodic perspective	88
4.5.2.2 Relative impact of emergent states	90
4.6 Limitations	91
4.7 Summary and conclusion	93
APPENDIX A: Project Experience Report (T1-T3; T5-6)	95
APPENDIX B: Mid-Project Process Survey Items (Time 4)	96
APPENDIX C: Post-Project Process Survey	100
APPENDIX D: Glossary of terms and definitions	103
APPENDIX E: Overview of hypotheses and findings	105
REFERENCES	107

LIST OF TABLES

	Page
Table 1: Frequency of valid weekly surveys (out of seven) as proportion of total sample (N = 167)	28
Table 2: Total number of responses, missing, and drops by week	28
Table 3: Survey content and administration schedule	34
Table 4: Open-ended affective event response exemplars classified by referent and valence	39
Table 5: Cross-table of weekly event frequencies for valence (negative, neutral, positive) by referent (collective, dyad, task, unspecified)	39
Table 6: Resource allocation and task demands over time	55
Table 7: Motivational trait descriptives and intercorrelations	55
Table 8: Descriptive statistics for mid-, and post-task measures of individual and team motivational states	57
Table 9: Hypotheses 1-2: Within-person effects on resource allocation over time	58
Table 10: Hypotheses 3-5: Dynamic effects of team efficacy, team cohesion, and team feedback on resource allocation	62
Table 11: Hypotheses 6-10: Trait and affective event effects on resource allocation	65
Table 12: Hypotheses 11-14: Exploratory findings on direction of resource allocation	71

LIST OF FIGURES

	Page
Figure 1: Proposed conceptual model of factors influencing the motivation of individuals in teams.	22
Figure 2: Project timeline, measurement schedule, and episodic periods.	29
Figure 3: Model of Hypotheses 1 and 2, depicting contrasting effects operating along different time frames.	48
Figure 4: Model of Hypotheses 3, 4, 5, and 10, articulating the effects of ambient and discretionary events and team emergent states on resource allocation over time.	50
Figure 5: Model of exploratory hypotheses, articulating the effects of indicators of team embeddedness and traits on direction of resource allocation.	52
Figure 6: Isolated effects of task difficulty, episode and sub-episode, plotted as separate predicted trajectories.	60
Figure 7: Predicted trajectory of resource allocation over time (dashed line) as function of task difficulty, episode, and sub-episode. In combination, these predictors reproduce the trend observed in the data (dotted line).	61
Figure 8: Observed impact of team and individual variables on motivation at each time point	75

LIST OF SYMBOLS AND ABBREVIATIONS

γ	Gamma – fixed coefficient
p	Probability – statistical significance value
HLM	Hierarchical linear model(ing)
NS	Not significant
RA	Resource allocation
T#	Measurement time point

SUMMARY

Teams have become increasingly popular in organizations (Devine, Clayton, Philips, Dunford, & Melner, 1999), and the issue of process loss in teams presents a persistent challenge to teamwork and team effectiveness (Karau & Williams, 1993). The present study addresses a basic issue in process loss; namely, team member motivation to contribute personal resources toward individual and team-level goals. This study identified three sources of motivation in teams: Task demands, team attributes, and member traits. Individual motivation increased with task difficulty, increased as deadlines approached, and declined overall with time on task. Team efficacy was positively associated with episodic increases in motivation over time, while cohesion was unrelated to motivation. Trait motivation was positively related, and psychological collectivism negatively related to individual motivation. This relationship persisted over the lifespan of the team. The results of this study have implications for understanding the unique and joint role of individual and contextual influences on team member motivation over time and experience.

CHAPTER 1

INTRODUCTION

Conventional wisdom holds that teams often struggle to stay motivated (Thompson, 2010). Team-focused interventions can improve team performance overall, but these gains may be short-lived, or benefit only a certain subset of team members (DeMatteo, Eby, & Sundstrom, 1998; Sales Executive Council, 2003). Organizations' reliance on work teams presents a crucial need to identify the characteristics of person and context factors that direct and sustain effort over time in teams. This dissertation uses a multilevel framework to examine the person and context factors impacting individual motivation in teams over time.

A team is “a distinguishable set of two or more people who interact, dynamically, interdependently, and adaptively toward a common and valued goal/objective/mission, who have been assigned specific roles or functions to perform, and who have a limited life-span of membership,” (Salas, Dickinson, Converse, & Tannenbaum, 1992, p. 4). An individual's motivation to perform in the context of a team may be affected by any number of features associated with teams, such as team type, goals, organization, and member interactions (Chen & Kanfer, 2006; Hackman & Morris, 1974; Hackman & Oldham, 1976). Early research on the effects of groups on motivation frequently focused on deleterious effects, such as social loafing (Kidwell & Bennett, 1993; Mulvey & Klein, 1998). Karau and Williams (1993) proposed that group effort weakens the expected relationship between individual effort and individual outcomes (i.e., when one's goal is more dependent on the group than one's self), and reduces the social pressure on

individuals to contribute. In these studies, loafing effects were inferred from differences in individual-level performance.

Karau and Williams (1993) also proposed that in some circumstances group performance leads to social facilitation, when the effort of an individual in a team is greater than an individual by him or herself. These contradictory effects highlight a central theme in team motivation research; namely, that the collective character of a team contextualizes individual motivational processes, with the potential for energizing or inhibiting individual effort. Evaluating, and ultimately predicting, the contribution of the collective toward individual goal striving requires exploring the nature of the interface between the individual and the team.

Individuals are nested vertically within the team as a whole and horizontally in terms of interpersonal linkages to individual team members (Chen & Kanfer, 2006). Motivation changes in response to relationships with individual teammates (Bowler & Brass, 2006) and specific, discretionary events (DeShon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004). For example, private praise from a teammate may encourage greater effort allocations on future performance trials, while conflict with a team member may prompt withdrawal from the team's activities. Discretionary stimuli such as praise or conflict originate from within the team but do not impact all members simultaneously, nor do they reflect the properties of the team itself (Chen & Kanfer, 2006). However, the aggregate experiences of all team members collectively produce an emergent state that reflects the shared perception of a particular team dynamic and has consequences for future performance.

Team level states and events exert consistent, cross-level effects on all members of the team simultaneously. Chen and Kanfer (2006) proposed that external conditions and events reflect ambient stimuli that exert consistent effects on all members of the team. While these stimuli have been shown to exert indirect effects on individual performance mediated through proximal motivational states (e.g., self-efficacy), it is unknown whether these stimuli also exert direct effects on individual resource allocation (Chen, Kanfer, DeShon, Mathieu, & Kozlowski, 2009).

Attentional theorists (Kahneman, 1973; Kanfer & Ackerman, 1989; Navon & Gopher, 1979; Norman & Bobrow, 1975) posit that each individual possesses a fixed quantity of attentional resources. A given proportion of total resources may be budgeted to an activity at any given time, or divided between several activities at once. Contemporary research on individual motivation in teams has rarely examined the impact of motivational inputs on direct indicators of motivation per resource allocation (e.g., time, effort, felt intensity of effort) toward team goals and activities. While states such as self-efficacy are hypothesized to have motivational effects, allocations of time, attention, and effort are not synonymous with either proximal motivational states or performance (Ach, 1910; Kanfer, 1987; Locke & Latham, 1990; Vancouver, More, & Yoder, 2008). Performance represents a contaminated and deficient proxy for motivation, as performance may increase due to other factors, such as learning (Chen, Farh, Campbell-Bush, Wu, & Wu, 2013; Chen et al., 2009; Dierdorff & Ellington, 2012; Katz-Navon & Erez, 2005; Tasa, Taggar, & Seijts, 2007). Task routinization shifts the effort-performance relationship over time, and efficacy or performance provide increasingly

inaccurate indicators of true effort allocation (Kanfer, 1987; Kanfer & Ackerman, 1989; Vancouver & Kendall, 2006; Vancouver et al., 2008).

To date, most research on motivation in teams has examined motivational processes cross-sectionally, but has not looked directly at within-person variability in motivation across repeated episodes (Roe, Gockel, & Meyer, 2012). Studies utilizing repeated-measures designs typically implement laboratory-based paradigms that artificially separate motivation toward individual goals from team-focused goals (Chen et al., 2009; DeShon et al., 2004). Investigations into the cross-level influences of team states over time are generally short-term studies (e.g., lab studies that do not occur in the context of simultaneous parallel demands on the individual's time and effort) and do not show how different cycles of team project demands can affect individual motivation independent of team influences (e.g., emergent states) (Chen et al., 2009; DeShon et al., 2004). For example, early on, approaching deliverable dates may temporarily increase individual motivation to allocate more time to the project in order to meet deliverable demands. Over the course of the project, however, changes in individual levels of resource allocation to meet impending deadlines may be more determined by perceptions of past expenditures, or expectations for upcoming performance outcomes. That is, an individual's cumulative experiences over the lifespan of team membership may create very different allocation strategies than suggested by cross-sectional examination of a single performance episode.

1.1 The present study

Three considerations emerge for analyzing contextual elements of team motivation. First, teams are multilevel collectives comprising homologous team and

individual constructs (Chen & Kanfer, 2006; Park, Spitzmuller, & DeShon, 2013). Second, team activities occur over repeated performance episodes, and the states and processes that impact individual motivation are dynamic (Chen et al., 2009; Park & DeShon, 2010). Third, applying a resource-allocation approach to team motivation necessitates a more complex, multi-directional classification of on-task allocations than for solo task paradigms (Chen et al., 2009; Dalal & Hulin, 2008; Ilgen, 2014).

The present study addresses the above issues by capturing the dynamic, collective, individual, and temporal elements of team motivation. The sample for this study was student teams engaged in a class project over the course of two months. This project required the completion of several deliverables, each representing a performance episode. The timeframe allowed for the development of team states such as cohesion and efficacy, and introduced costs associated with behavior that cannot be reproduced in short-term laboratory simulations. The measurement schedule enabled the emergence of such states to be captured over the course of the teams' lifespans. I assessed the intensity and persistence of motivation directly, in terms of investment of effort over time. Effort allocation was the primary criterion of interest in this study. Motivational states were assessed at the individual and team level simultaneously, and were captured repeatedly over the course of the study. Finally, I measured the effects of naturally-occurring ambient and discretionary affective events, allowing the joint and independent effects of states and events to be evaluated, relative to direct measures of resource allocation.

The primary purpose of this study is to provide a multi-level, micro-analytic examination of changes in motivation as independent and joint function of person characteristics, team demands, team emergent processes, and time on project. This

design integrates theories of personality, resource allocation and conservation, affective events theory, and job embeddedness to evaluate how various factors operate over time and within a changing environment to affect the intensity and direction of resource allocations in teams and across team boundaries. This study holds potential value for team research in teasing apart the impact of team-level processes from time on member project motivation, and for understanding how member's interactions with each other and the team itself drive subsequent allocation decisions.

***Research Question #1:** How does the within-person trajectory of resource allocation evolve over time on a team project, when compared within and across performance episodes?*

1.2 Time

Motivational processes comprise distal goal setting processes and proximal goal striving processes (Kanfer, 1987; Latham, Ganegoda, & Locke, 1977; Locke & Latham, 1990, 2002; Mitchell, Harman, Lee, & Lee, 2008). Motivation is captured directly by the direction, intensity, and persistence of effort on a task (Locke & Latham, 1990; Ployhart, 2008; Touré-Tillery & Fishbach). While existing team research has not examined individual variation in resource allocation over time, supporting evidence may be extrapolated from the solo-performance motivation literature. Kanfer and Ackerman's (1989) resource allocation model of skill acquisition suggests that the relationship between effort and performance depends on the characteristics of the task. Performance on resource-dependent tasks requires effort allocations commensurate with desired performance. Novel tasks are resource-dependent, in that they require greater attention and self-regulation during the early stages of task performance (Kanfer & Ackerman,

1989). As task procedures become routinized over time, attaining a given level of task performance requires less attentional resources. Thus, motivation (in terms of attentional effort) declines as performance increases. In contrast, resource-insensitive tasks are those that are dependent upon knowledge or skill to perform effectively. After learning, performance on these tasks is not strongly related to effort.

In the present study, the class project represents a resource dependent task, in that it is novel and relatively open-ended. According to Kanfer and Ackerman's (1989) resource-allocation model, motivation, in terms of time and effort, will decrease over the course of the project as project demands become routinized. This expected drop in effort will be accompanied by a stable or increasing performance trajectory across project sub-goals.

Although most motivation research has been conducted on solo task performance, certain results may be extrapolated from team-level studies to the individual nested within a team. In teams, members must engage in taskwork, or interacting with physical objects to produce some output, and teamwork, or communicating with fellow team members in order to coordinate task activities (Marks, Mathieu, & Zaccaro, 2001). Kanfer and Ackerman's (1989) resource allocation model of motivation identifies three potential directions of effort: on-task, off-task, and self-regulatory allocations. In a team performance context, on-task allocations comprise both teamwork and taskwork. Newly-formed project teams engage in learning related to the task itself (Gibson, 1999), as well as teamwork (e.g., learning communication norms, etc.). Stated another way, over time, as taskwork becomes proceduralized and teamwork improves, effort allocations may decline without a concomitant decline in performance. Over the lifespan of a project,

team members can reduce their effort allocations related to these two demands by building task and teamwork skill. A third explanation was offered by Porter, Gogus, and Yu (2010), who suggested that increased task-routinization enables teams to switch to less effortful teamwork strategies, reducing team and task demands on attention concurrently. Based on these consistent findings from the team- and individual-level literature, I propose:

H1: Within person, effort allocation to the project decreases over the lifespan of the project

In achievement settings, accomplishment of a superordinate goal, such as defending a dissertation or designing a new product, commonly requires the completion of several nested sub-goals. Analysis of changes in resource allocation over time must consider the timeline of the superordinate goal. Marks et al. (2001) suggested that team behavior in pursuit of an overarching goal followed, “temporal cycles of goal-directed activity,” organized into performance episodes, defined as, “distinguishable period of time over which performance accrues and feedback is available,” (p. 359). Examined continuously, resource allocation may decline over the lifespan of the project. However, different patterns of allocations may emerge episodically, as teams progress sequentially through relevant sub-goals. Mitchell and colleagues (Mitchell et al., 2008; Mitchell, Lee, Lee, & Harman, 2004) theorized that deadlines exert a motivational press as a function of their proximity. Distal rewards tend to be discounted (Karniol & Ross, 1996), and the perceived performance-utility relation is weaker for distant deadlines. However, proximal deadlines are more salient, and effort is perceived to hold greater utility. Nearness of a deadline is also associated with greater urgency, such that greater resources are budgeted

to more urgent tasks. Mitchell et al. (2008) also suggest that proximal goals are prioritized, which is a strong predictor of resource allocation (Kernan & Lord, 1990). From the teams literature, individual-level urgency around a deadline has a compositional (i.e., bottom-up) effect on team performance, suggesting a benefit of collective resource allocation (Sonnentag & Volmer, 2010).

In most situations, individuals hold multiple goals and the accomplishment of one goal depends on the extent to which attentional effort is directed toward that goal, rather than other goals the individual is trying to accomplish. For example, students may seek to earn high grades in three classes over the semester. In this instance, motivation entails consideration of where attentional effort is directed (Kanfer, Chen, & Pritchard, 2008). Direction incorporates elements of intensity and persistence, as one must choose how much to allocate to a given goal at a given time. For example, given a fixed quantity of time, achieving an 'A' in one course may necessitate a 'B' in another. In most multi-goal environments, an almost unlimited number of allocation decisions can be made. Factors impacting goal prioritization include goal salience and task expectancies (Northcraft, Schmidt, & Ashford, 2011; Orehek & Vazeou-Nieuwenhuis, 2013). These same factors apply to the team context as well. O'leary, Mortensen, and Woolley (2011) note that team members frequently belong to several teams at once, each vying for individuals' time and attention. Success in one team requires balancing several teams' goals simultaneously. Those who excel at time management are also the most efficient team members (Cummings & Haas, 2012).

Team-level factors are expected to have episodic, cross-level effects on individual motivation. Team-level findings are consistent with individual-level findings in terms of

expected patterns of results. Team behavior fluctuates according to cycles within a team's lifespan. When a team is given a specific timeframe to achieve a particular goal, the first half of that period is devoted to planning strategies for accomplishing that goal (Gersick, 1988). At roughly the mid-point, the urgency of the encroaching deadline pressures the team into action, and resources are allocated toward achieving the goal within the allotted time frame. These results suggest that the team context exerts stronger cross-level effects during the latter half of the period allotted for a particular goal. These effects are consistent with Marks et al.'s (2001) suggestion that performance episodes themselves can be meaningfully segmented into sub-episodes of "more limited scope and duration that contribute to the larger effort," (p. 360). As the cross-level effects of team performance phase are congruent with the individual-level effects of goal proximity, I propose that:

H2: Within person, effort allocation increases episodically with proximity to the deliverable deadline, such that effort allocations to the project are greater in the week immediately preceding a deadline, relative to the previous week.

Integrating the continuous and episodic approaches to resource allocation over time reveals two countervailing forces that act across different time frames. On the one hand, learning effects predict a decrease in resource allocation over the lifespan of the project. On the other, effort allocations increase within a given performance episode. These hypothesized relationships combine to form a saw-toothed pattern, where effort allocations increase as deadlines approach, peak, and then decline. As this process repeats, peak effort allocations can be expected to grow progressively smaller.

Research Question #2: When and where do team contextual effects originate, and how do they impact individual-level resource allocation over time?

1.3 Emergent states

Marks et al. (2001) describe team emergent states as a class of constructs that “characterize properties of the team that are typically dynamic in nature and vary as a function of team context, inputs, processes, and outcomes,” (p. 358). They represent the team’s shared perception of its collective state, and they are hypothesized to exert a contextual effect on individuals’ proximal motivational states (Chen & Kanfer, 2006). Team efficacy is one of the most frequently studied team motivational process. Team efficacy is the shared confidence in the team’s ability to muster the team-regulatory resources required to complete a given task (Bandura, 2000). More efficacious teams set more difficult goals, and expend greater effort in pursuing them (Chen et al., 2009; Porter, Gogus, & Yu, 2011; Wetzels, 2006). Team efficacy has a contextual effect on individual self-efficacy, such that individuals have higher confidence in their own abilities when team efficacy is high. In turn, higher self-efficacy is associated with greater goal-striving. Team efficacy also increases the quality and intensity of team action processes. These action processes have energizing and facilitating effects on individual goal striving. While team efficacy has direct and indirect cross-level effects on individual behavior, the direct effect of team efficacy on the persistence of individual effort allocation in the field has not been assessed. I hypothesize that:

H3: Team efficacy will exert positive, cross-level, time-lagged effects on subsequent resource allocation.

A second team state of interest is team cohesion. Team cohesion is the internal pressure of team members to remain with that team (Schachter, 1951). Cohesion produces the internal power of the group; the pressure for uniformity that the group wields on its members cannot exceed those members' desires to stay in the group. Cohesion's normative pressure allows the team to consolidate team member resources and synchronize individual task activities toward accomplishment of group goals (Festinger & Thibaut, 1951). Team cohesion emerges from team members' interest in the team's activities (task cohesion), or the team members themselves (social cohesion) (Festinger, 1950). Teams high in task cohesion possess stronger group norms which inform and sustain performance expectations, while social cohesion enables effective cooperation toward interdependent goals (Zaccaro & McCoy, 1988). Social cohesion serves as an index of team interaction effectiveness, and has direct, positive effects on team viability (Barrick, Stewart, Neubert, & Mount, 1998b). Members of cohesive teams may work harder out of a desire to support their teammates (social cohesion), an intrinsic desire to perform the task (task cohesion), or as an attempt to raise their status within the group (group pride) (Mullen & Copper, 1994)

Two additional considerations apply to the present study. First, outcomes, in terms of performance grades, are assigned solely at the team level. This team attribute may have several implications for the self-regulatory consequences of team cohesion. In collective goal tasks, social loafing is more common than in additive or individual goal tasks (Karau & Williams, 1993; Latane, Williams, & Harkins, 1979). Individuals who perceive social loafing by teammates are further encouraged to reduce their effort (Mulvey & Klein, 1998). Fishbach, Zhang, and Koo (2009) suggested that framing of

goal-directed behavior activates two alternative self-regulatory processes determining action toward a goal. These processes are perceived goal commitment (whether or not the goal is worth pursuing), and perceived goal progress (whether sufficient progress has been made). In solo task contexts, Fishbach et al. (2009) argued that once individuals activate goal commitment or goal progress processes, they infer their own goal-related states from evaluation of their own behavior. However, in collective goal contexts, Fishbach, Henderson, and Koo (2011) suggest that perceptions of fellow group members' effort serves an identical function. They further suggest that identification with the group moderates the extent to which goal commitment or goal progress processes are activated. To the extent that group members view themselves as being similar to the group, fitting within the group, and feeling pride for group membership, they are more likely to activate goal progress processes when teammates reduce their effort. That is, individuals who identify with the group will frame social loafing as indication of insufficient goal progress, and apply compensatory effort. Individuals who do not identify with the group will reduce their effort to match the perceived effort standard of their teammates.

Fishbach et al. (2011) analyzed the effect of identification in groups. In a team context, the three dimensions of group identification (similarity, fit, pride) correspond to the social dimension of team cohesion. From this perspective, shared perceptions of team cohesion provide salient, immediate social cues as to the goal progress and commitment of the team. I propose that team cohesion increases motivation in collective-goal teams by activating goal-striving processes in response to perceived social loafing.

A second, congruent factor in the motivational impact of a team's cohesion is goal multifinality (Köpetz, Faber, Fishbach, & Kruglanski, 2011). Goal commitment increases

when several active goals can be completed at once. Although team motivation focuses on motivation to complete a task, individuals may have both task-related and social goals (Chulef, Read, & Walsh, 2001). Previous evidence has shown that performance has a stronger causal impact on task cohesion than vice versa, and that social cohesion emerges from task cohesion (MacCoun, Kier, & Belkin, 2006; Wolfe & Box, 1986). These findings suggest that high effort allocations sustain social cohesion. Considering the social nature of teamwork, cohesive teams provide opportunity for multifinal social and task goals, such that achieving task goals is the most efficient means of achieving social goals (i.e., friendship, support, belongingness). In cohesive teams, goal-striving is intensified by creating conditions conducive to overlapping superordinate goals (Austin & Vancouver, 1996).

Due to the combined factors of normative pressure, goal commitment, and multifinality, I predict that team cohesion will exert a direct, top-down effect on individual resource allocation. Specifically:

H4: Team cohesion will exert positive, cross-level, time-lagged effects on subsequent resource allocation.

To date, investigation of cross-level motivational effects in teams has been limited to two construct categories: Team emergent states and teamwork processes. Both categories are treated as endogenous to the team. Less attention has been given to impact of distinct affective events as determinants of changes in resource allocation. Using Affective Events Theory (Weiss & Cropanzano, 1996), we can begin to examine how specific events that prompt positive or negative appraisals may affect subsequent resource allocation. To explore this, I examine the impact of a few key events – some

ambient (team level) and some discretionary (e.g., praise or criticism) in terms of their relationship to resource allocation and their potential for impacting the trajectory of allocations over time.

Chen and Kanfer (2006) proposed that motivational processes occur at the team and individual levels simultaneously, and that motivational states emerge in response to various inputs operating at separate levels. Shared experiences exert cross-level influence on individual motivation. In a team context, the features of the team and the characteristics of the environment the team exists within are ambient stimuli, or the factors that act on all team members simultaneously (Hackman, 1992).

1.4 Ambient stimuli

Teamwork represents a shared environment. Lab studies that manipulate team environment demonstrate that the features of the team environment affect the direction and intensity of individual resource allocation (Miller et al., 2013). Performance feedback is the most common ambient input examined in team motivation models. Team performance feedback has shown strong relationships to motivational variables such as potency (Collins & Parker, 2010) and team efficacy (Baker, 2001). Chen et al. (2009) showed that prior individual and team performance had unique, positive effects on subsequent self-efficacy. The relationship between team and self-efficacy was strengthened by individual feedback. Deshon et al. (2004) showed that the level that feedback is administered has effects on subsequent behavior. Participants receiving team-level feedback on previous performance trials exerted less subsequent effort toward their goal than did individuals receiving individual-level feedback.

At the individual level, feedback's relationship to motivation and performance depends on several characteristics of the performance context and the feedback itself. For example, feedback at the individual level reduces motivation when it causes attentional resources to be diverted toward self-regulatory processes. Kluger and DeNisi (1998) suggest that ego-involving feedback, regardless of valence, can be detrimental to motivation. Feedback directed to the team is not likely to be ego-involving, and therefore less likely to distract attention away from the task. I propose that:

H5: Positive team feedback will be positively associated with subsequent individual resource allocation.

Research Question #3: *What are the person factors affecting resource allocation in teams?*

1.5 Traits

Both external and internal factors influence motivation. Early research on personality argued that traits were a primary source of motivated behavior (Murray, 1938). Extensive evidence since then has shown that those higher in traits related to achievement motivation set higher performance goals for themselves, and work harder toward achieving those goals (Barrick & Mount, 1991; Barrick et al., 1998b; Bateman & Crant, 1993). Individual differences in trait motivation have been examined in relation to explicit achievement motivational dimensions such as performance and mastery, and orientations toward approach or avoidance (e.g., Guan, Xiang, McBride, & Bruene, 2006; Heidemeier & Bittner, 2012). Individual differences in trait motivation are frequently examined as individual differences in goal orientation (Heggstad & Kanfer, 2000; Kanfer & Heggstad, 1997; Latham & Pinder, 2005). Meta-analytic findings by Cellar et

al. (2010) show that mastery-approach motivation had the strongest relationships to self-efficacy ($\rho = .33$) and performance ($\rho = .13$), followed by performance-approach ($\rho = .11$; $\rho = .06$). Performance-avoid orientation was negatively related to both self-efficacy ($\rho = .15$) and performance ($\rho = -.08$) (Cellar et al., 2010). Trait complexes corresponding to performance or mastery motivation are associated with lower task-related cognitive fatigue (Ackerman & Kanfer, 2009) and higher performance (Kanfer, Wolf, Kantrowitz, & Ackerman, 2010)

The most well-known traits pertain to achievement, or individual differences in traits that affect an individual's tendency to seek out challenges and persist in accomplishing them. Kanfer and Ackerman (2000) suggested trait researchers had neglected the role of competitiveness in achievement motivation. Kanfer and Ackerman (2000) identified three primary indicators of trait motivation: Personal Mastery, Competitive Excellence, and Motivation Related to Anxiety. Hinsz and Jundt (2005) showed positive relationships between Mastery/Competitiveness scales and task performance, personal goals, and self-efficacy. Motivation related to anxiety was negatively related to task performance, goals, and self-efficacy. Given the core task demands present in any team scenario, these three dimensions of trait motivation are expected to affect individual resource allocations in a team context. Consistent with the solo-task literature, I propose that:

H6: Trait personal mastery motivation will be positively related to resource allocation to the project at each time point.

H7: Competitive excellence will be positively related to overall resource allocation to the project at each time point.

H8: Motivation-related emotionality will be negatively related to overall effort allocations to the project at each time point.

While substantial evidence demonstrates the motivational effects of personality traits on individual tasks, investigation into the effects of personality on performance unique to teamwork has not produced consistent effects. Research on team personality has attempted to link composition effects to team effectiveness in terms of informal role behaviors (Kichuk & Wiesner, 1997; LePine, Buckman, Crawford, & Methot, 2011). Investigation into the individual-level effects of the FFM have shown modest relation to individuals' team-directed contextual performance (Morgeson, Reider, & Campion, 2005). One relatively recent advance in team personality has been the construct validation of psychological collectivism. Psychological collectivism refers to an individual difference in one's propensity to see one's self as part of an in-group, to respect the norms of that group, and to value group goals at the expense of individual goals (Jackson, Colquitt, Wesson, & Zapata-Phelan, 2006). Psychological collectivism is positively associated with individual-level task performance and citizenship behavior, and negatively associated with counterproductive work- and withdrawal-behaviors. Psychological collectivism also exerts a compositional effect such that higher mean levels of team psychological collectivism are positively associated with team performance over time (Dierdorff, Bell, & Belohlav, 2011). Dierdorff et al. (2011) suggested that collectivism's relationship to performance may be explained by individuals' greater willingness to invest in teamwork, and higher individual commitment to team goal accomplishment. Although not explicitly conceptualized as a motivational trait, psychological collectivism is couched in motivational language describing volitional

reactivity to the norms, goals, and behaviors of the focal group itself. I therefore propose that:

H9: Psychological collectivism will be positively related to individual effort allocations to the project at each time point.

1.6 Discretionary stimuli

Individuals in a team are subject to shared and unique events. Experiences unique to a given team member represent discretionary stimuli. For example, a leader's praise or criticism rendered in private to a particular team member represents a discretionary event, as no other team member is affected by this interaction. The effects of discretionary stimuli in teams have been examined primarily in terms of conflict (Chen, Sharma, Edinger, Shapiro, & Farh, 2011; Jehn & Mannix, 2001). Although conflict is typically studied as a team-level state or process (Jehn & Mannix, 2001), behavioral conflict occurs interpersonally. The motivational effects of conflict may best be construed as aversive, discretionary episodes.

Seo, Barrett, and Bartunek (2004) proposed three pathways through which core affective experience could influence the direction, intensity, and persistence of effort. First, affective experiences provide information regarding the valence, expectancy, and utility of a given activity, which impacts the direction of effort allocations. A team member who is mocked for approaching another for help may decide that the aversive, affective consequences of such behavior may outweigh the informational benefits of this form of teamwork. Furthermore, the affective state following the event may have indirect effects, such that mood state colors expectancies for other tasks. Seo et al. (2004) proposed that positive mood states are associated with higher perceived utility,

expectancy, and more positive valence for future tasks. In contrast, negative mood states are associated with lower expectancy, utility, and negative valence. Second, affective activation increases the pool of resources available for a given task, increasing the intensity of subsequent effort. Finally, affective experience impacts persistence of effort. Positive events lead individuals to engage in “mood maintenance,” or a continuation of the current behavior in an attempt to extend the pleasurable mood state. Negative events cause “mood repair” processes, such that individuals change their behavior in an attempt to avoid or decrease the aversive emotional state. Individual motivation is impacted by discretionary stimuli, or those experiences unique to each person. The effects of ambient stimuli occur independently from discretionary stimuli (Pearsall, Christian, & Ellis, 2010). Dividing affective events into the effects of ambient and discretionary stimuli allows more accurate identification of the determinants of motivation of individuals in teams.

The motivational consequences of positive events in team contexts have not been examined. This fact is relatively surprising, given strong evidence that people can be an influential source of motivation (Turner, Foa, & Foa, 1971). Interpersonal reinforcement theory (E. B. Foa & Foa, 1980; U. G. Foa & Foa, 1974; Turner et al., 1971) identifies six categories of reinforcement that people can provide. Of these, four are relevant to motivation in teams: Love (e.g., friendship/liking), status (e.g., praise), information (feedback), and services (e.g., helping/backing-up). When originating from within one’s work team, these types of discretionary events will have consequences for one’s motivation to perform the team’s task. Positive events that increase affective commitment will be associated with larger effort allocations (Li, 2013). Positive affective responses to

neutral events also have direct effects on effort allocations (Seo & Ilies, 2009). Following substantial evidence that positive affect, positive affective commitment, and positive affective framing each have independent, positive effects on motivational states, I propose that:

H10: The frequency of weekly positive interpersonal events will be positively associated with weekly resource allocation.

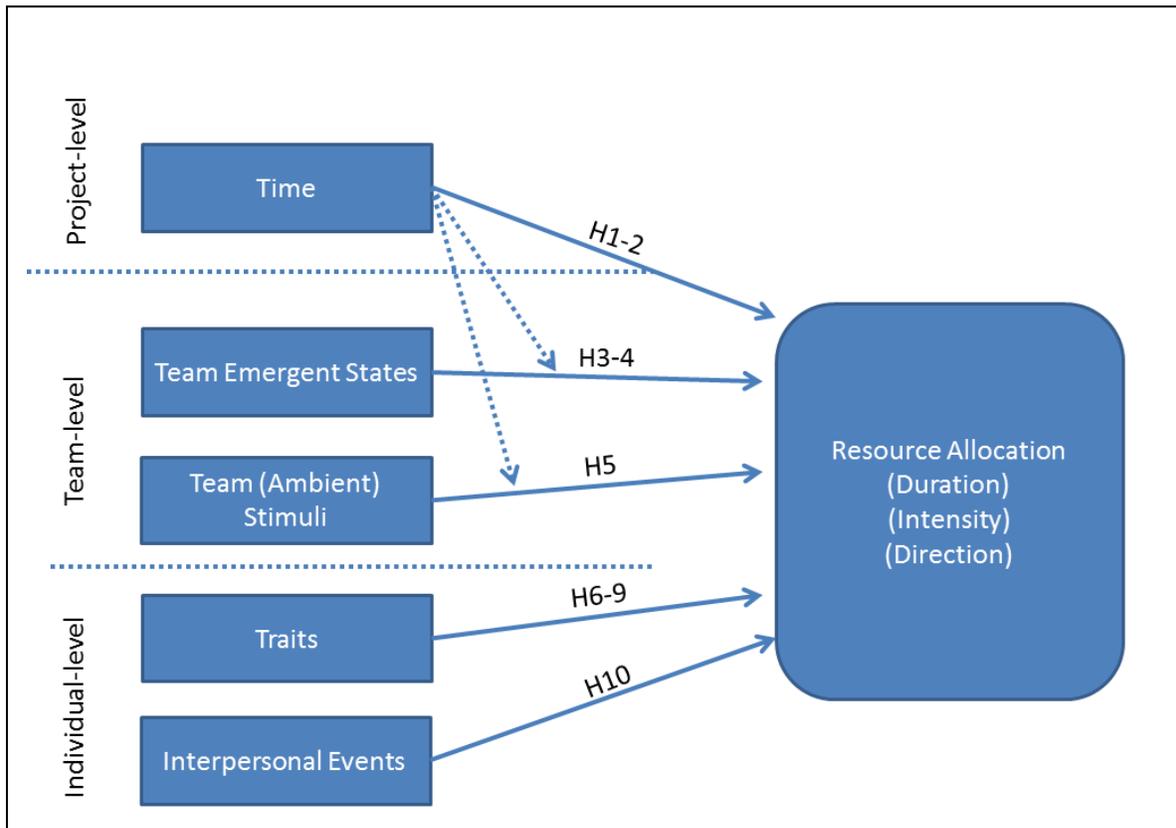
Motivation in teams represents an extension of individual motivational processes to include the contextual demands and inputs originating in the team itself. The goal of this dissertation is to clarify the interaction of person and situation factors that determine the motivational states and proximal behavior of the individual nested within the team (Chen & Gogus, 2008). Figure 1 shows the overall conceptual model proposed in this dissertation. The proposed study examines the independent and joint impact broad classes of team inputs, and individual trait and state factors simultaneously. Team member motivation is captured episodically and over the lifespan of the team from a resource allocation perspective.

1.7 Exploratory Hypotheses

Exploratory Research Question: How do state and trait factors determine the distribution of attentional resource across project-related activities?

An increasingly important configuration of teams are multiteam systems (MTS), whereby several teams must collaborate toward the accomplishment of a superordinate goal (Marks, DeChurch, Mathieu, Panzer, & Alonso, 2005; Mathieu, Marks, & Zaccaro, 2001). Boundary spanning, or external activity, refers to the allocation of effort toward

Figure 1. Proposed conceptual model of factors influencing the motivation of individuals in teams.



communicating or interfacing with external entities (Ancona, 1990). At the team level, failure to clarify expectations regarding boundary spanning roles may lead to decreases in team viability (Marrone, Tesluk, & Carson, 2007). In such contexts, team success may demand that team members cross team boundaries to solicit information and resources, or to curry favor with third-party stakeholders (Ancona & Caldwell, 1992). Tushman and Scanlan (1981) defined these external activities as boundary-spanning behaviors, to distinguish them from team-focused activities such as taskwork or teamwork.

Past research on boundary spanning has emphasized the role of task demands and team expectations (Marrone et al., 2007) but to date, the individual and contextual factors

that lead people to engage in boundary spanning activity over team-focused allocations are unclear. In cases where teams depend on each other to succeed, all-or-nothing approaches to boundary spanning behavior are insufficient to explain this phenomenon. Past theorizing by Kanfer and Kerry (2011) suggests that the individual's relationship to his/her team is a powerful determinant of the direction of resource allocation to either one's own team or an interdependent component team.

One possible explanation is based in part on the notion of team or context embeddedness (Mitchell, Holtom, Lee, Sablinski, & Erez, 2001). Mitchell et al. (2001) posit that individuals remain in an organization as a function of three factors: the number of links or network density in organization; fit (extent to which a member perceives comfort and compatibility with his/her team and team environment), and sacrifices (perceived cost of benefits that may be forfeited by leaving the job). In this context, the principles of embeddedness apply to the team, and boundary spanning may represent a socially acceptable way to withdraw from the team while still contributing to the team's goals. These cognitive processes may lead embedded individuals to allocate their resources to the focal team, and diminish boundary spanning as a consequence. I further propose that:

H11A: The number of links within a team will be negatively associated with boundary-spanning allocation.

H11B: The degree of fit within a team will be negatively associated with boundary-spanning allocation.

H11C: The degree of potential sacrifice associated with team withdrawal will be negatively related to boundary-spanning allocation.

Characteristics of, or individual's relationship to the team, act as "pull" factors which decrease boundary spanning by increasing the strength and immediacy of reinforcement for team-focused allocations over external investments. These forces make an individual less likely to boundary span. However, individual traits may also lead to interpersonal dynamics that "push" the individual to allocate resources toward component teams, making boundary spanning more likely. Network ties emerge as a result of stable differences in personality and goal orientations (Klein, Lim, Saltz, & Mayer, 2004). Openness is positively related to adversarial centrality, suggesting that high openness individuals are more likely to interrupt teamwork processes. Furthermore, openness is associated with crossing fault-lines that emerge within teams (Homan et al., 2008). I therefore posit:

H12: Openness will be positively related to boundary spanning allocation.

Teamwork introduces situational demands that fall outside the scope of traditional motivational trait measures that focus on performance attainment (Ach, 1910; Fisher & Ford, 1998; Heidemeier & Bittner, 2012; Kanfer, 1987). In order to identify the directional antecedents of effort, I compare the relative effects of traditional trait motivation measures (Personal Mastery, Competitive Excellence) to Psychological Collectivism, a construct that is motivational in nature, but specifically contextualized within a collective social environment.

Given the relative lack of role specialization in the present sample, combined with the shared reward structure for the project, team members have great discretion to choose their allocation direction. Task-related motivational traits are expected to determine larger allocations to the task. These traits may also have effects on the relative degree of

allocation, as a function of the particular demands of the team context. First, the team context provides greater opportunity for social comparison. The project may stimulate greater effort by those driven to showcase their ability to their teammates (i.e., Competitive Excellence). Second, the team context provides opportunity for social learning (Poortvliet & Darnon, 2010). The interdisciplinary nature of the team project introduces new opportunities for mastery beyond the course curriculum. Those motivated by Personal Mastery may attach greater value to the task demands of the team project if they believe their teammates provide supplementary source of expertise in a given topic. On the other hand, Psychological Collectivism is expected to enhance the perception that teamwork is instrumental to completion of task-related goals, and by extension, decisions to allocate effort toward teamwork. I therefore hypothesize that:

H13A: Trait Personal Mastery will be positively related to taskwork allocation.

H13B: Trait Competitive Excellence will be positively related to taskwork allocation

H13C: Trait Psychological Collectivism will be unrelated related to taskwork allocation

H14A: Trait Personal Mastery will be unrelated to teamwork allocation.

H14B: Trait Competitive Excellence will be unrelated to teamwork allocation

H14C: Trait Psychological Collectivism will be positively related to teamwork allocation

CHAPTER 2

METHOD

Hypotheses were tested using a subset of archival data from the first phase of SIMS II, a larger, two-phase research study investigating the effects of organizational structure and leadership on multi-team system innovation conducted and completed during Fall 2014. SIMS II was supported by the National Science Foundation (Grant #4206ABE). The SIMS II project comprised 120 student teams (N = 371) that participated in a class project over the course of 16 weeks. The goal of the class project was for teams to identify and solve an ecological issue as part of an interdisciplinary MTS. The project unfolded in two phases. Two psychology classes and one ecology class were sampled in Phase I (“Science” MTSs). One psychology class and one business class were sampled for Phase II (“Translational” MTSs; Not reported here). The present study utilized data from Phase I only.

2.1 Procedure

In Phase I, 88 students from two sections of a psychology class at George Mason University were randomly assigned into 30 “applied psychology” teams, ranging in size from three to four students. 89 students from an ecology class, also at George Mason, were randomly assigned to one of 30 “applied ecology” teams. Team sizes in Phase I ranged from two to four people, with 6 two-person teams, 51 three-person teams, and 3 four-person teams, for an average team size of three. Each applied psychology team was then randomly paired with an applied ecology team to form thirty, two-team “scientific discovery” MTSs. Teams in Phase I participated for twelve total weeks of project time. During the first seven weeks, teams completed four deliverables, two of which were

completed independently, and two of which were completed together with the other component team in the MTS. All grades were assigned at the team level, such that every member of a team received the same grade on each deliverable. Over the next five weeks, they served in an advisory capacity for their paired MTS (Phase II), providing feedback on Translational MTS deliverables.

Figure 2 presents a visual summary of the structure of SIMS II Phase I, including deliverable content, temporal organization, and measurement schedule. Data collection occurred in the first seven weeks of project time, during which the teams worked on the deliverables. No data was collected for the last five weeks of project time during the teams' advisory stage. Self-report data was collected via eight online surveys, one pre-task trait and demographic battery and seven state surveys.

2.1 Sample

Participants in Phase I of the SIMS II project were drawn from an ecology class ($n = 89$) and two social psychology classes ($n_1 = 37$, $n_2 = 51$) at George Mason University (VA). 177 students in total participated in this phase of the project. Students were required to take all surveys as part of project requirements, and provided informed consent. Of 177 students, five did not consent to the use of their data. Of 172 participants, five participants' survey data was dropped from the sample after data cleaning due to consistent inattentive/illogical responding. The final sample consisted of 167 participants, 165 of which completed the pre-task trait battery; 124 participants completed all seven surveys, and 160 completed five or more (See Table 1). Of 1169 possible weekly survey observations (167 students, each with 7 survey responses), 64 weekly surveys were not returned, for a total of 1095 observations and a 95 % response rate (see Table 2).

Table 1

Frequency of valid weekly surveys (out of seven) as proportion of total sample (N = 167)

# Surveys returned	n	%	Cumulative %
7	124*	74.3	74.3
6	22**	13.2	87.5
5	14	8.4	95.9
4	4	2.4	98.3
3	3	1.8	100

* 123 participants completed T0 survey

** 21 participants completed T0 survey

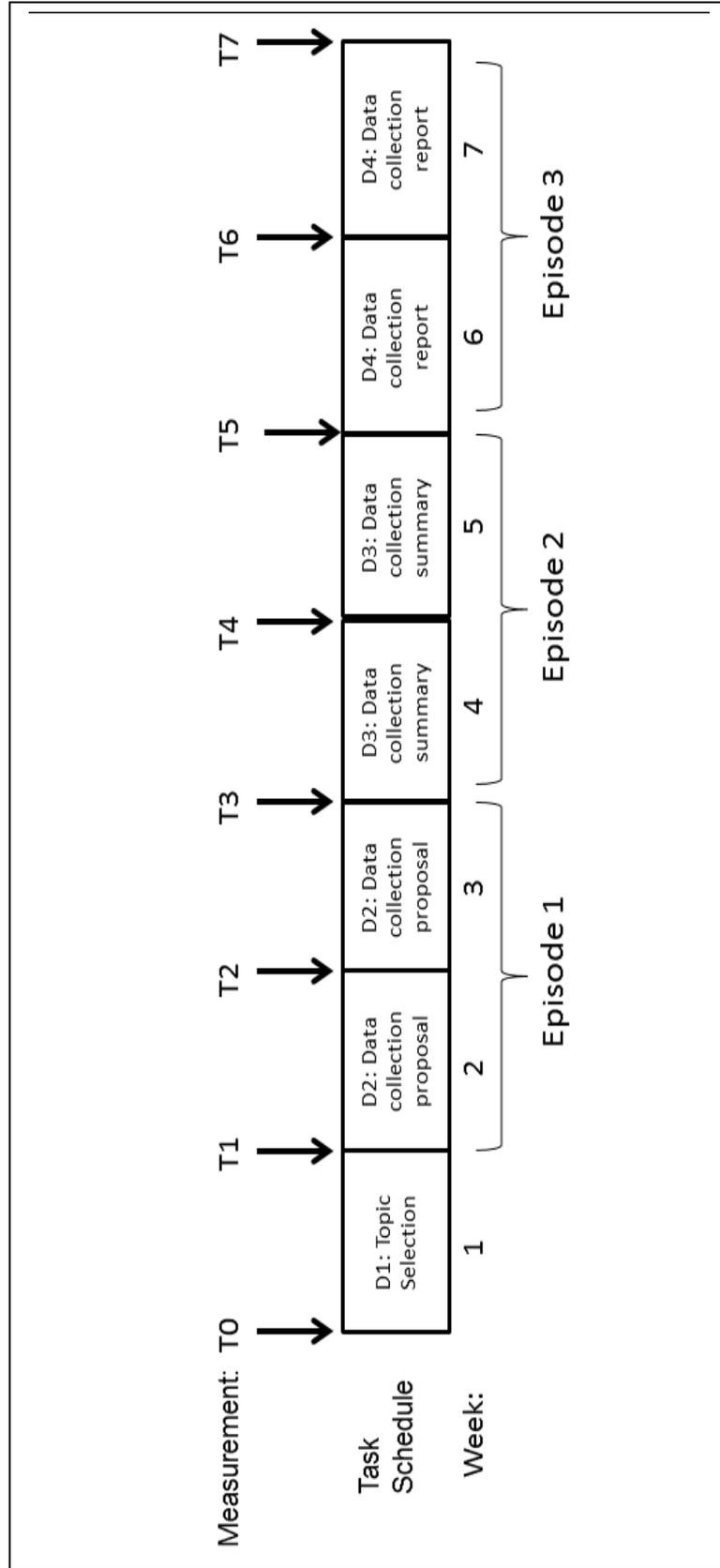
Table 2

Total number of responses, missing, and drops by week

Category	Week 0	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Total
Viable	165	154	158	152	151	158	157	161	1095
Missing	2	11	7	14	14	9	6	3	64
Dropped	0	2	2	1	2	0	4	3	14

The final sample (N = 167) was comprised of 67 males (40%) and 100 females (60%). The sample was drawn from the following academic backgrounds: 27 Engineering majors (16%), 62 Social Science majors (37.1%), 6 Business majors (3.6%), 52 Physical Sciences majors (31.4%), 11 Humanities majors (7%), and 9 Undeclared or Unspecified (5.4%)

Figure 2. Project timeline, measurement schedule, and episodic periods.



2.1.2 Phase I project task paradigm

Component teams selected an ecological issue, identified the contributory human attitudes and behaviors, and provided scientifically-grounded recommendations for how this issue might be addressed. This process was segmented into four deliverables. Teams completed two joint (MTS) deliverables in collaboration with their partnered team, and two discipline-specific deliverables.

2.1.2.1 Deliverable 1 (Joint)

Paired psychology and ecology teams collaborated to jointly execute Deliverable 1. Deliverable 1 was assigned in the first week of project activity, and one week was allotted for completion. The first deliverable contained two components. First, teams submitted a short paragraph describing the ecological issue they had selected for study. Second, component teams completed an MTS charter, for which teams negotiated unanimous consensus on operating guidelines and conflict management expectations for inter-team interaction. Team members from both teams met via WebEx to brainstorm potential ecological issues and complete the team charter.

2.1.2.2 Deliverable 2 (Psychology)

After selecting their topic issue, psychology teams wrote a one-page proposal for a study of human attitudes, behavior, and cognition related to their chosen issue. Two weeks were allotted for Deliverable 2, from Monday of Week 2 to Friday of Week 3. The data collection proposal contained five sections. First, teams outlined the purpose of their data collection. Second, teams described the characteristics of their selected sample. Third, teams developed a list of all survey questions to be administered, along with the rationale for inclusion. Fourth, teams outlined their planned method of survey

administration. Finally, teams provided a description of the planned analytic strategy once data had been collected. Teams received feedback on their data collection proposal, including recommendations for revising the design and measurement strategy of their study, which they incorporated prior to implementation.

2.1.2.3 Deliverable 2 (Ecology)

Following issue selection, ecology teams wrote a data collection proposal. Two weeks were allotted for this deliverable, from Monday of Week 2 to Friday of Week 3. The data collection proposal contained three sections. First teams described their topic area and broad category of ecological issues their topic fell within. Second, teams provided an overview of the type of data to be collected. Third, teams provided a list of human behaviors to be targeted for data collection, with the intention of providing programmatic recommendations for substantive behavior change. Teams received feedback from the class instructor on their data collection proposal, including recommendations for revising the design and measurement strategy of their study, which they incorporated prior to implementation..

2.1.2.4 Deliverable 3 (Psychology)

The objective of Deliverable 3 was to assess the psychological antecedents to behaviors contributing to the ecological issue, which was accomplished via two stages. First, psychology teams distributed surveys to a specified sample population to assess attitudes, behavior, and cognition related to their chosen ecological issue. Second, teams wrote up their findings in a 3-5 page, APA-style research paper. Two weeks were allotted for this deliverable, Weeks 4 and 5 of the project. The data collection write-up contained seven core requirements: 1) Explain the purpose of data collection, 2) Describe sample

characteristics, 3) List items administered to participants, 4) Describe data collection procedure, 5) Report data analytic methods, 6) Draw scientific conclusions from results, 7) Recommend policy change grounded in scientific observations.

2.1.2.5 Deliverable 3 (Ecology)

Teams' objective for Deliverable 3 was to conduct a literature search of their topic area. Teams were required to submit a two-page write-up explaining the context of their chosen issue, identifying the human behaviors that contribute to the issue, and to discuss the broader ecological impact of these behaviors. Two weeks were allotted for this deliverable, Weeks 4 and 5 of the project.

2.1.2.6 Deliverable 4 (Joint)

Paired ecology and psychology collaborated on a 3-5 page, APA-style synthesis of ecological and psychological findings related to their topic area. Two weeks were allotted for Deliverable 4, Weeks 6 and 7 of the project. Partner teams integrated their data collections write-ups and literature reviews in order to link latent psychological factors to concrete ecological outcomes through human performance of specific detrimental behaviors. Ecology teams were responsible for the introduction section of this paper, providing background on the ecological issue. Psychology teams were responsible for writing the method and results sections, explaining their findings and linking them to psychological theory. Teams collaborated on the abstract and the discussion section of the paper. Discussion section requirements included a summary of interdisciplinary conclusions drawn from theory, data, and ecological evidence. The paper concluded with concrete recommendations for intervention strategies for future policy implementation.

2.1.3 Phase I materials

Participants had access to three technology accounts, each with specific functions within the project. Intra-team communication was accomplished via Google Groups, or a listserv-type account that allowed team-wide messages to be sent via one address. The messages sent through these groups were archived, and were accessed for the present study. Basecamp, a project management program, was used for inter-team communication between team pairs (e.g., between the psychology and ecology component teams). Messages sent on basecamp captured trace data including name, date, time, and message content. Finally, teams held inter-team conference calls via Webex. These technology accounts allowed communication to be partitioned into intra-team and inter-team communication episodes, and allowed trace data to be extracted upon completion of the project¹.

2.2 Measures

This study utilizes a repeated-measures design. Eight online surveys were administered over the course of the project. Surveys were administered online through the Qualtrics survey service. The first survey assessed personality traits, demographic factors, and biodata. This survey was administered prior to team formation (time 0). The remaining seven surveys assessed motivational states and experiences during project. State and experience surveys were administered weekly, but survey content varied by

¹ Trace data is not reported in this dissertation. Email data showed low base rates for utilization of designated technology accounts. Only 15 out of 60 teams sent any emails using Google Groups. 24 individuals sent a total of 47 emails. Participant reports of technology use indicated a preference for alternate platforms, suggesting that rates of missing data were too high to draw inferences from observed email data. Basecamp data were unable to be extracted from the server.

measurement occasion (See Table 3 for a summary of survey content administered at time points T1 through T7). Retrospective reports of team experiences and resource allocation were assessed weekly. Team and individual motivational states were assessed mid-task (time 4) and post-task (time 7). The measures assessed at each time point are discussed below.

Table 3
Survey content and administration schedule

Scale	#	Week assessed						
		1	2	3	4	5	6	7
Resource allocation								
Effort Intensity	2	X	X	X	X	X	X	X
Effort Duration	1	X	X	X	X	X	X	X
Discretionary events	10	X	X	X	X		X	X
Allocation intentions	1	X	X	X	X	X	X	
State Measures								
Peer evaluation	4				X			X
Team viability	4				X			X
Upcoming demands					X			
Project activities	8				X			X
Off-task cognition	6				X			X
Eff-related cognition	x				X			X
Team Emb.	6				X			X
Off-task allocations	2				X			X
Team States								
Team Cohesion	4				X			X
Team Efficacy	7				X			X
Item Total	67	28	39	28	67	28	28	67

Team Emb. = team embeddedness.

Eff-related cognition = effort-related cognition

2.2.1 Time 0 (Pre-Task)

The time 0 survey assessed demographic information, bio-data such as experiences and interests, and personality traits. All personality scales utilized Likert-type response formats. Specific scales are described below.

Demographic and Bio-data scales

Sex, Year in School, and Major were assessed via multiple choice items. Three bio-data items assessed relevant life experiences. The first item “have you ever lived, worked, or studied in a foreign country” was assessed using a binary yes/no response format. Relevant experience was assessed with two items, “How much experience have you had working on science projects,” and “how much experience have you had working business development,” along a Likert-type response scale. Response options ranged from 1 (*no experience*) to 5 (*very high amount of experience*).

Psychological Collectivism

Psychological Collectivism was assessed using the Jackson et al.’s (2006) 15-item psychological collectivism inventory ($\alpha = .88$). Respondents rated agreement with a series of statements about previous experiences working with groups, along scale points ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). A sample item is, “I followed the norms of those groups.” Scale scores were computed by taking the mean across all items.

Trait Motivation

Three dimensions of trait motivation were assessed using a 30-item short-form version of Kanfer and Ackerman’s (2000) 48-item Motivational Trait Questionnaire (MTQ). Scale points ranged from 1 (*very untrue of me*) to 6 (*very true of me*). The MTQ

comprises three dimensions, each with two subscales: Personal Mastery, Competitive Excellence, and Motivation Related to Anxiety. Personal Mastery (10 items, overall $\alpha = .87$) was assessed using shortened versions of the Desire to Learn (5 items, $\alpha = .82$) and Mastery (5 items, $\alpha = .84$) subscales. A sample item is, “I set high standards for myself and work toward achieving them.” Competitive Excellence (10 items, overall $\alpha = .88$) was assessed using shortened versions of the Other Referenced Goals (5 items, $\alpha = .86$) and Competitiveness (5 items, $\alpha = .87$) subscales. A sample item is “I would rather cooperate than compete.” Motivation Related to Anxiety (10 items, overall $\alpha = .9$) was assessed using shortened versions of the Worry (5 items, $\alpha = .9$) and Emotionality (5 items, $\alpha = .78$) subscales. A sample item is “I am able to stay calm and relaxed before I take a test.” Each scale score was computed by taking the mean of item responses.

Openness

Openness ($\alpha = .81$) was assessed using a four-item IPIP scale (Goldberg, 2014). Scale points range from 1 (strongly disagree) to 5 (strongly agree). A sample item is, “I sympathize with others’ feelings.” The mean of all items was used to compute the scale score.

2.2.2 Weekly survey content

Seven weekly surveys were administered over the course of the project. These surveys assess retrospective resource allocation to the project over the previous week, discretionary events over the previous week, and effort intentions for the upcoming week. Survey content is presented in Appendix A.

Resource allocation

Retrospective reports of resource allocation were assessed for intensity and duration. Resource allocation intensity was assessed by summing responses from two items, “How hard did you work on the project?” (Paas, 1992; Schmitz & Skinner, 1993; Yeo & Neal, 2004), and “How demanding was the project?” (Hart & Staveland, 1988; Schmitz & Skinner, 1993). Response options ranged, respectively, from 1 (*not hard at all*) to 8 (*extremely hard*), and 1 (*not at all demanding*) to 8 (*extremely demanding*). Internal consistency ranged from .79 (week 2) to .94 (week 4) (mean $\alpha = .89$). Resource allocation duration was assessed using a single-item measure, “How much time did you spend working on the project?” (Vancouver & Kendall, 2006; Wanberg, Zhu, Kanfer, & Zhang, 2012). Response options ranged from 0 (*less than one hour*) to 10 (*ten or more hours*). Resource allocation intention for the upcoming week was assessed using a single item, “taking all your other obligations into account, how much time do you expect to spend working on the project this week?” Response options ranged from 0 (*less than one hour*) to 10 (*ten or more hours*).

Discretionary events

Participants reported the frequency of nine types of discretionary affective events they had experienced during the preceding performance episode. Seven positive and two negative events were presented, adapted from Basch and Fisher (1998), plus an optional open-ended “other” category. For open-ended responses, participants provided a description of the event they had experienced, and reported the frequency of that event during the preceding performance period. Response options ranged from 0 (*did not occur*) to 6 (*six or more times*). A sample event is “A teammate complimented my work.”

Positive discretionary event scale scores were computed for each week by summing the reported frequency of all positive events occurring during a given week.

Open-ended coding procedure

The open-ended response option allowed participants to describe an event they had experienced that was not represented on the list of items, and indicate the number of times it had occurred. 39 out of 167 participants provided a total of 132 open-ended event responses over a period of seven weeks ($M_{week} = 18.86$; $SD_{week} = 3.63$). Ten participants included open-ended responses for all seven weeks. Two provided six responses; two provided five; one provided four; two provided three; eight provided two; and fourteen participants provided an open-ended response for a single week.

An independent rater categorized open-ended responses on two dimensions: valence (affective tone) and referent (source of event). Event valence was classified as positive, negative or neutral in tone. The event referent was classified as the team, a dyad, task or technology demands, or unspecified. Exemplar responses from each category are provided in Table 4.

Participants reported negative events on forty occasions, neutral events on forty-nine occasions, and positive events on forty-three occasions over the course of the project. In 57 cases, participants attributed the event to the team as a whole; in twenty cases, participants singled out a particular individual on the team; in forty cases, participants attributed the event to technology or task demands. Cross-classified frequencies for coded responses are summarized in Table 5.

Table 4
Open-ended affective event response exemplars classified by referent and valence

Referent	Valence		
	Positive	Neutral	Negative
Team	“I worked well with my teammates”	“Interacted with all group members”	“I had problem interacting with my teammates”
Dyad	“A teammate recognized me for starting on the weekly assignment”	“I reviewed the feedback with a group member”	“Had a hard time with a teammate”
Task	“We completed our task ahead of time.”	“Started working on the final paper”	“I have problems understanding my task”
Unspecified	“Motivat[ed] to work harder on the project”	“Took control of the situation”	“Was not happy”

Table 5
Cross-table of weekly event frequencies for valence (negative, neutral, positive) by referent (collective, dyad, task, unspecified).

Classification	W1	W2	W3	W4	W5	W6	W7	Total
Negative	9	6	5	5	5	4	6	40
Team	4	4	4	4	0	2	4	22
Dyad	2	0	1	0	3	1	2	9
Task	3	2	0	0	0	1	0	6
Unspecified	0	0	0	1	2	0	0	3
Neutral	6	9	6	10	5	7	6	49
Team	1	5	2	5	1	1	2	17
Dyad	1	0	1	0	0	1	0	3
Task	4	3	3	5	4	5	3	27
Unspecified	0	1	0	0	0	0	1	2
Positive	10	6	8	3	8	2	6	43
Team	6	1	3	1	4	2	1	18
Dyad	2	2	2	0	0	0	2	8
Task	0	1	3	1	2	0	3	10
Unspecified	2	2	0	1	2	0	0	7
Event Totals	25	21	19	18	18	13	18	132

Positive and negative event sum scores (the total number of positive or negative events occurring in a given week, respectively) were calculated by combining open- and closed-ended event frequencies with corresponding valences. For open-ended responses coded as having a positive valence, the corresponding frequency data was added to that participant's positive event total. For open-ended responses coded as having a negative valence, the corresponding frequency data was added to that participant's negative event total. Neutral events were not included in weekly event totals.

2.2.3 Mid- and post-task survey content

In addition to the weekly survey items, two surveys contained a longer battery of motivational state measures. These measures assessed overall affect, behavior, and cognition related to the project, up to the time of measurement². Mid-task measures (T4) were assessed at the mid-point in the project (Appendix B). Post-task measures (T7) were assessed upon completion of the final deliverable (Appendix C). Items were reworded into the past tense for the post-task assessment.

Off-task allocation

Off-task allocation was measured with two items assessing how much time participants invested in non-project activities. The items are “How much time did you spend on personal business?” and “How much time did you spend on other classwork?” Items

² Although included in the proposal document for this dissertation, sociometric data were excluded from the final draft. Upon further review, sociometric indices capture fundamentally different properties of group relations (i.e. ‘ties’) than do psychometric measures and provide limited utility as indicators of psychometric construct validity (i.e., attributes) (Borgatti & Foster, 2003) .

utilize an open-ended response, in hours. Off-task allocation scale scores were computed by summing the time allocation to other class work and personal business.

Resource allocation direction

The direction of resource allocation across project activities was assessed using three, 3-item, locally-developed scales. The types of activities are taskwork (e.g., “writing project deliverables”), teamwork (e.g., “coordinating with your team”), and boundary spanning allocations (e.g., “Posting to basecamp”). Participants reported the percentage of their time spent on each of the nine activities, out of the total time they spent on the project, by using a sliding bar to indicate the correct proportion from 0 to 100%. Resource allocation to taskwork was computed by summing the three taskwork items, forming the proportion of time allocation devoted to working on the task. Resource allocation to teamwork was computed by summing the three teamwork items, forming the proportion of time devoted to teamwork activities. Resource allocation to boundary-spanning was computed by summing the three boundary-spanning items, forming the proportion of time devoted to external activities.

Effort-related (on-task) affective cognition

Anxiety-related Cognition related to the project was assessed using a four-item scale ($\alpha = .66$) adapted from Kanfer, Ackerman, Murtha, Dugdale, and Nelson (1994). Response options range from 1 (*never*) to 8 (*constantly*). A sample item is “I become frustrated with the amount of time I spent on the project.” Scale scores were computed by taking the mean of item responses.

Off-task cognition

A 6-item measure of off-task cognition (Kanfer et al., 1994) assessed the extent to which participants experienced divided or diminished attention during the time they actually spent working on the project ($\alpha = .75$). Response options range 1 (*never*) to 8 (*constantly*). A sample item is “I lost interest in the project for short periods.” Scale scores were computed by taking the mean of item responses.

Team embeddedness

Team embeddedness was assessed using six items adapted from Mitchell et al. (2001), along three indicators: Links (mean $\alpha = .7$), Fit (mean $\alpha = .78$), and Sacrifices (mean $\alpha = .04$). Each indicator contained two items. The two Links items were “How many teammates do you communicate with regularly,” and “How many of your teammates have relied on you for help during this project.” Since Links was a simple count, Links scale scores were computed by summing item responses. A sample Fit item is, “I fit well with this team.” Fit was assessed via a Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Fit scale scores were computed by taking the mean of item responses. A sample reverse-scored Sacrifices item is, “I ignored my teammates’ messages.” Sacrifices was assessed via a Likert-type response scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Sacrifices scale scores were computed by taking the mean of item responses.

Team viability

Participants’ satisfaction with their team and willingness to work with their teammates in the future was assessed using Resick, Dickson, Mitchelson, Allison, and Clark’s (2010) four-item Team Viability scale (mean $\alpha = .84$). Scale points range from 1 (*strongly disagree*) to 5 (*strongly agree*). A reverse-scored sample item is, “If I could

leave this team and work with another team on this project, I would.” Scale scores were computed by taking the mean of item responses.

Team efficacy

Team efficacy was assessed using Collins and Parker’s (2006) team efficacy scale. The 4-item team outcome efficacy subscale assessed teammates’ confidence in their ability to achieve a given level of performance on the project, ranging from “‘D’ on the next deliverable” to “‘A’ on the next deliverable” ($\alpha = .71$). Response options range from 0 (*not at all confident*) to 10 (*extremely confident*). The scale utilized the referent-shift consensus method (Chan, 1998), such that the referent for each item was “my team”. $r_{wg(j)}$ was selected as criteria for aggregation. Mean $r_{wg(j)}$ for mid-project (week 3) team efficacy was .70, supporting aggregation to the team level. Further supporting this decision, mean ICC(1) for team efficacy was equal to .65 (95% CI: lower bound = .55, upper bound = .74), and mean ICC(2) was equal to .71 (95% CI: lower bound = .63, upper bound = .78).

Team cohesion

Team cohesion was assessed via a 4-item, locally constructed measure ($\alpha = .89$). Responses options range from 1 (*strongly disagree*) to 5 (*strongly agree*). Items utilized the referent-shift consensus method (Chan, 1998) for assessing collective constructs, such that “my/our team” was the referent for each item. A sample item is “Our team likes working together.” Within-team agreement, assessed using $r_{wg(j)}$, averaged .90, supporting aggregation to the team level. Mean ICC(1) was equal to .88 (95% CI: lower bound = .85, upper bound = .91), and mean ICC(2) was equal to .89 (95% CI: lower bound = .86, upper bound = .92).

Peer evaluation

Participants received a peer-evaluation grade from each of their teammates. The item prompt read, “How much will your team’s performance be reduced if [the participant] were to leave the team?” Response options range from 0 (*the team will be better off*) to 5 (*the team’s performance will be greatly reduced*). This scale provides convergent validity evidence for self-report measures of resource allocation.

2.2.4 Task demands

Task demands, in terms of deliverable difficulty, were assessed by subjective ratings from subject matter experts (SMEs). Two psychology SMEs (both instructors from sampled psychology classes) rated the psychology deliverables. One ecology SME (the instructor from the sampled ecology class) rated the ecology deliverables. SMEs rated each deliverable’s according to a single-item measure, “How difficult is deliverable ____”. Response options ranged from 1 (*very easy*) to 10 (*very difficult*). Inter-rater reliability was sufficient for aggregation ($ICC_3 = .55$). Aggregated scores were computed through a weighted composite that adjusted for the number of raters within each discipline. Psychology SME ratings were averaged with each other, and then this score was averaged with ecology, to reflect the equal contributions of ecology and psychology to each deliverable.

2.3 Analysis strategy

Due to the sampling of geographically-dispersed teams and repeated measures design, analyses were conducted using hierarchical linear modeling with a four-level nested structure. Time points (measurement occasions) were nested within participants, nested within teams, nested within classes. Time series analyses require predictors to be

measured at the same time in order to be entered into the same equation. Therefore, predictors that occurred or were measured at separate points were entered into separate equations in order to gauge their impact within a specific time frame. All hypotheses were tested using hierarchical linear modeling. Analyses were conducted using the ‘nlme’ package (Pinheiro, Bates, DebRoy, Sarkar, & R Core Team, 2014) for R version 3.1.0 (R Core Development Team, 2014). A glossary of terms and operational and conceptual definitions is presented in Appendix D.

Criterion data from only weeks 2 to 7 of the study were utilized in hypothesis testing, excluding resource allocation toward Deliverable 1. Conceptual, computational, and practical factors led to the decision to exclude week 1 data. First, only a single week was allotted for Deliverable 1, whereas Deliverables 2 through 4 were each allotted two weeks. This prevented observation of hypothesized sub-episodic effects and made these performance episodes meaningfully non-comparable. Second, time-series analyses require a meaningful baseline from which to compare future changes in the criterion. Week 1 data reflected an entire performance episode in which all task expenditures fell within the deadline period. Since deadline proximity was expected to influence resource allocation, using week 1 data as baseline would confound episodic and sub-episodic effects and ultimately bias the estimated trajectory of effort over time. In contrast, week 2 reflected a time point for which both hypothesized effects would be at, or close to, zero. Third, Deliverable 1 (topic selection and completion of team charter) was qualitatively dissimilar from the latter three deliverables. Deliverable 1 consisted of a straightforward, closed-ended task that required a high degree of temporal coordination between members of the team and MTS, but otherwise low attentional demands to complete at an

acceptable standard of performance. Practically, Deliverable 1 was completed during a single meeting which required some deliberation but very little effort. In contrast, Deliverables 2 through 4 each required brainstorming, cooperation, and action with great discretion for individual team members. The disparity in situation strength between Deliverables 1 and 2-4 supported exclusion. Feedback provided by professors also corroborated this conclusion. Empirical data, presented later in the results section of this paper, validated the decision to utilize only weeks 2 through 7.

2.3.1 Growth Effects

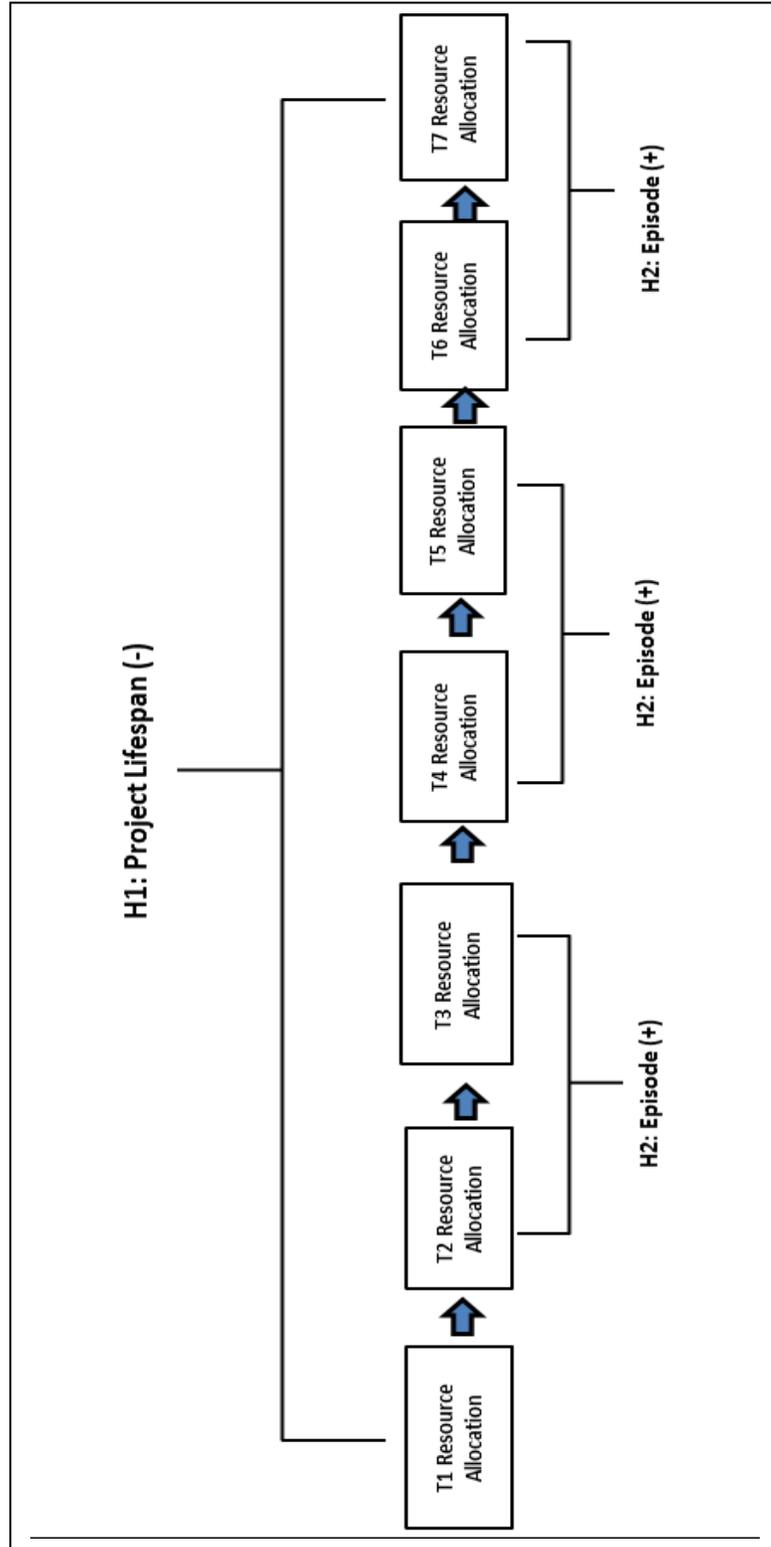
Hypotheses 1 and 2 were tested with hierarchical growth modeling utilizing a four level, repeated measures structure. A conceptual model of these effects is shown in Figure 3. Weekly measurement occasions for resource allocation represent the level 1 units, which were nested within people (level 2), nested within teams (level 3), nested within classes (level 4). The time series utilized autoregressive error terms to account for repeated within-person sampling (Bryk & Raudenbush, 1987). Task demands, in terms of instructor ratings of perceived deliverable difficulty, were entered in Step 1. Time effects were entered in subsequent steps. Time was coded in two ways. First, time was coded as the n^{th} performance episode during which measurement occurred, corresponding to the n^{th} deliverable. Two weeks fell within each performance episode such that both weeks received the same label. This continuous treatment of time was centered at the beginning of the second deliverable episode, such that observations in weeks two and three = 0, weeks four and five = 1, and weeks six and seven = 2. Using this centering procedure allowed resource allocation in Week 2, or the start of Deliverable 2, to serve as the

baseline for subsequent within-person changes in resource allocation (Ployhart, Holtz, & Bliese, 2002).

The second treatment of time was episodic. Participants completed all deliverables sequentially, and could not begin a deliverable before completing the previous one. Two weeks were allotted for each deliverable, and this two week period constituted a performance episode in accordance with the definition provided by Marks et al. (2001). Within each performance episode, the first and second weeks were determined *a priori* to represent meaningful sub-episodes. The effect of sub-episode was hypothesized to be independent of week itself in the absolute sense, and only manifest in relation to the time remaining until deliverable deadline. Therefore the first (initial) sub-episode within each performance episode was dummy coded as 0, and the second (terminal) sub-episode was dummy coded as 1.

Hypotheses 1 and 2 were tested hierarchically in Models 1a-d. Model 1a estimated the within-person effect of task demands on resource allocation at each corresponding measurement occasion. To test Hypothesis 1, the effect of Episode (0 to 2) was added to Model 1b, estimating the effect of time on average within-episode resource allocation (i.e., the weekly average during each two-week episode) after accounting for task demands. To test Hypothesis 2, the effect for sub-episode was added in Model 1c, estimating the average within-person effect of deadline proximity on resource allocation (duration and intensity) across three, two-week performance episodes (dummy coded; Sub-episode 1=0, sub-episode 2=1). Although not hypothesized, an exploratory test for an episode X sub-episode interaction was conducted in Model 1d.

Figure 3. Model of Hypotheses 1 and 2, depicting contrasting effects operating along different time frames.

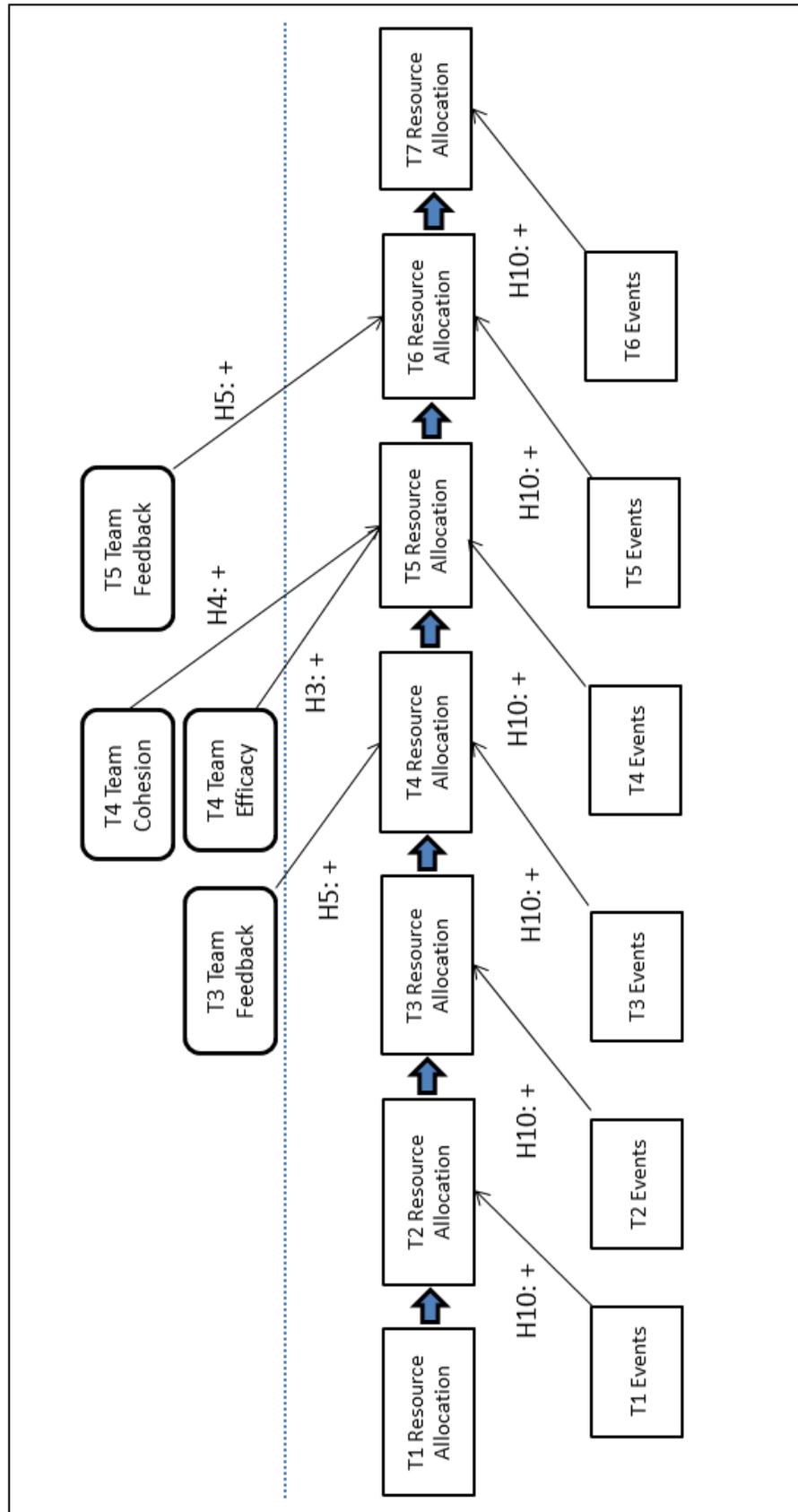


2.3.2 Cross-level effects

Hypotheses 3 and 4 were tested in Models 2a and 2b by estimating the effects of team emergent states on resource allocation within the second performance episode. Figure 4 depicts effects originating from the team. These hypotheses were tested in two stages. First, Model 2a tested a main effects model for team efficacy and team cohesion at midpoint. Both states were entered time-invariant predictors of resource allocation within the second performance episode in Model 2a. The second stage tested a slopes-as-outcomes model (Bryk & Raudenbush, 1992) by adding interaction terms by sub-episode for team efficacy and team cohesion, respectively, in Model 2b. These slopes-as-outcomes models tested the cross-level, time-lagged effects of team efficacy and team cohesion on within-person change in resource allocation across sub-episodes.

Hypothesis 5 was tested in Model 3. Teams received performance evaluation (i.e., deliverable grades) at two points over the project, weeks 2 and 5. Model 3 tested the average between- and within-person effects of feedback on subsequent resource allocation across both of these points. Deliverable grades were standardized at the grand mean prior to analysis to ease the computational burden and aid interpretation, while preserving between-class differences in grading difficulty. Feedback was administered twice in the project (Weeks 4 and 6), and was delivered in the week following completion of the assignment. Analysis of feedback effects spanned the terminal sub-episode of the completed assignment, and the initial sub-episode of the subsequent assignment during which feedback was provided. Since the effects occurred across different performance episodes, a separate coding scheme was applied to feedback episodes. The week feedback

Figure 4. Model of Hypotheses 3, 4, 5, and 10, articulating the effects of ambient and discretionary events and team emergent states on resource allocation over time.



was administered was coded 0 and the subsequent week coded 1 (i.e., the reverse of the coding scheme for sub-episode)

2.3.3 Individual-level effects

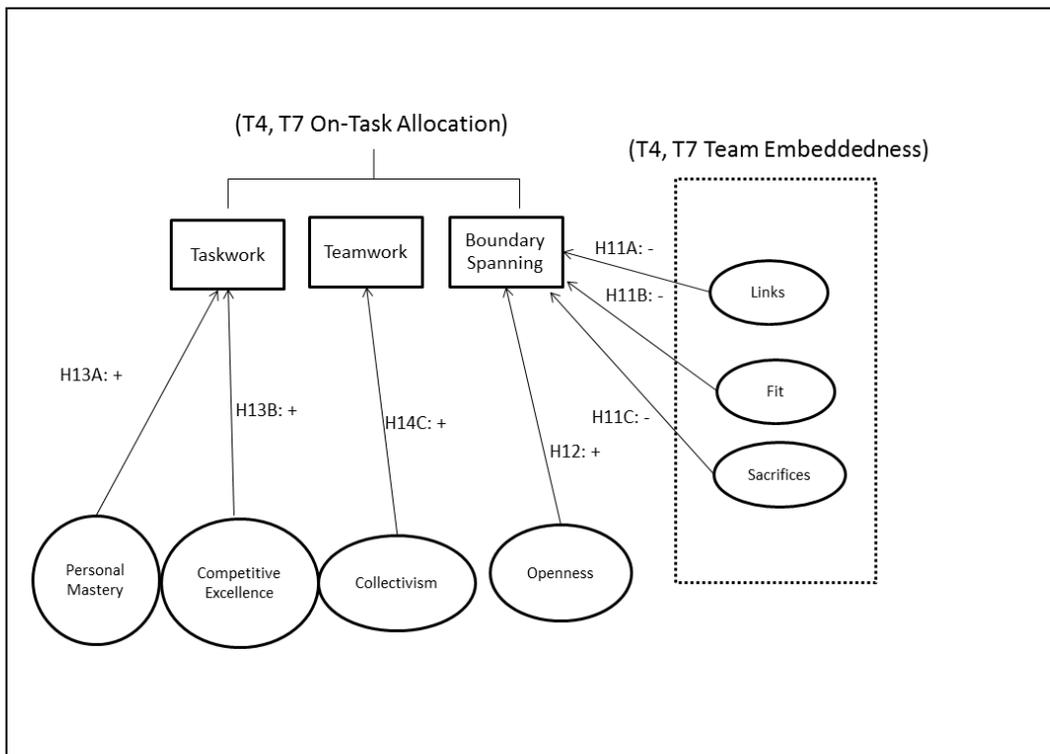
Hypotheses 6-9 were tested in Model 4. The independent effects of mastery, competitiveness, emotionality, and collectivism on resource allocation (duration, intensity, effort-related cognition) were estimated simultaneously after controlling for the effects of task demands, episode, and sub-episode. By applying a means-as-outcomes HLM model to time series, this analysis yielded intercept (baseline) differences while maintaining consistent slopes.

Hypothesis 10 was tested in Model 5. Unlike previous models, the predictor variable (positive interpersonal events) was measured at each time point and varied within- and between-person over the course of the project. Model 5 tested the time-lagged relationship between interpersonal events at week w and resource allocation at week $w + 1$, beginning with the first week of the project (Deliverable 1). Task demands and time terms for episode (centered at Week 2) and sub-episode (dummy coded as 0, 1) were entered as controls as in previous analyses, although the intercept estimate for resource allocation in week 2 was conditional upon the lagged effect of interpersonal events in week 1. Although not hypothesized, an interaction term between week and event frequency was entered in Model 5, testing for slope changes in the relationship between events and resource allocation over time. A negative interaction term would indicate that interpersonal events had a greater impact earlier in team formation, while a positive interaction term would suggest that interpersonal events grew more important the longer the team worked together (Ployhart et al., 2002).

2.3.4 Exploratory Analyses

Exploratory hypotheses 11-12 were tested in Model 6. The concurrent, between-person effects of three dimensions of team embeddedness (links to team, fit with team, potential sacrifices) and the average, between-person effect of pre-task (T0) openness on concurrent boundary-spanning allocation was estimated in Model 6. Exploratory hypotheses 13 and 14 were tested in Models 7 and 8, respectively. Using HLM, the average, between-person effect of personal mastery, competitive excellence, and psychological collectivism on taskwork (Model 7) and teamwork (Model 8) allocations were estimated across two time points (T4, T7). Figure 5 shows a conceptual model for all exploratory effects.

Figure 5. Model of exploratory hypotheses, articulating the effects of indicators of team embeddedness and traits on direction of resource allocation.



2.3.5 Power analysis

Results of a pilot study were used to estimate a priori power for the proposed analyses. In the current sample, seven level-1 measurement occasions are nested within 187 participants, for a total of 1309 level-1 observations. Team states were assessed at two time points for 60 teams, for a total of 120 level-2 observations. Power was estimated with Optimal Design software v.3.01 (Raudenbush, 2011), using an average standardized effect size for dynamic relationships of $\gamma = .31$, a within-person residual of $\sigma^2 = .52$, and coefficient variability of $\tau = .90$. To detect growth effects, approximately 150 participants are required to achieve power of .5 and 170 participants to reach power of .7. Thus, the observed power in this study is approximately .68.

CHAPTER 3

RESULTS

3.1 Descriptive Statistics

Table 6 presents descriptive statistics for resource allocation and task demands for each week of the project. Week 1 data is reported in this table for sake of completeness, but excluded from further analysis. Descriptive results from pre-task trait assessment and trait intercorrelations are provided in Table 7. Descriptive results from mid- and post-task state batteries are shown in Table 8. Mean resource allocation amount for Weeks 2-7 overall equaled 2.61 hours ($SD = 1.91$) per week, ranging from .6 hours to 6.71 hours. Mean resource allocation intensity for Weeks 2-7 overall equaled 8.06 units ($SD = 3.62$), ranging from 3 to 13.5. Resource allocation amount and intensity were correlated overall $r = .74$ ($p < .01$), ranging from $r = .48$ ($p < .01$; Week 3), to $r = .77$ ($p < .01$; Week 6). The two items comprising the resource allocation intensity scale (subjective effort, perceived demandingness) correlated $r = .86$ with each other. Subjective effort ($r = .73$) and perceived demandingness ($r = .70$) were both strongly related to the reported duration of resource allocation. Given that behavioral (i.e., reported duration of resource allocation) measures provide more objective indices of resource allocation than subjective measures (i.e., reported, experiential intensity of resource allocation), and that subjective measures were effectively redundant with behavioral measures, further analyses were restricted to reported duration of resource allocation.

Table 6
Resource allocation and task demands over time

Wk.	D	Ep.	Sub.	Amount		Intensity		Difficulty	Events	
				<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>M</i>	<i>SD</i>
1	1	--	--	1.97	.95	6.75	2.31	1.25	12.66	7.91
2	2	1	1	1.31	1.13	5.15	2.75	3.75	6.51	6.03
3	2	1	2	2.24	1.21	7.59	2.49	3.75	9.58	6.11
4	3	2	1	2.44	1.66	8.04	3.2	5	8.82	5.83
5	3	2	2	3.87	2.17	10.30	3.2	5	10.59	6.32
6	4	3	1	2.05	1.71	6.88	3.81	5.25	5.82	5.95
7	4	3	2	3.76	1.93	10.35	3.08	5.25	10.78	6.78

Wk = Week; D = Deliverable; Ep = Performance episode; Sub. = Sub-episode.

Examination of descriptive results from the first week of the project provided support for the decision to exclude these data from analysis. First, resource allocation duration ($M = 1.97$, $SD = .95$; $t(149) = 6.68$, $p < .001$) and intensity ($M = 6.75$, $SD = 2.31$; $t(149) = 7.06$, $p < .001$) in Week 1 were greater than in Week 2, consistent with concerns that deadline pressure confounded baseline estimates. Second, between-person variance in resource allocation was lower in week 1 than any other week, providing a restriction of range in the predictor and obscuring between-person differences in intercept. Third, internal reliability for resource allocation intensity ($\alpha = .59$) was insufficient in week 1, suggesting that Deliverable 1 was not sufficiently difficult to provide an accurate estimate of perceived effort allocation. Finally, the correlation between subjective and behavioral measures of resource allocation was weaker than at any other point in the project ($r = .32$, $p < .05$), indicating that task demands for Deliverable 1 were qualitatively different from later deliverables.

Table 7
Motivational trait descriptives and intercorrelations

Scale	N	M	SD	1	2	3	4
1. Personal Mastery	165	4.81	0.66	--			
2. Motivation Related to Anxiety	165	3.63	1.02	-.13	--		
3. Competitive Excellence	165	3.61	0.92	.24**	.17*	--	
4. Psychological Collectivism	165	3.62	0.58	.2**	-.07	-.06	--
5. Openness	165	3.78	0.54	.45**	-.24**	.06	.07

* $p < .05$; ** $p < .01$.

As shown in Table 6, deliverables were administered in ascending order of difficulty. The episodic (i.e., temporal) sequencing of deliverables corresponded to the rank ordering of deliverable difficulty ($r = .93$). However, the intervals for difficulty were not consistent, as Deliverable 3 was one-third times more difficult than Deliverable 2, but Deliverable 4 was only one-twentieth times more difficult than Deliverable 3. Put another way, sequential task difficulty increased monotonically while time (operationalized as the n th episode) increased linearly. This supported the inclusion of episodic and task demand effects in analysis, and allowed computation without estimation problems.

On average, individuals experienced 8.7 positive affective events per week ($SD = 6.46$). The number of affective events experienced in a given week was moderately related to the amount of time spent on the project ($r = .49$). Examined concurrently, this relationship suggests that spending more time on the project simply increased the opportunity for positive interactions with team members. Subsequent analyses examined the time-lagged effects of positive affective events, which eliminated this confounding relationship.

Table 8

Descriptive statistics for mid-, and post-task measures of individual and team motivational states

Scale	Week 4 (Midpoint)			Week 7 (End)		
	N	M	SD	N	M	SD
Resource Allocation to Taskwork	150	54.75	22.57	162	59.00	17.48
Resource Allocation to Teamwork	150	26.48	15.43	162	24.86	13.44
Resource Allocation to External	150	18.90	14.59	162	16.14	11.28
Off-Task Cognition	147	15.22	4.16	161	2.56	0.71
Effort-Related Cognition	150	10.10	2.83	161	2.41	0.65
Off-Task Allocation	149	24.65	18.63	162	25.69	17.11
Upcoming Demands - Off-task	149	3.32	1.15	--	--	--
Team Embeddedness - Links to Team	150	4.13	1.31	160	4.40	1.53
Team Embeddedness - Fit	150	3.46	.77	162	3.50	0.83
Team Embeddedness - Sacrifices	150	3.93	.59	162	3.94	0.60
Team Cohesion	148	3.87	.67	160	3.83	0.63
Team Process Efficacy	146	7.25	2.22	159	7.60	1.44
Team Outcome Efficacy	145	8.04	1.90	159	8.05	1.33

3.2 Within-Person Trends in Resource Allocation

Hypothesis 1 suggested that within-person, resource allocation to the project would decrease over time. Prior to testing this hypothesis, I ran a series of null models (intercept-only) to test for systematic between- and within-individual variance existed in repeated measurements of resource allocation duration and intensity. ICC(1) for duration was equal to .23, indicating that 23.03% of variance in duration existed between-person, and 76.97% existed within-person. A further decomposition of variance effects found that 4.97% of in duration variance could be explained by team membership, and 7.71% explained by class enrollment. These variance estimates support inclusion of random effects for individual, team, and class.

Hypothesis 1 was tested in models 1a and 1b, reported in Table 9. Deliverable difficulty was positively associated with resource allocation ($\gamma = 1.56, p < .01$). After accounting for the effects of deliverable difficulty, episode number was negatively related to resource allocation ($\gamma = -.56, p < .01$), supporting Hypothesis 1. These effects can be better understood in isolation. When predicting the effects of task demands only, participants increased their time allocation on average by 1 hour and 33.6 minutes for each unit increase in deliverable difficulty. This corresponded to an increase in average weekly time allocation of 1 hour and 57 minutes from Deliverable 2 (predicted allocation = 1 hour and 49.2 minutes) to 3 (predicted allocation = 3 hours and 46.2 minutes), and an increase of 23.4 minutes from Deliverable 3 to 4 (predicted allocation = 4 hours and 9.6 minutes). Isolating the effects of time revealed a different trend. Independent of task demands, participants decreased their time spent on the project by 33.6 minutes each episode from a baseline average of 1 hour and 49.2 minutes. Post-hoc model comparisons showed that estimating first-order autocorrelation improved model fit for Models 1a (LRT (6,7) = 5.12, $p < .05$) and 1b (LRT(6,7) = 15.66, $p < .01$) from models without autocorrelation, supporting the decision to allow autocorrelation across measurement occasions.

Table 9
Hypotheses 1-2: Within-person effects on resource allocation over time

	Model 1a	Model 1b	Model 1c	Model 1d
<i>Intercept</i>	1.87 (.37)	1.82 (.37)	1.18 (.37)	1.37 (.39)
Task difficulty	0.90** (.07)	1.56** (.19)	1.62** (.19)	1.60** (.19)
Episode		-0.56** (.15)	-0.67** (.15)	-0.84** (.16)
Sub-episode			1.38** (.08)	1.00** (.13)
Episode X Sub-episode				0.37** (.1)

Note: Parameters are unstandardized, standard errors in parentheses.

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

Hypothesis 2 suggested that within-person, resource allocation increases within-episode in proportion to deadline proximity. This was tested in Model 1c of Table 9 by adding sub-episode to Model 1b. In support of Hypothesis 2, sub-episode (in terms of deadline proximity; dummy coded initial = 0, terminal = 1) was positively related to resource allocation duration ($\gamma = 1.38, p < .01$), such that on average, participants committed an additional 1 hour and 22.8 minutes in deadline weeks relative to non-deadline weeks. Adding sub-episode to the models increased the parameter for difficulty to 1.62 ($p < .01$) and reduced the parameter for episode to -.67.

Model 1c showed that resource allocation changed over time and within episode. The presumption that sub-episodic effects stayed consistent over time was highly speculative. Although not hypothesized, I tested whether sub-episodic effects changed over time, in model 1d in Table 9. The interaction term for Episode X Sub-episode was significant and positive ($\gamma = .37, p < .01$), indicating that individuals increased the proportion of personal resources allocated to the terminal (vs. initial) sub-episode over time. This effect occurred even as the absolute quantity of resources invested in each performance episode peaked and fell. From a baseline of 1 hour, 22.2 minutes, time allocation to the project increased by 1 hour and 36 minutes for each unit change in deliverable difficulty. Independently, time allocation to the project decreased by 50.4 minutes in each subsequent episode, increased by 1 hour during terminal sub-episodes, and increased by 22.2 minutes in each subsequent sub-episode. The independent effects of time and task demands are plotted in isolation in Figure 6. These effects are plotted in combination in Figure 7, showing their joint impacts on trajectory of resource allocation

over time in comparison to observed scores and demonstrating that these predictors closely reproduce the trends observed in the data.

Figure 6. Isolated effects of task difficulty, episode and sub-episode, plotted as separate predicted trajectories.

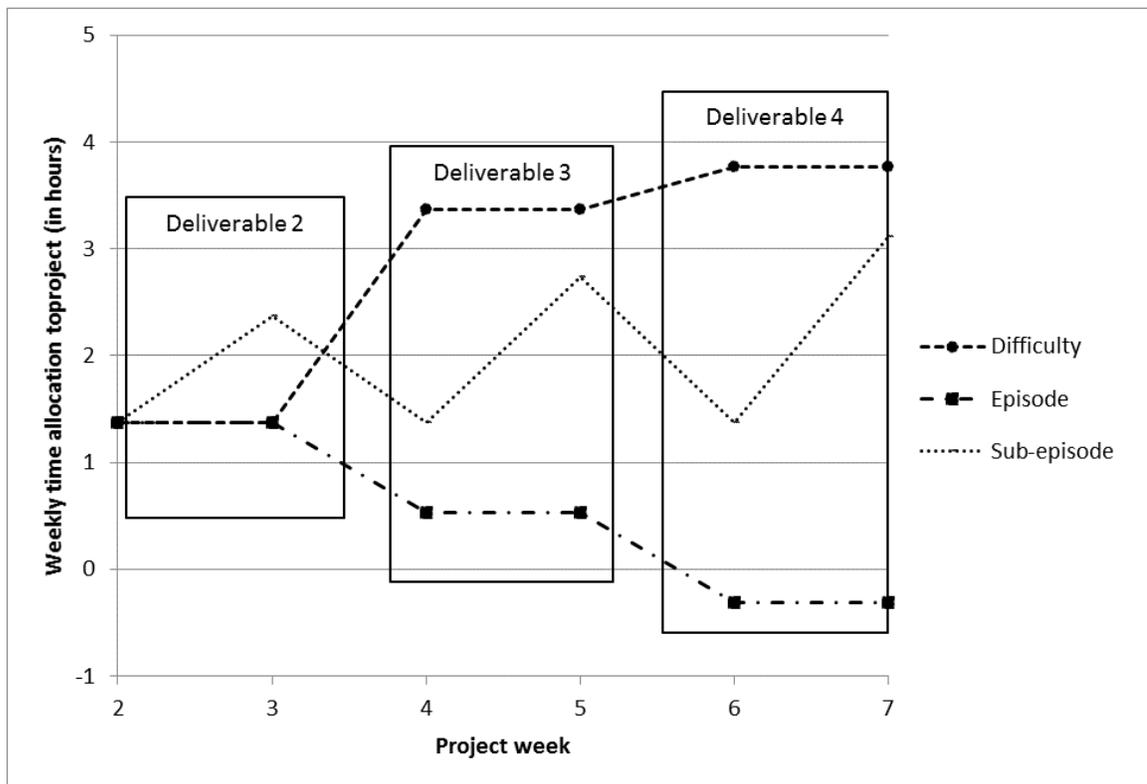
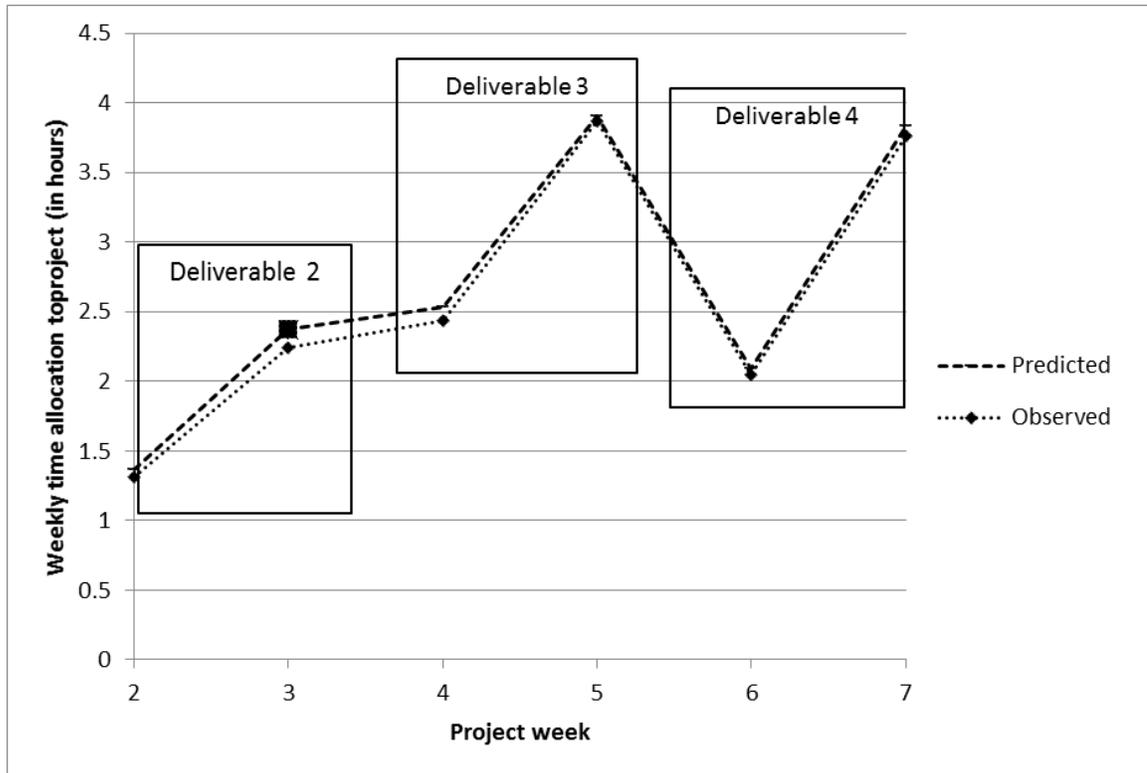


Figure 7. Predicted trajectory of resource allocation over time (dashed line) as function of task difficulty, episode, and sub-episode. In combination, these predictors reproduce the trend observed in the data (dotted line).



3.3 Between-Team Factors

3.3.1 Team Emergent States

Hypotheses 3 and 4 predicted positive, cross-level, time-lagged effects of team efficacy and team cohesion at time t on resource allocation at time $t+1$. Team cohesion and team efficacy were measured at the mid-point of the project (Week 4), and their effects on resource allocation in Week 5 are tested by models 2a and 2b in Table 10. Since all effects occurred within the second performance episode, sub-episode was

entered as a control. The main effects of team cohesion and team efficacy are tested in Model 2a. Team cohesion was not related to resource allocation duration ($\gamma = .01, p > .05, ns$). Team efficacy was not related to resource allocation duration ($\gamma = -.02, p > .05, ns$). In other words, between-team differences in team cohesion and team efficacy did not predict between-person differences in overall resource allocation in the second performance episode (i.e., across both weeks of the episode).

After accounting for potential between-team effects of team cohesion and team efficacy, the within-team effects of cohesion and efficacy were tested in slopes-as-outcomes Model 2b of Table 10 by adding state X sub-episode interaction terms (Bryk & Raudenbush, 1987). Team efficacy was positively associated with within-person changes in resource allocation duration ($\gamma = .41, p < .05$). Hypothesis 3 is therefore supported. Put another way, individuals increased their time investment on the project on average by 1 hour, 29.4 minutes between the initial (week 4) and terminal sub-episodes (week 5) of Episode 3. However, those nested in teams 1 *SD* above the mean in team efficacy increased their time investment an additional 25.6 minutes in this same period. This effect was only discernable in Model 5b after separating slope and intercept effects. Team cohesion was not related to within-person changes in resource allocation amount ($\gamma = .04, p > .05, ns$). Hypothesis 4 is not supported.

Table 10

Hypotheses 3-5: Dynamic effects of team efficacy, team cohesion, and team feedback on resource allocation.

Predictors	States:	States:	Events:
	Main effects	Interaction	Dynamic
	Model 2a	Model 2b	Model 3
<i>Intercept</i>	2.64 (.50)	2.63 (.50)	3.16** (.43)
Sub-Episode	1.47 (.17)**	1.49 (.17)**	
Team Cohesion	.01 (.14)	.00 (.16)	
Team Efficacy	-.02 (.13)	-.24 (.16)	
Team Cohesion X Sub-Episode		.04 (.20)	
Team Efficacy X Sub-Episode		.41 (.18)*	
Performance			.39** (.11)
Inter-episodic period			-.8** (.11)
Performance feedback			-.65** (.13)

Note: Scores on team cohesion, efficacy, performance, and feedback were standardized prior to analysis. Standard errors in parentheses.

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

3.3.2 Team Feedback

Hypothesis 5 predicted a positive relationship between feedback valence and subsequent effort allocation. The effects of feedback are tested in Model 3 in Table 10. As explained previously, feedback was administered twice in the project (Weeks 4 and 6), and in both cases was delivered in the week following completion of the assignment. That is, analysis of feedback effects spans the terminal sub-episode of the completed assignment, and the initial sub-episode of the subsequent assignment during which feedback is provided. There was a main effect of performance, such that team grade on each deliverable was positively associated with amount of resources allocated during that deliverable's terminal sub-episode ($\gamma = .39, p < .01$). There was also a main effect of trans-episodic feedback period (i.e., between when teams submitted their assignment and when they received feedback), such that resource allocation dropped between episodes (γ

= -.8, $p < .01$). The interaction between feedback period and feedback was negatively related to resource allocation ($\gamma = -.65$, $p < .01$). Hypothesis 5 is therefore not supported. Contrary to expectations, individuals reduced their subsequent resource allocation by 39 minutes for each standard deviation increase in feedback valence that their team received.

3.4 Between-Person Factors

3.4.1 Traits

Hypotheses 6-10 predicted that the three dimensions of trait achievement motivation and psychological collectivism would be associated with differences in average resource allocation over the lifespan of the project. All four trait measures were tested simultaneously after accounting for the effects of episode, sub-episode, and deliverable difficulty, in Model 4 of Table 11. After accounting for time and difficulty effects, static predictors should be interpreted as the variance in intercept attributable to traits. Standardized parameters for trait predictors are reported, such that the intercept value reflects baseline resource allocation at mean levels of all traits. In support of Hypothesis 6, personal mastery was positively associated with resource allocation duration ($\gamma = .3$, $p < .01$). Hypothesis 7 was not supported, as competitive excellence was unrelated to resource allocation duration ($\gamma = -.11$, $p > .05$, *ns*). Hypothesis 8 was not supported, as motivation related to anxiety was unrelated to resource allocation duration ($\gamma = .08$, $p > .05$, *ns*). Contrary to expectation, psychological collectivism was negatively related to resource allocation duration ($\gamma = -.21$, $p < .05$). Hypothesis 9 was not supported.

The trait effects tested in Model 4 show differences at baseline, and these differences are expected to maintain rank-order consistency over time. However, prior

empirical evidence has shown that motivational traits can impact the trajectory of motivation over time (Ackerman & Kanfer, 2009; Wanberg et al., 2012). Given past findings and the unexpected effect of collectivism, follow-up exploratory analyses were conducted to account for static moderation effects over time. No interaction by time was observed for mastery ($\gamma = .03, p > .05, ns$), competitiveness ($\gamma = 0, p > .05, ns$), anxiety ($\gamma = .04, p > .05, ns$), or collectivism ($\gamma = .01, p > .05, ns$).

Table 11
Hypotheses 6-10: Trait and affective event effects on resource allocation.

Predictors ^a	Traits	Events
	Model 4	Model 5
<i>Intercept</i>	1.32 (.38)	1.48 (.39)
Task difficulty	1.63** (.19)	1.62** (.2)
Episode	-.85** (.16)	-.90** (.17)
Sub-Episode	1.02** (.14)	.88** (.14)
Episode X Sub-Episode	.38** (.1)	.40** (.1)
Personal Mastery	.30** (.09)	
Motivation Related to Anxiety	.08 (.09)	
Competitive Excellence	-.11 (.09)	
Psychological Collectivism	-.21* (.09)	
Positive Events		-.04** (.01)
Sub-Episode X Positive Events		.01 (.02)

a Episode coded 1 = 0, 2 = 1, 3 = 2 = 6; Sub-Episode coded as non-deadline week = 0, deadline week = 1; Positive events centered within person.

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

Although not hypothesized, there is theoretical support for the attenuation of trait effects by states (Tasa, Sears, & Schat, 2011; Tett & Burnett, 2003). This person-situation interaction approach suggests that the expression of traits depend on the ambient characteristics of the team in which a given person is embedded. The moderation of traits

by states was tested in a series of follow-up analyses. The first set of follow-up analyses tested the interaction of traits X team emergent states. There was no significant moderation by team cohesion for psychological collectivism ($\gamma = .23, p > .05, ns$), personal mastery ($\gamma = -.07, p > .05, ns$), motivation related to anxiety ($\gamma = -.23, p > .05, ns$), or competitive excellence ($\gamma = -.21, p > .05, ns$). There was no significant moderation by team efficacy for psychological collectivism ($\gamma = .08, p > .05, ns$), personal mastery ($\gamma = .2, p > .05, ns$), motivation related to anxiety ($\gamma = -.12, p > .05, ns$), or competitive excellence ($\gamma = -.14, p > .05, ns$).

The second set of moderation analyses tested the three-way interaction of traits X team emergent states X time. Since team emergent states were only measured at the midpoint of the study (week 4), time reflected the change in predicted resource allocation from the initial to terminal sub-episode of episode 2 (Deliverable 3). Trait X state and trait X state X time parameters were estimated simultaneously for each trait-state pairing, allowing the former to be interpreted as the intercept parameter and the latter as the slope parameter. The interaction between team cohesion and psychological collectivism was significant and positive ($\gamma = .4, p < .01$), and the interaction between team cohesion, psychological collectivism, and time was negative ($\gamma = -.37, p < .05$). Psychological collectivism was positively related to resource allocation for individuals nested within cohesive teams, but only during initial sub-episodes. The nearly symmetrical parameters suggest that resource allocation reverted to baseline under conditions of deadline pressure. No moderation was observed for personal mastery (by cohesion: $\gamma = -.21, p > .05, ns$; by cohesion and time: $\gamma = .36, p > .05, ns$), motivation related to anxiety (by

cohesion: $\gamma = -.18, p > .05, ns$; by cohesion and time: $\gamma = -.13, p > .05, ns$), or competitive excellence (by cohesion: $\gamma = -.03, p > .05, ns$; by cohesion and time: $\gamma = -.35, p > .05, ns$).

Efficacy X psychological collectivism was not related to resource allocation ($\gamma = .3, p > .05, ns$), but efficacy X psychological collectivism X time was significant and negative ($\gamma = -.45, p < .05$). High psychological collectivism individuals nested within highly efficacious teams did not allocate resources differently than other team members in initial sub-episodes. However, in terminal sub-episodes these individuals tended to allocate fewer resources if their teams had strong, positive capability beliefs. No moderation effect was observed for personal mastery (by team efficacy: $\gamma = .2, p > .05, ns$; by team efficacy and time: $\gamma = -.04, p > .05, ns$), motivation related to anxiety (by team efficacy: $\gamma = -.04, p > .05, ns$; by team efficacy and time: $\gamma = -.17, p > .05, ns$), or competitive excellence (by team efficacy: $\gamma = -.05, p > .05, ns$; by team efficacy and time: $\gamma = -.14, p > .05, ns$).

3.4.2 Interpersonal Events

Model 5 tests the relationship between positive affective events and resource allocation, reported in Table 11. Positive events were centered within individuals in order to account for baseline perceptual differences in what experiences constitute positive affective events. Centering allows person X time differences to emerge in a relative sense, such that “good” weeks can be distinguished from “bad” weeks for each person. After accounting for task demands and time effects, positive events had a negative, time-lagged relationship to resource allocation ($\gamma = -.04, p < .01$). The more positive interactions an individual had with his or her teammates, the fewer resources that individual allocated in the subsequent measurement period. No interaction effect was

observed between time and events ($\gamma = .01, p > .05, ns$) such that the effect of events on resource allocation stayed consistent over the course of the project.

As reported previously, the amount of time spent on the project in a given week was positively related to the number of events experienced in that same week. Taking the time-lagged relationship removes the direct covariation of time allocation. However, this did not account for within-person error. Spending more time on the project one week (and as a consequence experiencing more affective events), made one more likely to spend more time in subsequent weeks, and therefore experience more affective events. Put another way, affective events at time t was correlated with affective events at time $t+1$ through each individual's tendency to spend more or less time on the project. The autocorrelation term accounted for the fact that time spent on the project in a given week is correlated with other within-person measurements by classifying within-person effort-events covariance as error.

Follow-up analyses tested whether team states contextualized affective events. No moderation effect was observed for team efficacy ($\gamma = -.01, p > .05, ns$) or team cohesion ($\gamma = -.02, p > .05, ns$). Next, double moderation was tested for the interaction between events, states, and time. No moderation effect was observed for team efficacy X sub-episode ($\gamma = -.03, p > .05, ns$). There was a significant, negative three-way interaction between team cohesion, sub-episode, and positive affective events ($\gamma = -.11, p < .01$). Individuals reduced their effort in the terminal sub-episode with each additional affective event, but only for those individuals nested within cohesive teams.

Finally, a third series of follow-up analyses tested the interaction between events and the traits of those experiencing them. There was a significant, negative interaction

between positive events and personal mastery ($\gamma = -.02, p < .05$) such that individuals higher in trait mastery reduced their effort following positive events beyond the overall effect of positive events. There was no significant interaction between events and either motivation related to anxiety ($\gamma = -.004, p > .05, ns$) or competitive excellence ($\gamma = -.01, p > .05, ns$). There was a significant, positive interaction between affective events and psychological collectivism ($\gamma = .02, p < .05$), such that individuals higher in psychological collectivism invested greater personal resources in the project following positive interpersonal events.

3.5 Exploratory results

All exploratory hypotheses used resource allocation direction as criterion. Resources could be directed toward, and divided among, three classes of activities: taskwork, teamwork, and external activities (e.g., coordinating with partnered team). Resource allocation in each direction was assessed mid- and post-task via a three-item subscale, for which items were written to reflect the most salient and central aspects of each class. Allocations to items within each class were summed to give the proportion of their time on the project they had spent on each of the three activities. Resource allocation direction was operationalized in two ways for exploratory analysis: 1) In raw units, or the percentage of time spent on each of three categories of activities: taskwork, teamwork, and external activities (summing to 100%) at mid-point and post-task, for six total variables; 2) In weighted weekly units, by multiplying each time allocation measurement in the first half and last half of the project by the directional proportions reported at mid- and post-task, respectively. This approach retained both between- and

within-person differences in absolute resource allocation. This approach produced 12 variables, two for each time point.

3.5.1 Team Embeddedness

Exploratory hypotheses 11a-c predicted that three indicators of team embeddedness (links to team, fit with team, perceived sacrifices of team withdrawal) would be negatively related to resource allocation toward boundary-spanning. Proportional units are tested in model 6a and weighted units are tested in model 6b, presented in Table 12. The hypothesized relationship between links to team and boundary-spanning allocation was not supported. Number of links was unrelated to boundary spanning in raw units, but positively related to boundary spanning in weighted weekly units ($\gamma = .05, p < .01$). The hypothesized relationship between fit and boundary-spanning was not supported. Fit unrelated to boundary spanning under proportional ($\gamma = -.56, p > .05, ns$) or weighted ($\gamma = 0, p > .05, ns$) units. The hypothesized relationship between perceived sacrifices and boundary-spanning was not supported. Perceived sacrifices associated with withdrawing from the team were positively related to boundary spanning allocation raw scores ($\gamma = 3.72, p < .01$), and unrelated to weighted weekly scores ($\gamma = .09, p > .05, ns$). It is important to note that Cronbach alpha for sacrifice was close to zero ($\alpha = .04$), suggesting that this result is not valid. No support was found for exploratory hypotheses 11a-c.

Table 12
Hypotheses 11-14: Exploratory findings on direction of resource allocation

Predictor	External Allocation		Taskwork Allocation		Teamwork Allocation	
	Model 6a: Relative	Model 6b: Absolute	Model 7a: Relative	Model 7b: Absolute	Model 8a: Relative	Model 8b: Absolute
Intercept	15.67 (2.48)	.31 (.14)	55.29 (3.46)	1.54 (.23)	26.83 (2.58)	.69 (.12)
Links	.41 (.55)	.05** (.02)				
Fit	-.56 (1.11)	.00 (.04)				
Sacrifices	3.72 (1.40)*	.09 (.05)				
Openness	-1.14 (.85)	.01 (.03)				
Mastery			.24 (1.32)	.18* (.07)	.49 (.93)	.07* (.03)
Compet.			.26 (1.30)	-.07 (.07)	.53(.92)	.00 (.03)
Collect.			.57 (1.30)	-.09 (.07)	-1.04 (.92)	-.07* (.03)

RA = Resource allocation; Compet. = Competitiveness; Collect. = Psychological collectivism

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

3.5.2 Trait effects

Exploratory Hypothesis 12 predicted that openness would be positively related to boundary spanning. This prediction, tested in Model 6a of Table 12, was not supported. Openness to experience was unrelated to boundary spanning under proportional ($\gamma = -1.14, p > .05, ns$) or weighted schemes ($\gamma = .01, p > .05, ns$). Exploratory Hypotheses 13a-b are tested in raw units in Model 7a and weighted units in Model 7b of Table 12. Hypothesis 13a predicted that Trait Personal Mastery was positively related to taskwork allocation. This hypothesis was partially supported. Trait personal mastery was unrelated to raw (proportional) taskwork allocation ($\gamma = .24, p > .05, ns$), but was positively related to weighted weekly taskwork allocation ($\gamma = .18, p < .01$). Hypothesis 13b predicted that trait Competitive Excellence was positively related to taskwork allocation. This was not supported. Competitive excellence was unrelated to taskwork allocation under raw ($\gamma = .26, p > .05, ns$) or weighted schemes ($\gamma = -.07, p > .05, ns$). Hypothesis 13c predicted

that psychological collectivism would be unrelated to taskwork allocation. This was supported, as Psychological Collectivism was unrelated to taskwork allocation under raw ($\gamma = .57, p > .05, ns$) or weighted schemes ($\gamma = -.09, p > .05, ns$). Hypotheses 14a predicted that trait personal mastery would be unrelated to teamwork allocation. This was partially supported, as personal mastery was positively related to weighted weekly teamwork allocation ($\gamma = .07, p < .05$), but unrelated to raw scores ($\gamma = .49, p > .05, ns$). Hypothesis 14b predicted that competitive excellence would be unrelated to teamwork allocation. This was supported. Competitive excellence was unrelated to relative ($\gamma = .53, p > .05, ns$) or absolute ($\gamma = .00, p > .05, ns$) teamwork allocation. Hypothesis 14c predicted that psychological collectivism would be positively related to teamwork allocation. This was not supported, as psychological collectivism was unrelated to raw teamwork allocation ($\gamma = -1.04, p > .05, ns$) and negatively related to weighted weekly teamwork allocation ($\gamma = -.07, p < .05$).

CHAPTER 4

DISCUSSION

Teams have become a fixture of work structure in organizations (Devine et al., 1999). Despite substantial investigation into the antecedents and consequences of team motivation, three notable deficits appear in the team motivation literature. First, researchers have focused on the relationship between team motivational states and team performance while largely ignoring how the team itself motivates individuals (Park et al., 2013). Second, despite repeated calls for investigation into how team motivation changes over time, there is a notable scarcity of empirical evidence on longitudinal trajectories of motivation in teams (Ilgen, 2014; Kozlowski & Ilgen, 2006; Mathieu, Maynard, Rapp, & Gilson, 2008; Roe et al., 2012). Third, motivation research faces its own “criterion problem.” Past studies have principally selected self-efficacy or performance as a focal criterion (Park et al., 2013), despite long understanding that these constructs do not capture motivation directly (Ach, 1910). More recent theoretical work has called for greater clarity in motivational criteria, raising concerns that performance and self-efficacy are insufficient to explore motivational consequences at the individual level within teams (Dalal & Hulin, 2008; Ployhart, 2008).

This dissertation has achieved three broad goals. First, I have identified and classified three broad sources of motivation present in the team context and related them to individual behavior. Second, I have demonstrated the dynamic nature of individual and contextual determinants of motivation over time. Third, I have captured motivation directly in terms of resource allocation, marking a departure from previous studies that utilized self-efficacy or performance as indirect indicators of motivation. The data

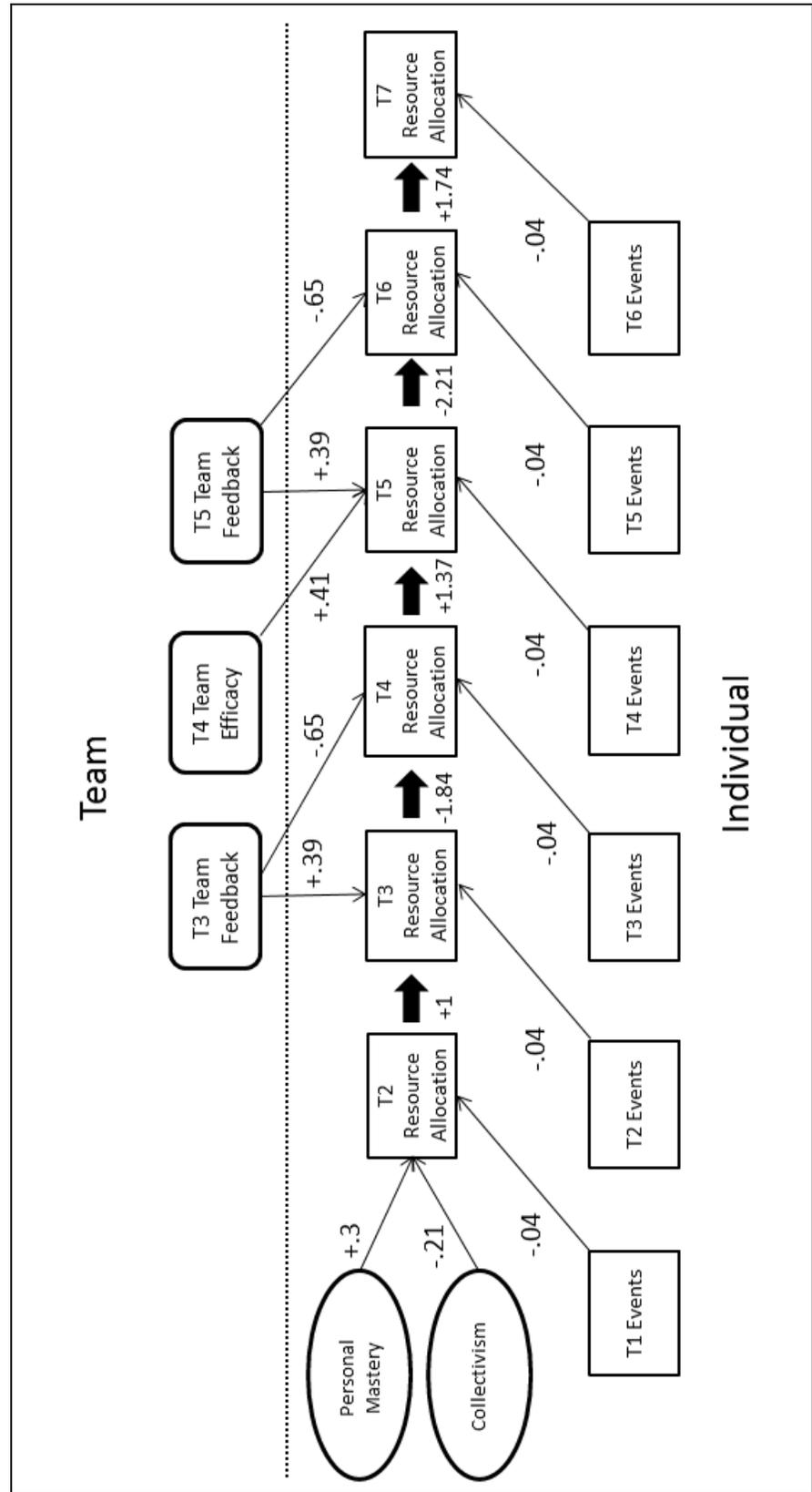
observed in this study largely support the hypothesized relationships between the salient characteristics of the team performance context and individual motivation. However, several significant relationships emerged in the opposite direction from that hypothesized. In both cases, the findings of this study contribute substantially to the existing literature on team motivation.

Findings can be broadly organized into within-person effects of project demands, between-team effects, and between-person effects. The complete array of effects found in this study is shown in Figure 8. An overview of hypothesized and observed findings can be found in Appendix E. The within-person cluster of findings showed that individual resource allocation changed over the lifespan of the team. The pattern of change revealed three overlapping processes: dynamic change, episodic change, and intra-episodic change. The between-team cluster of findings identified three pathways through which the team itself impacts individual motivation: Shared states that emerged from within the team and which carried cross-level consequences for team members, feedback directed toward the team, and interactions with team members unique to an individual's experience in the team. The between-individual cluster of findings showed that individual characteristics impact behavior apart from the shared team environment.

4.1 Within-person effects of project demands

Several trends emerged in relation to within-person changes in resource allocation. First, resource allocation changed dynamically with task demands, such that more difficult tasks required greater effort to accomplish. Second, resource allocation changed episodically, such that effort dropped over successive episodes, after accounting for the ordering of deliverables and their respective difficulty. Structural characteristics of

Figure 8. Observed impact of team and individual variables on motivation at each time point



teams such as task interdependence and shared reward contingencies are thought to offset the social dynamics associated with team process loss including free-riding and diffusion of responsibility (Rutte, 2005; Wageman, 1999) . The present study shows that task and outcome interdependence alone are insufficient to sustain effort among individual team members. Comparing effort across dynamic tasks showed that task demands can be separated from the effects of time. In the present case, task demands were arranged in ascending order of difficulty, and effort increased monotonically with each performance episode. However, with each successive episode, individuals exerted less effort than expected by demands of the task alone.

Laboratory experiments on the effect of repeated trials of a single task have shown that performance and motivational indicators such as self-efficacy tend to improve over time (Chen et al., 2009; DeShon et al., 2004; Tasa et al., 2007). The current study expands on this in two ways. First, sampled teams performed separate tasks over their lifespans. This allows the separation of the effects of task demands from those of time itself. Second, this study assesses these effects on resource allocation directly. Time allocation provides a more proximal measure of effort compared to self-efficacy which reflects prior learning and anticipated future outcomes. These findings are consistent with evidence presented by Vancouver and colleagues showing that individuals reduce effort as self-efficacy approaches a maximal threshold (Vancouver & Kendall, 2006; Vancouver et al., 2008). Heggstad and Kanfer (2005) suggested that in the context of skill acquisition, self-efficacy has its strongest effects at the beginning of a new task, and

that subsequent performance changes can be explained solely by past performance. Although self-efficacy was not captured in the present study, prior evidence suggests that self-efficacy increases over time, while my results showed a declining pattern of motivation in terms of resource allocation. These observations occurred despite changing quantitative (in terms of task difficulty) and qualitative (in terms of varying knowledge and instructional parameters) task demands across performance episodes.

The third major finding was that individuals nested in teams responded to deadline pressure. Resource allocation changed intra-episodically, such that individuals allocated greater resources during terminal sub-episodes relative to initial sub-episodes. This effect is consistent with the solo-context literature on multiple-goal situations (Kernan & Lord, 1990; Lee, 2012; Louro, Pieters, & Zeelenberg, 2007; Mitchell et al., 2008; Schmidt & DeShon, 2007). Individuals dynamically prioritize goals according to temporal proximity, and this effect was observed for individuals nested within teams as well. This effect was also consistent with punctuated equilibrium (Gersick, 1988). Punctuated equilibrium suggests that teams have an innate rhythm or time perspective regarding their current goal, and that team action processes commence when roughly 50% of time allotted to the task remains before deadline. This effect was observed in the present data, as teams tended to allocate their resources to the second of two possible weeks.

These results have disconfirmatory value as well. Social loafing theory suggests that individual effort declines over time in a group task as individuals take advantage of social diffusion of responsibility. This is associated with the “sucker effect” (Kerr, 1983), whereby individuals successively reduce effort in an attempt to restore equitable

inputs toward group tasks. When group effort dips below the minimum threshold required for task completion, social compensation occurs whereby individuals sporadically increase effort in an attempt to sustain performance (Williams & Karau, 1991). However, this prediction is not consistent with observed behavior in this study. The present results show a consistent, predictable tendency for within-individual increases in effort as deliverable deadlines approach. While varying degrees of social loafing doubtless occurred in the course of the project, social compensation effects were not sufficient in explaining the pattern of within-episode effects. Instead, deadline pressure and punctuated equilibrium present a more plausible explanation for at least a portion of the observed results.

The fourth finding offered by this study is the changing nature of sub-episodic effects. Over subsequent performance episodes, individuals invested proportionally more resources into the terminal sub-episode of each deliverable, even as total allocations fell. Put another way, teams continually reduced the amount of effort they invested in the first half of each consecutive deliverable, while keeping effort in the second half roughly constant (proportional to task demands). This allocation pattern suggests that the planning stage (or transition phase) of each deliverable became successively less effortful and more efficient. Several factors may be driving greater transition process efficiency. First, teamwork processes may routinize. For example, team members adopt informal roles (Mathieu, Tannenbaum, Donsbach, & Alliger, 2014), and these roles may solidify over time as the team develops shared expectations regarding division of labor (Mathieu, Goodwin, Heffner, Salas, & Cannon-Bowers, 2000). Teams also develop communication norms that eliminate process loss associated with ambiguous or misunderstood

communication (Mathieu et al., 2008). Second, teams may implement strategies that reduce inefficiencies (Mathieu & Rapp, 2009). For example, teams may find that spacing effort across weeks does not benefit project performance but does interfere with non-project work. This interpretation is consistent with solo-context, multi-goal studies that find that given equally likely chances of success, individuals prioritize more urgent goals. Third, taskwork processes may be routinizing, and executing each task may require less accompanying effort. Teams that establish shared procedures for completing assignments perfect them across successive deliverables. As a result, teams use planning time to revise previous procedures rather than brainstorm new ones. In other words, teams no longer have to anticipate task demands ahead of time, and efficient task execution reduces planning demands.

4.2 Motivational effects originating from the team

The second cluster of findings related to the factors of the team context associated with changes in effort allocation. More efficacious teams did not have higher allocation overall (for a given episode) compared to non-efficacious teams, Instead, team efficacy's effects occurred intra-episodically, such that efficacious teams increased their effort in the terminal sub-episode of deliverable 3 beyond that expected by time alone. Put another way, greater team efficacy did not lead a team to *reduce* effort at the start of the deliverable period, but rather *shift* allocation to the second period. This effect suggests that teams with lower capability beliefs viewed coordination in the first week as more instrumental, while those anticipating higher performance delayed effort until necessitated by deadlines. A thrust toward efficiency is corroborated by findings from Cummings and Haas (2012) that individuals' total number of multi-team memberships

were positively related to performance, suggesting that competition for time and attention optimized efficiency of time allocation across teams.

Contrary to expectations, team cohesion was not related to either amount of resource allocation or change in resource allocation. Being strongly attracted to one's team did not translate to greater willingness to work for that team. Past findings (Mullen & Copper, 1994; Zaccaro & McCoy, 1988) have shown weak relations between cohesion and performance, though cohesive teams are less likely to experience social loafing (Mulvey & Klein, 1998). In the present study, there is no evidence to suggest that individuals in cohesive teams behaved differently than those in less cohesive teams.

Team feedback's effects occurred trans-episodically. Teams submitted their deliverables at the end of each episode, and received feedback early in the following episode. Feedback effects reflected change in resource allocation beyond what was predicted by time or high performance. Teams that received better feedback spent less time on the project in the subsequent initial sub-episode than those that received worse feedback. Presuming a true causal relationship, teams presented two possible behaviors following feedback. Teams that did well felt emboldened to reduce transition processes and proceeded more quickly to the action stage of the next deliverable. Teams that did poorly necessitated greater planning in order to improve performance on the next task. In both cases effort was expended instrumentally and deliberately in order to optimize performance.

Conceptually, team feedback's effect should have been mediated through team efficacy. This effect was not observed in the present data. Team feedback was significantly related to efficacy in only one of the three classes sampled. When a time-

lagged effect of feedback was entered simultaneously into a prediction equation with team efficacy, team efficacy's relationship to resource allocation dropped out of significance. Since the feedback-efficacy relationship is backed by strong conceptual and empirical support, this relationship cannot be easily explained except in terms of an experimental confound. A possible explanation is that teams nested in classes without significant relationships between feedback and efficacy may not have received salient feedback relative to the class that did show a relationship. For example, classes that were told in passing that grades were available may not have checked them at the same time, compared to a class that received an email announcement with a link to grade postings. Nonetheless, teams may have had a good sense of their performance on each deliverable prior to feedback, which would increase efficacy independent of performance feedback.

The number of positive affective events one experienced in a given week was negatively related to resource allocation in the subsequent week. Although this effect is consistent with past theorizing on affect's detrimental effects (Beal, Weiss, Barros, & MacDermid, 2005), another possibility is that positive events serve as an indicator for process effectiveness. High-functioning teams encounter very little process loss, and experience more pleasant interpersonal interactions as a consequence. Teams with low process loss are able to coordinate action quickly and effortlessly. Teams that struggle to organize their members (or experience social loafing) are more likely to experience task conflict and consequently have to sustain effort longer in order to maintain performance.

4.3 Individual characteristics influencing motivation

The third cluster of findings relate to the impact of traits on resource allocation. Substantial research has shown that team personality composition impacts team

performance (Barrick et al., 1998b; Dierdorff & Ellington, 2012; Kramera, Bhave, & Johnson, 2014; LePine, 2003; Resick et al., 2010). Although some have theorized that these effects are mediated by individual goal striving (Bell, 2007; Stewart, Fulmer, & Barrick, 2005), little evidence has been found linking personality to differences in effort allocation (Kichuk & Wiesner, 1997; LePine et al., 2011; Morgeson et al., 2005). Moreover, while the structure of motivational traits have been thoroughly studied (Heggestad & Kanfer, 2000; Hinsz & Jundt, 2005; Kanfer & Ackerman, 2000; Kanfer & Heggestad, 1997; Latham & Pinder, 2005), their effects have been assessed primarily in solo-task contexts. There is little evidence that personality traits have consistent effects across individual and group contexts (Barrick & Mount, 1991; Barrick, Stewart, Neubert, & Mount, 1998a; Bell, 2007).

My results showed that personal mastery was positively related to effort allocation. This effect was apparent at the beginning of the project and constant over time. This finding expands upon past investigations into trait motivational effects on effort allocation by observing similar effects in the team context (Hinsz & Jundt, 2005). However, neither competitive excellence nor motivation related to anxiety were related to time spent on the project, and it is possible that the contextual elements of teamwork may not have provided the cues necessary to activate these specific traits (Tett & Burnett, 2003). Specifically, the cooperative environment of the team did not present clear opportunities for competition, and shared workload and task interdependence may have reduced the level of anxiety individuals experienced, while preventing individuals from capitalizing on '11th hour' deadline pressure to provide motivation (Choi & Moran, 2009).

Two features of the team context complicate the relationship between trait motivation and effort. First, task interdependence introduces intermediary teamwork demands not directly related to goal achievement. For example, coordinating action with several teammates is required to achieve the team's goal, but coordination in itself does not represent an achievement situation. Second, outcome interdependence mandates that team goal achievement depends on the action of fellow teammates. If a high achiever wanted to set a difficult team goal, but his or her low-achieving teammates decided on an easy goal, this would attenuate the impact of motivational traits through its effect on goal setting. Nonetheless, those individuals higher in personal mastery contributed greater effort to the team project.

Psychological collectivism is implicitly motivational in nature, as item content capture significant goal-related information. Prior research on collectivism has shown positive relationships to performance. Contrary to expectations, individuals higher in psychological collectivism contributed less effort toward their team goal than those lower in the trait. The negative relationship between collectivism and resource allocation was unexpected given consistent evidence that it is positively related to performance. In the present study, collectivism was entered simultaneously with personal mastery. This negative relationship suggests that after accounting for shared variance in approach motivation, the remaining components of collectivism were negatively related to motivation. These findings have significant bearing on how collectivism is interpreted. As emphasized previously, performance provides a poor index of motivation. The current findings suggest that collectivism's motivational effects can be partially explained by its overlap with achievement motivation. The second, more provocative implication is that

collectivism's impact on performance is primarily non-motivational in nature. For instance, those individuals higher in collectivism may be engaging in different activities or taking on different roles (Mathieu et al., 2014; Stewart et al., 2005) without contributing greater effort to the team's goal.

4.4 Exploratory findings

Within the context of this study I had conceptualized resource allocation toward external entities (MTS, instructors) as an indicator of team withdrawal. Individuals less attracted to or less embedded within their team would direct their energies elsewhere. However, the hypothesized relationships were not observed. Neither openness nor team embeddedness were related to boundary-spanning allocation in the expected direction. These results speak to a distinction in the teamwork literature between external activities (as resource allocation) and boundary spanning (as role performance), since under the strict definition, boundary spanning requires individuals to A) Communicate with external parties, and B) disseminate external information to team members. Successful boundary-spanning requires substantial effort and a central position in one's team. This is supported by the positive relationship between links and external allocation.

A corollary to this supposition is that "embeddedness" is not homologous across levels. Job embeddedness theory proposes that one's work environment can become a central focus in one's life, and properties of that environment encourage retention. The scope and magnitude of life consequences associated with job change may not translate to the team context. Given the ad-hoc nature of most work teams, it is unlikely that fit, links, and sacrifices have similar meanings or consequences at the organization and team level.

No facet of trait motivation or psychological collectivism predicted the proportion of resources allocated to taskwork compared to teamwork. The division of resources is likely situationally determined. Such factors as task demands, present distribution of informal roles throughout the team, and shared leadership each contribute to emphasizing taskwork over teamwork. No support was obtained for the notion that trait differences predicted stable individual differences in resource allocation direction.

4.5 Implications

4.5.1 Implications for motivation research

The results of this study augment existing motivation research in three primary ways. First, this study provides a glimpse inside the “black box” of team behavior. Findings from the solo motivation literature, specifically the effects of deadline pressure and achievement motivation, operated similarly in the present team context. The vertical and horizontal interdependencies within teams introduce additional motivational inputs beyond solo work, but these linkages do not fundamentally alter the formation or expression of goal-directed action. Teams are frequently distinguished from other work arrangements due to ostensibly unique demands; however, the present findings demonstrate that teams represent a particular performance context. Although past reviews have emphasized the collective character of team motivation (Park et al., 2013), these findings suggest that future research should emphasize the team *and* individual levels of motivation simultaneously.

The second contribution of this study relates to three interrelated findings regarding the dynamics of motivation over time. The data showed that the total amount of personal resources allocated during each episode increased, peaked, and then fell slightly

across the lifespan of the team. The results of a multilevel, longitudinal analysis isolated three separate, dynamic effects acting on resource allocation: Task demands, learning effects, and deadline pressure. The first finding was that task demands had the strongest influence on resource allocation, such that resource allocation in a given episode increased concordantly with the difficulty of that task. The total amount of personal resources allocated during each episode increased in roughly monotonic fashion over the course of the project. This overall trend was caused by the incidental ordering of deliverables from least to most difficult. However, task difficulty was not the only factor acting on resource allocation.

The second finding was that the effect of task demands grew weaker over successive episodes, such that participants expended successively fewer resources than that expected based on the effects of task demands alone. That is, after accounting for the effects of task demands, resource allocation declined over sequential episodes. In line with previous findings on motivation and skill acquisition over time (Kanfer & Ackerman, 1989; Kanfer et al., 1994; Kanfer & Heggstad, 1997), these results suggest that participants gradually learned how to perform teamwork or taskwork behaviors more effectively. However, in a departure from previous studies which have examined repeated trials of a single task, participants completed three qualitatively and quantitatively different tasks over the course of the project. Since no task was the same, task routinization can largely be ruled out as an explanatory variable, leaving teamwork routinization as a possible causal factor.

The third finding was that within episode, resource allocation increased in the final week of each episode in response to deadline pressure. This effect grew stronger

over time, such that independent of the changes in absolute allocation in each episode over the lifespan of the project, individuals invested proportionally greater resources in the terminal week of each successive episode. This suggests that (1) individuals nested within teams respond to deadline pressure as in solo contexts, and that (2) individuals implement a more deliberate or strategic allocation strategy across repeated trials.

Several considerations emerge from this cluster of within-person findings. First, future research should include quantitative assessments of task demands to complement procedural, qualitative descriptions. Second, episodes provide a useful conceptualization of time in motivation research. Researchers should utilize a within-person approach and stay mindful of the timeframe for investigating their motivational construct of interest. Finally, caution should be exercised when selecting measurement occasions. Ignoring the timing of measurement in relation to deadlines can result in biased estimates of motivation.

The third contribution of this study was the finding that proximal measures of resource allocation changed dynamically across different time scales. To my knowledge, this is the first longitudinal, multilevel field study of individuals in teams that captured changes in resource allocation. Previous laboratory studies have utilized this approach, but along time frames that ranged from minutes to hours. By extending the time frame under investigation to seven weeks, temporal dynamics (e.g., deadline pressure) and emergent states (e.g., team cohesion) were captured with higher fidelity. Resource allocation, in terms of time investment on the project, represents a departure from studies focusing on antecedents (e.g., self-efficacy, empowerment) or consequences (e.g.,

performance, retention) of motivation (Kanfer, 1987; Ployhart, 2008; Seo & Ilies, 2009; Spreitzer, 1995).

4.5.2 Implications for team research

The results of this study hold several implications for team research. Despite repeated calls for greater attention to the role of time in teams (Ilgen, 2014; Park et al., 2013; Roe, 2014; Roe et al., 2012), between-team or cross-sectional studies continue to predominate. The within-person findings of the present study contribute two key findings for future research: the value of episodic organization of team activities and the relative impact of different team emergent states.

4.5.2.1 Implications of the episodic perspective

The present study supported Marks et al.'s (2001) conceptualization of episodes by assessing resource allocation during sequential, non-overlapping episodes of equal length. Episodes were temporally aligned around specific tasks and bounded by deadlines. Marks et al. (2001) suggested that episodes are further divided into transition and action phases. Both Gersick (1988) and Marks et al. (2001) proposed that teams devote roughly 50% of an episode to planning and 50% to execution. The weekly survey design implemented in this study, combined with two-week long performance episodes, allowed measurement occasions to overlap neatly with the postulated occurrence of transition and action phases. Although resource allocation was not classified into teamwork or taskwork dimensions, the pattern of observed results conformed to Gersick's (1988) and Marks et al.'s (2001) segmentation of periods into phases of roughly equal length.

Results supported this phasic model in two ways. First, resources were distributed unevenly within-episode, potentially indicative of an effort-attenuated transition phase, followed by an effort-intensive action phase. Second, these within-episode effects grew stronger over time even as total resource allocation fell, indicating that participants reduced resource allocation during the first week while remaining fairly consistent during the second. The declining allocation of resources in the first segment of each episode may reflect teamwork routinization. This perspective contributes to the team literature by linking individual resource allocation to team development theory (DeRue & Morgeson, 2007), which posits that team members adapt to their team and task roles over time. Thus, team members are not only performing more effectively but also more efficiently, in terms of resource allocation. Teams with more efficient resource allocation strategies are better prepared to respond to and overcome situational demands that exceed the resource capacity of any single team member (Porter et al., 2010).

The present study also showed relative, but not absolute, differences in time allocation between high and low performing teams. The total time each team invested on each deliverable was not substantially different between high and low performing teams. However, more effective teams devoted roughly 40% of their total time allocation during the periods corresponding to transition phases, and 60% during periods corresponding to action phases. In contrast, less effective teams devoted 50% of their time during the first week and 50% during the second. These results complement existing evidence on the relationship between process and performance by exploring between- and within-team allocation during transition and action phases. DeChurch and Haas (2008) showed that reactive planning (i.e., planning during the action phase of task performance) was most

strongly related to team performance. The present results are consistent with this finding. Teams that allocated fewer resources during the transition stage may not have planned less intensively than other teams, but may simply have engaged in reactive planning during action phases, leading to higher performance.

4.5.2.2 Relative impact of emergent states

The results of this study have implications for the study of team emergent states. Team efficacy was positively related to individual-level motivation in terminal portions of each episode, while cohesion was unrelated to motivation. In other words, the motivating potential of the team on team member resource allocation emerged from beliefs related to task accomplishment, but not social attraction to its members. Team research has generally treated emergent states as equally important, or studied them in isolation. Chen and Kanfer (2006) called for greater investigation into the complex linkages between individuals and the team as a whole, stating that it is, “widely understood that these interconnections are the most complex and least well understood aspects of motivation in teams,” (p. 236). The comparative findings here suggest that team emergent states do not have equal importance for individuals. Future research should attempt to identify the relative importance of various team emergent states in terms of the magnitude of their cross-level impact. Moreover, the timeframe during which motivational effects manifest should be investigated. The teams sampled for this study had short lifespans and relatively low costs associated with failure. Under these conditions, individuals aligned their efforts according to the task rather than the team itself; however it is plausible that more meaningful and long-term engagement with the team would amplify the role of cohesion in motivation.

4.6 Limitations

The present study has several limitations. First, by virtue of the interdisciplinary study design, individuals pursued a poorly-specified team goal. Since the task paradigm did not contain an individual performance component, it was unclear how individuals represented personal and team goals and the perceived relation between the two. Future studies should explore individual representations of personal and team goals in order to clarify the effect of goal generation on effort allocation. A related issue was the lack of individual performance measures. It was unclear how personal effort translated to individual or team performance in the present scenario. However, incorporating individual performance measures would have changed the collective reward structure and fundamentally altered the motivational features of the project (Pearsall et al., 2010). The reward structure used in this study represented a strong manipulation of team outcome interdependence (Wildman et al., 2012). The presence of individualized outcomes would have decreased the importance of the team context, making effects harder to observe.

The second limitation of this study was the lack of a direct measure of social loafing. The extent that effort declined as a result of social loafing versus task and social learning cannot be ascertained from the present data. Two approaches to measuring social loafing predominate. First, social loafing is manipulated experimentally through the use of confederates (Harkins, 1987; Harkins, Latane, & Williams, 1980; Latane et al., 1979). Second, social loafing is assessed in terms of perceptions or expectations of team member effort (Mulvey & Klein, 1998; Williams & Karau, 1991). Neither of these approaches allows objective measurements of social loafing, nor do they inform the analytic strategy required to account for their effects. Comer (1995) notes that no direct operationalization

of loafing currently exists. Future studies should attempt to develop measures of loafing, and techniques to analyze the causal impact of loafing on each individual in the team.

The third limitation of the study was its use of a student sample. The stakes of succeeding or failing are much lower in an undergraduate population than among employed adults. Nonetheless, as in the real world, one's team may not be the principal focus of one's time and effort. As evidenced by the multi-team membership literature, individuals must often balance several team commitments, each vying for time and attention (O'leary et al., 2011). The pronounced thrust toward efficiency found in the current study was observed under conditions that provide a reasonable facsimile of real-world environs.

The fourth limitation of this study was in the limited measurement schedule of team states. Levels of team efficacy and team cohesion were changing each week whether or not they were being measured (Baker, 2001; Bartone & Adler, 1999; DeRue, Hollenbeck, Ilgen, & Feltz, 2010). In the present study, both were only measured at midpoint. Future studies should capture team states dynamically in order to compare their effects across time.

The final limitation of the study was that only one type of team was utilized. As outlined by Wildman et al. (2012), teams vary along several characteristics. The teams observed in the present study were principally defined by three features: task interdependence, role structure, and life span. The nature of the task followed reciprocal interdependence in principle, such that effective performance required continual coordinated inputs between team members. However, in practice, teams may have displayed pooled tendencies, such that one person could have performed the work, and

additional effort from teammates would have improved the final outcome. Wageman and Gordon (2005) showed that teams often have great latitude to structure their interactions, and may increase or decrease interdependence in accordance with group preferences. In the present data, such norms would impact the individual-level effort demands of the team itself. Furthermore, although not included in Wildman et al.'s (2012) taxonomy, rewards were tied solely to group performance, which in some cases may decrease individual motivation (Pearsall et al., 2010). A second related factor was the functional division of labor. Teams in this study did not have a clearly defined role structure, nor did task demands require specialized competencies. As a consequence, teams could develop clear expectations regarding performance and time demands of the project which may have altered the temporal rhythm of allocations. Finally, the sampled ad-hoc teams disbanded after thirteen weeks. Team-level forces such as team cohesion are attenuated in groups that have a limited future utility, so it is unsurprising that these effects were not observed. Future studies should compare or manipulate different team elements to observe changes in individual motivation over longer periods of time.

4.7 Summary and Conclusion

Managers in organizations commonly perceive that teams experience difficulty staying motivated over time (Thompson, 2010), while Ilgen (2014) noted that time possesses psychological properties beyond objective clock-time. This study showed that resource allocation changed dynamically in proportion to task demands, decreased episodically with social learning, and increased intra-episodically in accordance with deadline pressure. Team emergent states and events are thought to sustain effort over time beyond the minimum effort required for task performance (Chen et al., 2002;

Collins & Parker, 2010; Gully, Incalcaterra, Joshi, & Beaubien, 2002). This study showed no impact of team efficacy on difference in amount of resources allocated overall. Rather, individuals nested in efficacious teams allocated their effort differently and potentially more efficiently. Trait motivation is associated with higher effort allocations, but it was unclear whether these effects generalized to the team context. This study found that trait motivation predicted greater effort and time investment in the task. In contrast, psychological collectivism has strong theoretical support for positive relationship with effort in teams, but after accounting for trait motivation, individuals who viewed themselves as acting interdependently with others exerted less effort on the project. Taken together, these results show that the team one belongs to shapes one's effort over time in concert with one's natural tendencies.

Appendix A: Project Experience Report (T1-T3; T5-6)

General Instructions: The purpose of this brief survey is to better understand weekly project demands and activities so that we can improve the experience for future project teams. *Take a minute to think back to your activities and experiences during the past full week (7 days) as you worked on the just completed deliverable or current deliverable before completing each question.*

Overall, about how much time did you spend working on the project **the past week**?

_____ hours

Overall, how demanding was the project on you **the past week**?

1	2	3	4	5	6	7	8
Not at all			Moderately				Extremely
Demanding			Demanding				Demanding

Overall, how hard did you work on the project in **the past week**?

1	2	3	4	5	6	7	8
Not at all			Moderately				Extremely

Taking all your other obligations into account, how much time do you expect to spend working on the project **this week**?

_____ hours

People report a variety of events that occur while working on the project. Think back to your experiences on the project last week. Indicate how often each of the following events occurred to you while working on the project last week using the scale below.

Did not occur 0 1 2 3 4 5 6+ or more times

- _____ A teammate praised my work.
- _____ A teammate made a negative comment about my ideas or work. (R)
- _____ I interacted with a person from another team.
- _____ I felt motivated to work more on the project.
- _____ I learned something new.
- _____ I made friends with a team member that I had not known before.
- _____ I received recognition from my team for my contributions.
- _____ I helped a teammate or a teammate helped me with project work.
- _____ I had a disagreement with another team member. (R)
- _____ Other (describe) _____

Appendix B: Mid-Project Process Survey Items (Time 4)

Construct: Effort Duration

Overall, about how much time did you spend working on the project **the past week**?

_____ hours

Construct: Effort Intensity

Overall, how demanding was the project on you **the past week**?

1	2	3	4	5	6	7	8
Not at all			Moderately				Extremely
Demanding			Demanding				Demanding

Overall, how hard did you work on the project in **the past week**?

1	2	3	4	5	6	7	8
Not at all			Moderately				Extremely

Construct: Upcoming Effort Intensity

Taking all your other obligations into account, how much time do you expect to spend working on the project **this week**?

_____ hours

Construct: Affective Events

People report a variety of events that occur while working on the project. Think back to your experiences on the project last week. Indicate **how often each of the following events occurred to you while working on the project last week** using the scale below.

Did not occur 0 1 2 3 4 5 6+ or more times

- _____ A teammate praised my work.
- _____ A teammate made a negative comment about my ideas or work.
- _____ I interacted with a person from another team.
- _____ I felt motivated to work more on the project.
- _____ I learned something new.
- _____ I made friends with a team member that I had not known before.
- _____ I received recognition from my team for my contributions.
- _____ I helped a teammate or a teammate helped me with project work.
- _____ I had a disagreement with another team member.
- _____ Other (describe) _____

Construct: Peer Evaluation

How would your team's performance be affected if the following person left the team (assume only one would leave at a time)?:

[1=Better off; 2= Hardly at all; 3= Slightly reduced; 4= Considerably reduced; 5 = Extremely reduced]

Person X: _____

Person Y: _____

Person Z: _____

Construct: Team Viability

Please use the rating scale to indicate how much you agree or disagree with the following statements. (1=strongly disagree, 2=disagree, 3=slightly disagree, 4=neither agree nor disagree, 5=slightly agree)

Please describe your perceptions of your *team*:

1. I really enjoy/enjoyed being part of this *team*.
2. I felt like I get/got a lot out of being a member of this *team*.
3. I look forward to working with my teammates on the next deliverable/wouldn't hesitate to participate on another task with the same *team* members.
4. If I could leave/have left this **team** and work/worked with another *team*, I would/would have. ®

Construct: Team Embeddedness

Links to Team

Please select the point on the rating scale that corresponds to your answer.

[0 1 2 3 4 5]

1. ____How many of your teammates do you communicate with regularly?
2. ____How many of your teammates have relied on you for help during this project?

Fit

Please indicate your agreement with the following statements.

[1=Strongly Disagree, 5=Strongly Agree]

1. I fit well with my team
2. I have a lot in common with my teammates

Team-related Sacrifices

Please indicate your agreement with the following statements

[1=Strongly Disagree, 5=Strongly Agree]

1. I would feel bad if I ignored my teammates.
2. I feel there are social and academic benefits to being involved with this team.

Construct: Upcoming Task Demands The next three questions ask about other activities you will be working on over the next week beyond this project.

1. In the next week, how many important deadlines do you have coming up?
(Intensity)
 - i. 0 1 2 3 4 5 6+

2. How much progress have you made on these projects? (Urgency)
___%

Construct: Off-Task Allocations Scale: Never 1 to 6 Very Often

During the time you spent working on the upcoming/most recent deliverable, approximately how often did you think about and/or interrupt your work on the project to spend time on:

1. ___homework for other classes
2. ___taking care of personal business

Construct: Effort-Related Cognition

The following questions pertain to YOUR experiences during completion of the most recent ESB/Global Group deliverable. Use the scale below to indicate the number that best corresponds to your feelings and experiences while completing this deliverable.

[1=never; 8=constantly]

1. I became frustrated by the amount of time I was spending on this deliverable.
2. I thought about how poorly I was performing my role on this deliverable.
3. Overall, I was satisfied with how I performed on this deliverable. ®
4. I thought about how useful my work was to the success of the final deliverable.

Construct: Off-Task Cognition

The following questions pertain to all the time you spent working on the **project to this point**. Use the scale below to indicate your experience during this time.

[1 = never, 8 = constantly]

1. I took "mental breaks" while working on the project.
2. I found myself daydreaming while working on the project.
3. I lost interest in working on the project for short periods.
4. I thought about other things that I have to do while working on the project.
5. I wondered about if I was doing as well as others in working on the project. .
6. I thought about the difficulty of successfully completing the project.

Construct: Direction of On-Task Resource Allocations

Of all the time you have actually spent on the project to this point, how much of your time did you spend:

[1=No time at all; 6=A great deal of time]

1. Collecting data for this deliverable? (task)
2. Writing this deliverable? (task)
3. Editing or formatting this deliverable? (task)
4. Planning for this deliverable? (team)
5. Making sure everyone was on the same page? (team)
6. Helping others who were having difficulties with the project? (team)

7. Communicating with the other team in your Task Group/Global Group (boundary-spanning)
8. Posting to basecamp (boundary-spanning)
9. Communicating with the instructor or taskforce facilitator (askpeter) on project-related questions. (Boundary Spanning)

Construct: Team Cohesion

Psychometric: Instructions: Please describe your perceptions of your team and your task force.*

(1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree)

1. Our *team* is unified in its task focus
2. Our *team* is committed to our team's task
3. Our *team* members get along well with each other
4. Our *team* members have good relationships with each other

Construct: Team Efficacy Team Process Efficacy (Short form):

Instructions: How confident are you that your *team* could, if required, do each of these tasks right now?

(0=Not at all confident, 10=Very confident)

1. Resolve conflicts that have become personalized
2. Identify realistic goals that unify individual team member goals
3. Adapt to changing situations/demands

Team Outcome Efficacy:

Instructions: On your current team assignment, how confident are you that your team can achieve a grade of **at least**:

(0=Not at all confident, 10=Very confident)

1. D
2. C
3. B
4. A

Construct: Team Potency

(1=Not at all; 5=To a great extent)

This team believes it can become exceptionally good at producing high-quality work

This team expects to be known as a high performing team

My team feels it can solve any problem it encounters

My team has confidence in itself

My team believes it will get a lot done when it works hard

Appendix C: Post-Project Process Survey

Construct: Effort Duration

Overall, about how much time did you spend working on the project **the past week**?

_____ hours

Construct: Effort Intensity

Overall, how demanding was the project on you **the past week**?

1	2	3	4	5	6	7	8
Not at all			Moderately				Extremely
Demanding			Demanding				Demanding

Overall, how hard did you work on the project in **the past week**?

1	2	3	4	5	6	7	8
Not at all			Moderately				Extremely

Construct: Upcoming Effort Intensity

Taking all your other obligations into account, how much time do you expect to spend working on the project **this week**?

_____ hours

Construct: Affective Events

People report a variety of events that occur while working on the project. Think back to your experiences on the project last week. Indicate **how often each of the following events occurred to you while working on the project last week** using the scale below.

Did not occur 0 1 2 3 4 5 6+ or more times

- _____ A teammate praised my work.
- _____ A teammate made a negative comment about my ideas or work.
- _____ I interacted with a person from another team.
- _____ I felt motivated to work more on the project.
- _____ I learned something new.
- _____ I made friends with a team member that I had not known before.
- _____ I received recognition from my team for my contributions.
- _____ I helped a teammate or a teammate helped me with project work.
- _____ I had a disagreement with another team member.
- _____ Other (describe) _____

Construct: Peer Evaluation

Source: Locally developed

How would your team's performance have been affected if the following person left the team (assume only one would leave at a time)?:

[1=Better off; 2= Hardly at all; 3= Slightly reduced; 4= Considerably reduced; 5 = Extremely reduced]

Person X: _____

Person Y: _____

Person Z: _____

Construct: Team Viability

Please use the rating scale to indicate how much you agree or disagree with the following statements. (1=strongly disagree, 2=disagree, 3=slightly disagree, 4=neither agree nor disagree, 5=slightly agree)

Please describe your perceptions of your *team*:

5. I really enjoyed being part of this *team*.
6. I felt like I got a lot out of being a member of this *team*.
7. I wouldn't hesitate to participate on another project with the same *team* members.
8. If I could have left this *team* and work/worked with another *team*, I would have.

®

Construct: Team Embeddedness

Links to Team

Please select the point on the rating scale that corresponds to your answer.

[0 1 2 3 4 5]

1. _____How many of your teammates did you communicate with regularly?
2. _____How many of your teammates relied on you for help during this project?

Fit

Please indicate your agreement with the following statements.

[1=Strongly Disagree, 5=Strongly Agree]

3. I fit well with my team
4. I have a lot in common with my teammates

Team-related Sacrifices

Please indicate your agreement with the following statements

[1=Strongly Disagree, 5=Strongly Agree]

5. I ignored my teammates' messages
6. I felt there were social and academic benefits to being involved with this team.

Construct: Direction of On-Task Resource Allocations

Of all the time you have actually spent on the project to this point, how much of your time did you spend:

[1=No time at all; 6=A great deal of time]

1. Collecting data for this deliverable? (task)

2. Writing this deliverable? (task)
3. Editing or formatting this deliverable? (task)
4. Planning for this deliverable? (team)
5. Making sure everyone was on the same page? (team)
6. Helping others who were having difficulties with the project? (team)
7. Communicating with the other team in your Task Group/Global Group (boundary-spanning)
8. Posting to basecamp (boundary-spanning)
9. Communicating with the instructor or taskforce facilitator (askpeter) on project-related questions. (Boundary Spanning)

Construct: Off-Task Cognition

The following questions pertain to all the time you spent working on the **project to this point**. Use the scale below to indicate your experience during this time.

[1 = never, 8 = constantly]

1. I took "mental breaks" while working on the project.
2. I found myself daydreaming while working on the project.
3. I lost interest in working on the project for short periods.
4. I thought about other things that I have to do while working on the project.
5. I wondered about if I was doing as well as others in working on the project. .
6. I thought about the difficulty of successfully completing the project.

Construct: Off-Task Allocations

Scale: Never 1 to 6 Very Often

During the time you spent working on the last deliverable, approximately how often did you think about and/or interrupt your work on the project to spend time on:

1. ___homework for other classes
2. ___taking care of personal business

Construct: Effort-Related Cognition

The following questions pertain to YOUR experiences during completion of the most recent ESB/Global Group deliverable. Use the scale below to indicate the number that best corresponds to your feelings and experiences while completing this project.

[1=never; 8=constantly]

1. I became frustrated by the amount of time I was spending on this deliverable.
2. I thought about how poorly I was performing my role on this deliverable.
3. Overall, I was satisfied with how I performed on this deliverable. ®
4. I thought about how useful my work was to the success of the final deliverable.

Construct: Team Cohesion

Please describe your perceptions of your team and your task force.*

[1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree]

1. Our *team* was unified in its task focus
2. Our *team* was committed to our team's task
3. Our *team* members got along well with each other
4. Our *team* members had good relationships with each other

Construct: Team Efficacy

Team Process Efficacy (Short form):

How confident are you that your *team* could, if required, do each of these tasks right now?

(0=Not at all confident, 10=Very confident)

1. Resolve conflicts that have become personalized
2. Identify realistic goals that unify individual team member goals
3. Adapt to changing situations/demands

Team Outcome Efficacy:

[0=Not at all confident, 10=Very confident]

1. D
2. C
3. B
4. A

Construct: Team Potency

(1=Not at all; 5=To a great extent)

1. This team believes it could become exceptionally good at producing high-quality work
2. This team expects to be known as a high performing team
3. My team feels it can solve any problem it encounters
4. My team has confidence in itself
5. My team believes it can get a lot done when it works hard

Appendix D: Glossary of terms and definitions

Term	Theoretical definition	Measurement/Operationalization
Performance episode	“Distinguishable periods of time over which performance accrues and feedback is available,” (Marks et al., 2001, p. 359)	Two week period allotted to each team deliverable.
Performance feedback	“Providing people with some information regarding their task performance,” (Kluger & DeNisi, 1998, p. 67).	Grade on previous deliverable, returned week following submission: Deliverable 2 returned Week 4; Deliverable 3 returned Week 5
Performance sub-episode	Segmentations of episodes into sections of, “more limited scope and duration that contribute to the larger effort,” (Marks et al., 2001, p. 360).	Each performance episode comprised two, week-long sub-episodes. Initial sub-episodes are the first weeks of each episode (2, 4, 6), while terminal sub-episodes (3, 5, 7) are the second weeks bounded by deliverable due dates.
Resource allocation amount	Sustained attention and effort over time,” (Ployhart, 2008, p. 19)	Retrospective, self-report duration of resource allocation in given week of project, captured via single item: “How many hours did your work on this deliverable this week?”
Resource allocation direction	The focus of a person’s thoughts or actions,” (Ployhart, 2008, p. 19)	Retrospective self-report on proportion of time allocated toward three primary activities: Taskwork, teamwork, and boundary spanning. Two alternate measures: 1) Relative direction, or percentage of time and effort devoted to each of the three cardinal activities, and 2) Absolute direction, or product of weekly time allocation weighted by proportional allocation.
Resource allocation intensity	“Magnitude or amount of mental/physical resources devoted to some task or set of tasks,” (Ployhart, 2008, p. 19)	Subjective resource allocation intensity in given week of project, assessed via sum of two items: 1) “How hard did you try on the project?”; 2) “How demanding was the project on you this week?”
Task Difficulty	“The amount of effort required to complete the task,” (Shaw, 1963, p. 19)	Deliverable difficulty as rated by course instructors, averaged across raters, via single item: “How difficult was this assignment, from 1 (very easy) to 10 (very difficult)?
Week	Measurement occasion for each week of the project	Centered at week 2, dummy coded 0-5.

Appendix E: Overview of hypotheses and findings

Hyp.	Prediction	Observation
H1	<i>Within person, effort allocation to the project decreases over the lifespan of the project</i>	Supported. Within-person, effort allocations decreased over the lifespan of the project, after accounting for deliverable difficulty.
H2	<i>Within person, effort allocation increases episodically with proximity to the deliverable deadline, such that effort allocations to the project are greater in the week immediately preceding a deadline, relative to the previous week.</i>	Supported. Resource allocation increased within-episode.
H3	<i>Team efficacy will exert positive, cross-level, time-lagged effects on subsequent resource allocation.</i>	Supported. Team efficacy at midpoint was positively related to change in in resource allocation within-episode
H4	<i>Team cohesion will exert positive, cross-level, time-lagged effects on subsequent resource allocation.</i>	Not supported. Team cohesion was unrelated to change in in resource allocation within-episode.
H5	<i>Positive team feedback will be positively associated with subsequent individual resource allocation.</i>	Not supported. Team feedback was negatively related to resource allocation in subsequent period.
H6	<i>Trait personal mastery motivation will be positively related to resource allocation to the project at each time point.</i>	Supported. Personal mastery is positively related to resource allocation at intercept (starting value).
H7	<i>Competitive excellence will be positively related to overall resource allocation to the project at each time point.</i>	Not supported. Competitive excellence was unrelated to resource allocation intercept.
H8	<i>Motivation-related emotionality will be negatively related to overall effort allocations to the project at each time point.</i>	Not supported. Emotionality was unrelated to resource allocation intercept.
H9	<i>Psychological collectivism will be positively related to overall effort allocations to the project at each time point.</i>	Not supported. Psychological collectivism was negatively related to resource allocation at intercept.
H10	<i>The frequency of weekly positive interpersonal events will be positively associated with weekly resource allocation.</i>	Not supported. The frequency of events was negatively related to effort in subsequent week.
H11A	<i>H11A: The number of links within a team will be negatively associated</i>	Not supported. Links was unrelated to boundary spanning.

	<i>with boundary-spanning allocation.</i>	
H11B	<i>H11B: The degree of fit within a team will be negatively associated with boundary-spanning allocation.</i>	Not supported. Fit was unrelated to boundary spanning.
H11C	<i>H11C: The degree of potential sacrifice associated with team withdrawal will be negatively related to boundary-spanning allocation.</i>	Not supported. Degree of sacrifice was positively related to boundary spanning allocation, although alpha for sacrifice was close to zero (.04).
H12	<i>H12: Openness will be positively related to boundary spanning allocation.</i>	Not supported. Openness unrelated to boundary spanning.
H13A	<i>H13A: Trait Personal Mastery will be positively related to taskwork allocation.</i>	Not supported. Trait personal mastery was unrelated to relative or absolute taskwork allocation.
H13B	<i>H13B: Trait Competitive Excellence will be positively related to taskwork allocation</i>	Not supported. Competitive excellence was unrelated to proportional or absolute taskwork allocation.
H13C	<i>H13C: Trait Psychological Collectivism will be unrelated related to taskwork allocation</i>	Supported. Collectivism was unrelated to relative or absolute taskwork allocation.
H14A	<i>H14A: Trait Personal Mastery will be unrelated to teamwork allocation.</i>	Partially supported. Personal mastery positively related to absolute teamwork allocation, but unrelated to relative teamwork allocation.
H14B	<i>H14B: Trait Competitive Excellence will be unrelated to teamwork allocation</i>	Supported. Trait competitive excellence was unrelated to absolute or relative teamwork allocation.
H14C	<i>H14C: Trait Psychological Collectivism will be positively related to teamwork allocation</i>	Not supported. Psychological collectivism was negatively related to absolute teamwork allocation but unrelated to relative teamwork allocation.

REFERENCES

- Ach, N. (1910). *On volition* Leipzig: Verlag von Quelle & Meyer.
- Ackerman, P. L., & Kanfer, R. (2009). Test length and cognitive fatigue: an empirical examination of effects on performance and test-taker reactions. *Journal of Experimental Psychology: Applied*, *15*(2), 163.
- Ancona, D. G. (1990). Outward bound: strategic for team survival in an organization. *Academy of Management Journal*, *33*(2), 334-365.
- Ancona, D. G., & Caldwell, D. F. (1992). Bridging the Boundary: External Activity and Performance in Organizational Teams. *Administrative Science Quarterly*, *37*, 634-665.
- Austin, J. T., & Vancouver, J. B. (1996). Goal constructs in psychology: Structure, process, and content. . *Psychological Bulletin*, *120*, 338-375.
- Baker, D. F. (2001). The Development of Collective Efficacy in Small Task Groups. *Small Group Research*, *32*(4), 451-474. doi: 10.1177/104649640103200404
- Bandura, A. (2000). Exercise of human agency through collective efficacy. *Current Directions in Psychological Science*, *9*(3), 75-78.
- Barrick, M. R., & Mount, M. K. (1991). The Big Five Personality Dimensions and Job Performance: A Meta-Analysis. *Personnel Psychology*, *44*, 1-26.
- Barrick, M. R., Stewart, G. L., Neubert, M. J., & Mount, M. K. (1998a). Relating member ability and personality to work-team processes and team effectiveness. *Journal of Applied Psychology*, *83*(3), 377.
- Barrick, M. R., Stewart, G. L., Neubert, M. J., & Mount, M. K. (1998b). Relating Member Ability and Personality to Work-Team Processes and Team Effectiveness. *Journal of Applied Psychology*, *83*, 377-391.
- Bartone, P. T., & Adler, A. B. (1999). Cohesion over time in a peacekeeping medical task force. *Military Psychology*, *11*(1), 85.
- Basch, J., & Fisher, C. D. (1998). Affective events-emotions matrix: A classification of work events and associated emotions. *School of Business Discussion Papers*, 65.

- Bateman, T. S., & Crant, J. M. (1993). The proactive component of organizational behavior: A measure and correlates. *Journal of Organizational Behavior, 14*(2), 103-118.
- Beal, D. J., Weiss, H. M., Barros, E., & MacDermid, S. M. (2005). An episodic process model of affective influences on performance. *Journal of Applied Psychology, 90*(6), 1054.
- Bell, S. T. (2007). Deep-level composition variables as predictors of team performance: a meta-analysis. *Journal of Applied Psychology, 92*(3), 595.
- Borgatti, S. P., & Foster, P. C. (2003). The network paradigm in organizational research: A review and typology. *Journal of Management, 29*(6), 991-1013.
- Bowler, W. M., & Brass, D. J. (2006). Relational Correlates of Interpersonal Citizenship Behavior: A Social Network Perspective. *Journal of Applied Psychology, 91*, 70-82.
- Bryk, A. S., & Raudenbush, S. W. (1987). *Application of Hierarchical Linear Models to Assessing Change*.
- Bryk, A. S., & Raudenbush, S. W. (1992). *Hierarchical linear models: Applications and data analysis methods*. Newbury Park, CA: Sage.
- Cellar, D. F., Stuhlmacher, A. F., Young, S. K., Fisher, D. M., Adair, C. K., Haynes, S., . . . Riester, D. (2010). Trait Goal Orientation, Self-Regulation, and Performance: A Meta-Analysis. *Journal of Business and Psychology, 26*(4), 467-483. doi: 10.1007/s10869-010-9201-6
- Chan, D. A. (1998). Functional Relations Among Constructs in the Same Content Domain at Different Levels of Analysis: A Typology of Composition Models.
- Chen, G., Bliese, P. D., Payne, S. C., Webber, S. S., Mathieu, J. E., & Born, D. H. (2002). Simultaneous Examination of the Antecedents and Consequences of Efficacy Beliefs at Multiple Levels of Analysis.
- Chen, G., Farh, J.-L., Campbell-Bush, E. M., Wu, Z., & Wu, X. (2013). Teams as innovative systems: Multilevel motivational antecedents of innovation in R&D teams. *Journal of Applied Psychology, 98*(6), 1018.
- Chen, G., & Gogus, C. I. (2008). Motivation in and of work teams: A multilevel perspective. In R. Kanfer, G. Chen, & R. D. Pritchard (Eds.), *Work motivation: Past, present, and future*. New York, NY: Routledge.
- Chen, G., & Kanfer, R. (2006). Toward a Systems Theory of Motivated Behavior in Work Teams. *Research in Organizational Behavior, 27*, 223-267.

- Chen, G., Kanfer, R., DeShon, R. P., Mathieu, J. E., & Kozlowski, S. W. J. (2009). The motivating potential of teams: Test and extension of cross-level model of motivation in teams. *Organizational Behavior And Human Decision Processes*, *110*(1), 45-55. doi: 10.1016/j.obhdp.2009.06.006
- Chen, G., Sharma, P. N., Edinger, S. K., Shapiro, D. L., & Farh, J.-L. (2011). Motivating and demotivating forces in teams: cross-level influences of empowering leadership and relationship conflict. *Journal of Applied Psychology*, *96*(3), 541.
- Choi, J. N., & Moran, S. V. (2009). Why not procrastinate? Development and validation of a new active procrastination scale. *The Journal of Social Psychology*, *149*(2), 195-212.
- Chulef, A. S., Read, S. J., & Walsh, D. A. (2001). A hierarchical taxonomy of human goals. *Motivation and Emotion*, *25*(191-232).
- Collins, C. G., & Parker, S. K. (2010). Team capability beliefs over time: Distinguishing between team potency, team outcome efficacy, and team process efficacy. *Journal of Occupational and Organizational Psychology*, *83*(4), 1003-1023. doi: 10.1348/096317909x484271
- Comer, D. R. (1995). A model of social loafing in real work groups. *Human Relations*, *48*(6), 647-667.
- Cummings, J. N., & Haas, M. R. (2012). So many teams, so little time: Time allocation matters in geographically dispersed teams. *Journal of Organizational Behavior*, *33*(3), 316-341. doi: 10.1002/job.777
- Dalal, R. S., & Hulin, C. L. (2008). Motivation for what? A multivariate dynamic perspective of the criterion. *Work motivation: Past, present, and future*, *27*, 63-100.
- DeChurch, L. A., & Haas, C. D. (2008). Examining team planning through an episodic lens effects of deliberate, contingency, and reactive planning on team effectiveness. *Small Group Research*, *39*(5), 542-568.
- DeMatteo, J. S., Eby, L. T., & Sundstrom, E. (1998). TEAM-BASED REWARDS: CURRENT EMPIRICAL EVIDENCE AND. *Research in Organizational Behavior*, *20*, 141-183.
- DeRue, D. S., Hollenbeck, J., Ilgen, D., & Feltz, D. (2010). Efficacy dispersion in teams: Moving beyond agreement and aggregation. *Personnel Psychology*, *63*(1), 1-40.
- DeRue, D. S., & Morgeson, F. P. (2007). Stability and change in person-team and person-role fit over time: the effects of growth satisfaction, performance, and general self-efficacy. *Journal of Applied Psychology*, *92*(5), 1242.

- DeShon, R. P., Kozlowski, S. W., Schmidt, A. M., Milner, K. R., & Wiechmann, D. (2004). A multiple-goal, multilevel model of feedback effects on the regulation of individual and team performance. *Journal of Applied Psychology, 89*(6), 1035.
- Devine, D. J., Clayton, L. D., Philips, J. L., Dunford, B. B., & Melner, S. B. (1999). Teams in organizations prevalence, characteristics, and effectiveness. *Small Group Research, 30*(6), 678-711.
- Dierdorff, E. C., Bell, S. T., & Belohlav, J. A. (2011). The power of “we”: Effects of psychological collectivism on team performance over time. *Journal of Applied Psychology, 96*(2), 247.
- Dierdorff, E. C., & Ellington, J. (2012). Members matter in team training: Multilevel and longitudinal relationships between goal orientation, self-regulation, and team outcomes. *Personnel Psychology, 65*(3), 661-703.
- Festinger, L. (1950). Informal social communication. *Psychological Review, 57*(5), 271.
- Festinger, L., & Thibaut, J. (1951). Interpersonal communication in small groups. *The Journal of Abnormal and Social Psychology, 46*(1), 92.
- Fishbach, A., Henderson, M. D., & Koo, M. (2011). Pursuing goals with others: Group identification and motivation resulting from things done versus things left undone. *Journal of Experimental Psychology: General, 140*(3), 520.
- Fishbach, A., Zhang, Y., & Koo, M. (2009). The dynamics of self-regulation. *European Review of Social Psychology, 20*(1), 315-344.
- Fisher, S. L., & Ford, J. K. (1998). Differential effects of learner effort and goal orientation on two learning outcomes. *Personnel Psychology, 51*(2), 397-420.
- Foa, E. B., & Foa, U. G. (1980). Resource theory *Social exchange* (pp. 77-94): Springer.
- Foa, U. G., & Foa, E. B. (1974). *Societal structures of the mind*: Charles C Thomas.
- 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.
- Gibson, C. B. (1999). Do They Do What They Believe They Can? Group Efficacy and Group Effectiveness across Tasks and Cultures.
- Goldberg, L. R. (2014). International Personality Item Pool: A Scientific Collaboratory for the Development of Advanced Measures of Personality Traits and Other Individual Differences. Retrieved 7/19/14, from <http://ipip.ori.org/>
- Guan, J., Xiang, P., McBride, R., & Bruene, A. (2006). Achievement Goals, Social Goals, and Students' Reported Persistence and Effort in High School Physical Education. *Journal of Teaching in Physical Education, 25*, 149-170.

- 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. doi: 10.1037//0021-9010.87.5.819
- Hackman, J. R. (1992). *Group influences on individuals in organizations*: Consulting Psychologists Press.
- Hackman, J. R., & Morris, C. G. (1974). *Group tasks, group interaction process, and group performance effectiveness: A review and proposed integration*: Defense Technical Information Center.
- Hackman, J. R., & Oldham, G. R. (1976). Motivation through the Design of Work: Test of a Theory. *Organizational Behavior and Human Performance, 16*, 250-279.
- Harkins, S. G. (1987). Social loafing and social facilitation. *Journal of Experimental Social Psychology, 23*(1), 1-18.
- Harkins, S. G., Latane, B., & Williams, K. (1980). Social loafing: Allocating effort or taking it easy? *Journal of Experimental Social Psychology, 16*(5), 457-465.
- Hart, S. G., & Staveland, L. E. (1988). Development of NASA-TLX (Task Load Index): Results of empirical and theoretical research. *Advances in psychology, 52*, 139-183.
- Heggestad, E. D., & Kanfer, R. (2000). Individual differences in trait motivation: Development of the Motivational Trait Questionnaire. *International Journal of Educational Research, 33*(7), 751-776.
- Heggestad, E. D., & Kanfer, R. (2005). The predictive validity of self-efficacy in training performance: little more than past performance. *Journal of Experimental Psychology: Applied, 11*(2), 84.
- Heidemeier, H., & Bittner, J. V. (2012). Competition and achievement goals in work teams. *Human Performance, 25*(2), 138-158.
- Hinsz, V. B., & Jundt, D. K. (2005). Exploring Individual Differences in a Goal-Setting Situation Using the Motivational Trait Questionnaire. *Journal of Applied Social Psychology, 35*(3), 551-571.
- Homan, A. C., Hollenbeck, J. R., Humphrey, S. E., Van Knippenberg, D., Ilgen, D. R., & Van Kleef, G. A. (2008). Facing differences with an open mind: Openness to experience, salience of intragroup differences, and performance of diverse work groups. *Academy of Management Journal, 51*(6), 1204-1222.
- Ilgen, D. R. (2014). Work team motivation: Progress and perils. In J. K. Ford, J. R. Hollenbeck, & A. M. Ryan (Eds.), *The nature of work: Advances in psychological*

theory, methods, and practice. Washington, DC: American Psychological Association.

- Jackson, C. L., Colquitt, J. A., Wesson, M. J., & Zapata-Phelan, C. P. (2006). Psychological collectivism: a measurement validation and linkage to group member performance. *Journal of Applied Psychology, 91*(4), 884.
- Jehn, K. A., & Mannix, E. A. (2001). The dynamic nature of conflict: A longitudinal study of intragroup conflict and group performance.
- Kahneman, D. (1973). *Attention and effort*. Englewood Cliffs, NJ: Prentice-Hall.
- Kanfer, R. (1987). Task-specific motivation: An integrative approach to issues of measurement, mechanisms, processes, and determinants. *Journal of Social and Clinical Psychology, 5*, 237-264.
- Kanfer, R., & Ackerman, P. (2000). Individual differences in work motivation: Further explorations of a trait framework. *Applied Psychology, 49*(3), 470-482.
- Kanfer, R., & Ackerman, P. L. (1989). Motivation and Cognitive Abilities: An Integrative/Aptitude-Treatment Interaction Approach to Skill Acquisition. *Journal of Applied Psychology, 74*, 657-690.
- Kanfer, R., Ackerman, P. L., Murtha, T. C., Dugdale, B., & Nelson, L. (1994). Goal setting, conditions of practice, and task performance: A resource allocation perspective. *Journal of Applied Psychology, 79*(6), 826.
- Kanfer, R., Chen, G., & Pritchard, R. D. (2008). The three C's of work motivation: Content, context, and change. In R. Kanfer, G. Chen, & R. D. Pritchard (Eds.), *Work motivation: Past, present, and future* (pp. 1-16). New York, NY: Routledge.
- Kanfer, R., & Heggstad, E. D. (1997). Motivational traits and skills: A person-centered approach to work motivation. *RESEARCH IN ORGANIZATIONAL BEHAVIOR, VOL 19, 1997, 19*, 1-56.
- Kanfer, R., & Kerry, M. (2011). Motivation in Multiteam Systems. In S. J. Zaccaro, M. A. Marks, & L. A. DeChurch (Eds.), *Multiteam Systems: An Organization Form for Dynamic and Complex Environments*. New York: Routledge.
- Kanfer, R., Wolf, M. B., Kantrowitz, T. M., & Ackerman, P. L. (2010). Ability and trait complex predictors of academic and job performance: A person-situation approach. *Applied Psychology, 59*(1), 40-69.
- Karau, S. J., & Williams, K. D. (1993). Social loafing: A meta-analytic review and theoretical integration. *Journal of Personality and Social Psychology, 65*(4), 681.
- Karniol, R., & Ross, M. (1996). The motivational impact of temporal focus: Thinking about the future and the past. *Annual Review of Psychology, 47*(1), 593-620.

- Katz-Navon, T. Y., & Erez, M. (2005). When Collective- and Self-Efficacy Affect Team Performance: The Role of Task Interdependence. *Small Group Research*, 36(4), 437-465.
- Kernan, M. C., & Lord, R. G. (1990). Effects of valence, expectancies, and goal-performance discrepancies in single and multiple goal environments. *Journal of Applied Psychology*, 75(2), 194.
- Kerr, N. L. (1983). Motivation losses in small groups: A social dilemma analysis. *Journal of Personality and Social Psychology*, 45(4), 819.
- Kichuk, S. L., & Wiesner, W. H. (1997). The big five personality factors and team performance: implications for selecting successful product design teams. *Journal of Engineering and Technology Management*, 14(3), 195-221.
- Kidwell, R. E., & Bennett, N. (1993). Employee propensity to withhold effort: A conceptual model to intersect three avenues of research. *Academy of Management Review*, 18(3), 429-456.
- Klein, K. J., Lim, B.-C., Saltz, J. L., & Mayer, D. M. (2004). How do they get there? An examination of the antecedents of centrality in team networks. *Academy of Management Journal*, 47(6), 952-963.
- Kluger, A. N., & DeNisi, A. (1998). Feedback interventions: Toward the understanding of a double-edged sword. *Current Directions in Psychological Science*, 7(3), 67-72.
- Köpetz, C., Faber, T., Fishbach, A., & Kruglanski, A. W. (2011). The multifinality constraints effect: how goal multiplicity narrows the means set to a focal end. *Journal of Personality and Social Psychology*, 100(5), 810.
- Kozlowski, S. W. J., & Ilgen, D. R. (2006). Enhancing the Effectiveness of Work Groups and Teams. *Psychological Science in the Public Interest*, 7, 77-124.
- Kramera, A., Bhave, D. P., & Johnson, T. D. (2014). Personality and group performance: The importance of personality composition and work tasks. *Personality and Individual Differences*, 58, 132-137.
- Latane, B., Williams, K., & Harkins, S. (1979). Many hands make light the work: The causes and consequences of social loafing. *Journal of Personality and Social Psychology*, 37(6), 822.
- Latham, G. P., Ganegoda, D. B., & Locke, E. A. (1977). *Goal-Setting*: Wiley Online Library.
- Latham, G. P., & Pinder, C. C. (2005). Work motivation theory and research at the dawn of the twenty-first century. *Annual Review of Psychology*, 56, 485-516. doi: 10.1146/annurev.psych.55.090902.142105

- Lee, H. (2012). Effects of goal relations on self-regulated learning in multiple goal pursuits: performance, the self-regulatory process, and task enjoyment. *Asia Pacific Education Review, 13*(2), 369-386. doi: 10.1007/s12564-012-9216-y
- LePine, J. A. (2003). Team adaptation and postchange performance: effects of team composition in terms of members' cognitive ability and personality. *Journal of Applied Psychology, 88*(1), 27.
- LePine, J. A., Buckman, B. R., Crawford, E. R., & Methot, J. R. (2011). A review of research on personality in teams: Accounting for pathways spanning levels of theory and analysis. *Human Resource Management Review, 21*(4), 311-330.
- Li, C.-Y. (2013). Does Self-Efficacy Contribute to Knowledge Sharing and Innovation Effectiveness? A Multi-Level Perspective.
- Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting & task performance*: Prentice-Hall, Inc.
- Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *American Psychologist, 57*(9), 705-717. doi: 10.1037//0003-066x.57.9.705
- Louro, M. J., Pieters, R., & Zeelenberg, M. (2007). Dynamics of multiple-goal pursuit. *J Pers Soc Psychol, 93*(2), 174-193. doi: 10.1037/0022-3514.93.2.174
- MacCoun, R. J., Kier, E., & Belkin, A. (2006). Does social cohesion determine motivation in combat? An old question with an old answer. *Armed Forces & Society, 32*(4), 646-654.
- Marks, M. A., DeChurch, L. A., Mathieu, J. E., Panzer, F. J., & Alonso, A. (2005). Teamwork in Multiteam Systems. *Journal of Applied Psychology, 90*, 964-971.
- Marks, M. A., Mathieu, J. E., & Zaccaro, S. I. (2001). A temporally based framework and taxonomy of team processes.
- Marrone, J. A., Tesluk, P. E., & Carson, J. B. (2007). A Multilevel Investigation of Antecedents and Consequences of Team Member Boundary-Spanning Behavior. *Academy of Management Journal, 50*, 1423-1439.
- Mathieu, J. E., Goodwin, G. F., Heffner, T. S., Salas, E., & Cannon-Bowers, J. A. (2000). The Influence of Shared Mental Models on Team Process and Performance. *Journal of Applied Psychology, 85*, 273-283.
- Mathieu, J. E., Marks, M. A., & Zaccaro, S. J. (2001). Multiteam systems *Handbook of Industrial, Work, and Organizational Psychology*.

- 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. doi: 10.1177/0149206308316061
- 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., Tannenbaum, S. I., Donsbach, J. S., & Alliger, G. M. (2014). A review and integration of team composition models: Moving toward a dynamic and temporal framework. *Journal of Management*, 40, 130–160.
- Miller, M. W., Groman, L. J., Rietschel, J. C., McDonald, C. G., Iso-Ahola, S. E., & Hatfield, B. D. (2013). The effects of team environment on attentional resource allocation and cognitive workload. *Sport, Exercise, and Performance Psychology*, 2(2), 77-89. doi: 10.1037/a0030586
- Mitchell, T. R., Harman, W. S., Lee, T. W., & Lee, D.-Y. (2008). Self-regulation and multiple deadline goals.
- Mitchell, T. R., Holtom, B. C., Lee, T. W., Sablinski, C. J., & Erez, M. (2001). Why people stay: Using job embeddedness to predict voluntary turnover. *Academy of Management Journal*, 44(6), 1102-1121.
- Mitchell, T. R., Lee, T. W., Lee, D.-Y., & Harman, W. (2004). Attributions and the action cycle of work. *Attribution Theory in the Organizational Sciences*, 25-48.
- Morgeson, F. P., Reider, M. H., & Campion, M. A. (2005). Selecting individuals in team settings: The importance of social skills, personality characteristics, and teamwork knowledge. *Personnel Psychology*, 58(3), 583-611.
- Mullen, B., & Copper, C. (1994). The relation between group cohesiveness and performance: An integration. *Psychological Bulletin*, 115(2), 210.
- Mulvey, P. W., & Klein, H. J. (1998). The Impact of Perceived Loafing and Collective Efficacy on Group Goal Processes and Group Performance. *Organizational Behavior And Human Decision Processes*, 74, 62–87.
- Murray, H. A. (1938). Explorations in personality.
- Navon, D., & Gopher, D. (1979). On the economy of the human-processing system. *Psychological Review*, 86(3), 214.
- Norman, D. A., & Bobrow, D. G. (1975). On data-limited and resource-limited processes. *Cognitive psychology*, 7(1), 44-64.

- Northcraft, G. B., Schmidt, A. M., & Ashford, S. J. (2011). Feedback and the rationing of time and effort among competing tasks. *J Appl Psychol*, *96*(5), 1076-1086. doi: 10.1037/a0023221
- O'leary, M. B., Mortensen, M., & Woolley, A. W. (2011). Multiple team membership: A theoretical model of its effects on productivity and learning for individuals and teams. *Academy of Management Review*, *36*(3), 461-478.
- Orehek, E., & Vazeou-Nieuwenhuis, A. (2013). Sequential and concurrent strategies of multiple goal pursuit. *Review of General Psychology*, *17*(3), 339-349. doi: 10.1037/a0032584
- Paas, F. G. (1992). Training strategies for attaining transfer of problem-solving skill in statistics: A cognitive-load approach. *Journal of Educational Psychology*, *84*(4), 429.
- Park, G., & DeShon, R. P. (2010). A multilevel model of minority opinion expression and team decision-making effectiveness. *Journal of Applied Psychology*, *95*(5), 824.
- Park, G., Spitzmuller, M., & DeShon, R. P. (2013). Advancing Our Understanding of Team Motivation: Integrating Conceptual Approaches and Content Areas. *Journal of Management*, *39*(5), 1339-1379. doi: 10.1177/0149206312471389
- Pearsall, M. J., Christian, M. S., & Ellis, A. P. (2010). Motivating interdependent teams: individual rewards, shared rewards, or something in between? *Journal of Applied Psychology*, *95*(1), 183.
- Pinheiro, J., Bates, D., DebRoy, S., Sarkar, D., & R Core Team. (2014). nlme: Linear and Nonlinear Mixed Effects Models (Version 3.1-117). Retrieved from <http://CRAN.R-project.org/package=nlme>
- Ployhart, R. E. (2008). The measurement and analysis of motivation. In R. Kanfer, G. Chen, & R. D. Pritchard (Eds.), *Work motivation: Past, present, and future*. New York, NY: Routledge.
- Ployhart, R. E., Holtz, B. C., & Bliese, P. D. (2002). Longitudinal data analysis: Applications of random coefficient modeling to leadership research. *The Leadership Quarterly*, *13*(4), 455-486.
- Poortvliet, P. M., & Darnon, C. (2010). Toward a More Social Understanding of Achievement Goals The Interpersonal Effects of Mastery and Performance Goals. *Current Directions in Psychological Science*, *19*(5), 324-328.
- Porter, C. O., Gogus, C. I., & Yu, R. C.-F. (2010). When does teamwork translate into improved team performance? A resource allocation perspective. *Small Group Research*, *41*(2), 221-248.

- Porter, C. O., Gogus, C. I., & Yu, R. C. (2011). The Influence of Early Efficacy Beliefs on Teams' Reactions to Failing to Reach Performance Goals. *Applied Psychology*, 60(4), 645-669.
- R Core Development Team. (2014). R (Version 3.1.0).
- Raudenbush, S. W. e. a. (2011). Optimal Design Software for Multi-level and Longitudinal Research (Version 3.01). Retrieved from www.wtgrantfoundation.org
- Resick, C. J., Dickson, M. W., Mitchelson, J. K., Allison, L. K., & Clark, M. A. (2010). Team composition, cognition, and effectiveness: Examining mental model similarity and accuracy. *Group Dynamics: Theory, Research, and Practice*, 14(2), 174.
- Roe, R. A. (2014). Time, performance and motivation. In A. J. Shipp & Y. Fried (Eds.), *Time and Work: How Time Impacts Individuals* (pp. 63). New York: Psychology Press.
- Roe, R. A., Gockel, C., & Meyer, B. (2012). Time and change in teams: Where we are and where we are moving. *European Journal of Work and Organizational Psychology*, 21(5), 629-656. doi: 10.1080/1359432x.2012.729821
- Rutte, C. G. (2005). Social loafing in teams. *The essentials of teamworking: International perspectives*, 191-208.
- Salas, E., Dickinson, T. L., Converse, S. A., & Tannenbaum, S. I. (1992). Toward an understanding of team performance and training.
- Sales Executive Council. (2003). Shifting the Performance Curve: Exporting High-Performance Sales Disciplines to the Core.
- Schachter, S. (1951). Deviation, rejection, and communication. *The Journal of Abnormal and Social Psychology*, 46(2), 190.
- Schmidt, A. M., & DeShon, R. P. (2007). What to do? The effects of discrepancies, incentives, and time on dynamic goal prioritization. *J Appl Psychol*, 92(4), 928-941. doi: 10.1037/0021-9010.92.4.928
- Schmitz, B., & Skinner, E. (1993). Perceived control, effort, and academic performance: Interindividual, intraindividual, and multivariate time-series analyses. *Journal of Personality and Social Psychology*, 64(6), 1010.
- Seo, M.-g., Barrett, L. F., & Bartunek, J. M. (2004). The role of affective experience in work motivation. *Academy of Management Review*, 29, 423-439.

- Seo, M.-g., & Ilies, R. (2009). The role of self-efficacy, goal, and affect in dynamic motivational self-regulation. *Organizational Behavior And Human Decision Processes*, *109*(2), 120-133.
- Sonnentag, S., & Volmer, J. (2010). What you do for your team comes back to you: A cross-level investigation of individual goal specification, team-goal clarity, and individual performance. *Human Performance*, *23*(2), 116-130.
- Spreitzer, G. M. (1995). Psychological empowerment in the workplace: Dimensions, measurement, and validation. *Academy of Management Journal*, *38*(5), 1442-1465.
- Stewart, G. L., Fulmer, I. S., & Barrick, M. R. (2005). An exploration of member roles as a multilevel linking mechanism for individual traits and team outcomes. *Personnel Psychology*, *58*, 343–365.
- Tasa, K., Sears, G. J., & Schat, A. C. H. (2011). Personality and teamwork behavior in context: The cross-level moderating role of collective efficacy. *Journal of Organizational Behavior*, *32*(1), 65-85. doi: 10.1002/job.680
- Tasa, K., Taggar, S., & Seijts, G. H. (2007). The development of collective efficacy in teams: a multilevel and longitudinal perspective. *Journal of Applied Psychology*, *92*(1), 17-27.
- Tett, R. P., & Burnett, D. D. (2003). A Personality Trait-Based Interactionist Model of Job Performance. *Journal of Applied Psychology*, *88*, 500-517.
- Thompson, L. L. (2010). *Making the team: A guide for managers* (4th ed.). Upper Saddle River, NJ: Prentice Hall.
- Touré-Tillery, M., & Fishbach, A. (2014). How to Measure Motivation: A Guide for the Experimental Social Psychologist. *Social and Personality Psychology Compass*, *8*, 328-341.
- Turner, J. L., Foa, E. B., & Foa, U. G. (1971). Interpersonal reinforcers: Classification, interrelationship, and some differential properties. *Journal of Personality and Social Psychology*, *19*, 168-180.
- Tushman, M. L., & Scanlan, T. J. (1981). Boundary spanning individuals: Their role in information transfer and their antecedents. *Academy of Management Journal*, *24*(2), 289-305.
- Vancouver, J. B., & Kendall, L. N. (2006). When self-efficacy negatively relates to motivation and performance in a learning context. *Journal of Applied Psychology*, *91*(5), 1146.

- Vancouver, J. B., More, K. M., & Yoder, R. J. (2008). Self-efficacy and resource allocation: support for a nonmonotonic, discontinuous model. *J Appl Psychol*, *93*(1), 35-47. doi: 10.1037/0021-9010.93.1.35
- Wageman, R. (1999). Task design, outcome interdependence, and individual differences: Their joint effects on effort in task-performing teams (Commentary on Huguet et al., 1999).
- Wageman, R., & Gordon, F. M. (2005). As the twig is bent: How group values shape emergent task interdependence in groups. *Organization Science*, *16*(6), 687-700.
- Wanberg, C. R., Zhu, J., Kanfer, R., & Zhang, Z. (2012). After the pink slip: Applying dynamic motivation frameworks to the job search experience. *Academy of Management Journal*, *55*(2), 261-284.
- Weiss, H. M., & Cropanzano, R. (1996). Affective events theory: A theoretical discussion of the structure, causes and consequences of affective experiences at work. In B. M. Staw & L. L. Cummings (Eds.), *Research in Organizational Behavior* (Vol. 18, pp. 1-74). Greenwich, CT: JAI Press.
- Wetzels, M. (2006). *The Impact of Team Efficacy Development on Performance in Multi-team Service Systems*.
- Wildman, J. L., Thayer, A. L., Rosen, M. A., Salas, E., Mathieu, J. E., & Rayne, S. R. (2012). Task types and team-level attributes: Synthesis of team classification literature. *Human Resource Development Review*, *11*, 97-129.
- Williams, K. D., & Karau, S. J. (1991). Social loafing and social compensation: the effects of expectations of co-worker performance. *Journal of Personality and Social Psychology*, *61*(4), 570.
- Wolfe, J., & Box, T. M. (1986). *Team cohesion effects on business game performance*. Paper presented at the Proceedings of the 13th Annual Conference of ABSEL. Stillwater: Oklahoma State University.
- Yeo, G. B., & Neal, A. (2004). A multilevel analysis of effort, practice, and performance: effects; of ability, conscientiousness, and goal orientation. *Journal of Applied Psychology*, *89*(2), 231.
- Zaccaro, S. J., & McCoy, M. C. (1988). The Effects of Task and Interpersonal Cohesiveness on Performance of a Disjunctive Group Task1. *Journal of Applied Social Psychology*, *18*(10), 837-851.