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University of Iowa

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THE BAD APPLE SPOILS THE BUNCH: HOW A DISAGREEABLE PERSON
DAMAGES TEAM PERFORMANCE AND WHAT CAN BE DONE ABOUT IT

by

Bret Howard Bradley

An Abstract

Of a thesis submitted in partial fulfillment
of the requirements for the Doctor of
Philosophy degree in Business Administration
in the Graduate College of
The University of Iowa

August 2008

Thesis Supervisor: Professor Greg L. Stewart

ABSTRACT

Teams are being used more in organizations to do important work. However, both positive and negative effects come with the increased use of teams. One problem is the “bad apple” effect where a highly disagreeable team mate, for example, damages team performance. This research aims to study how this person damages team performance and what can be done to minimize the negative impact. I propose that a disagreeable teammate negatively impacts team affective states which in turn give rise to defensive behaviors among teammates. These defensive behaviors impact team processes which in turn impact the team’s performance. In addition, I propose that team interdependence moderates the impact of disagreeableness on teammate affective reactions such that teammates in less interdependent contexts will react less negatively to the “bad apple.”

I designed a 2x2 lab experiment with a confederate, or trained research participant, to test these hypotheses. I manipulated disagreeableness through the behaviors of the confederate and I manipulated interdependence through the information, goals, and rewards of the teams. Results support all the hypothesized relationships. Of note, I found that interdependence interacted with disagreeableness to predict team affective reactions as measured by salivary cortisol – a well established biomarker for affective reactions. I also found support for a mediating model using team core affect or affective culture mediating the impact of disagreeableness on team process. Finally, I found support for a mediated moderation model demonstrating that the moderation of interdependence and disagreeableness on team process was mediated by team cortisol. However, the impact on process was in the opposite direction than expected. Namely,

that more interdependent teams had higher processes despite elevated cortisol levels indicating a negative affective, or stress reaction. This counterintuitive finding has implications for future research attempting to discover useful methods of minimizing the impact of a disagreeable teammate on the team.

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Graduate College
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CERTIFICATE OF APPROVAL

PH.D. THESIS

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To my family

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CHAPTER I

INTRODUCTION

One of the major trends in organizations today is the increase of work done in teams (Ilgen, Hollenbeck, Johnson, & Jundt, 2005). With this increase comes the need to improve our understanding of the dynamics of teams. Hence, team research has grown rapidly and spans multiple literatures and domains.

Theoretical Background

One of the most prominent literatures regarding how teams work is that of team composition which deals with the skills, abilities, and dispositions that individuals bring to the team and how these elements interact to impact the team's functioning and performance. For example, personality has been a long studied element that contributes to team composition and dynamics. The rise in popularity and acceptance of the Big 5 taxonomy of individual personality (Digman, 1990) allows team researchers a common perspective to study the compositional effects of personality in teams. This taxonomy comprises conscientiousness, extraversion, emotional stability, openness to experience, and agreeableness. Meta-analytic findings show that conscientiousness and emotional stability influence individual level performance (Barrick & Mount, 1991) and that team aggregated personality influences team performance (Stewart, 2006). Specifically, average levels of team conscientiousness and openness to experience lead to better team performance in organizational settings (Bell, 2007). However, given the critical need to get along with others in a team context, many have hypothesized and some found that agreeableness is of critical importance in the team context (Morgeson, Reider, &

Campion, 2005; Mount, Barrick, & Stewart, 1998; Neumann & Wright, 1999; Barrick, Stewart, Neubert, & Mount, 1998).

Disagreeable Team Member

One of the most interesting findings with regard to agreeableness and team performance relates to the effect of a highly disagreeable team member. A recent meta-analysis shows that team minimum agreeableness has an impact on team performance (Bell, 2007). In addition, Barrick and colleagues (1998) found that teams with a highly disagreeable team member performed meaningfully worse than teams that did not include such a member. They concluded that “including a member who lacks desirable interpersonal traits can negatively affect team processes and performance” and that “examination of the minimum-score operationalization [of personality] clearly demonstrates the effect of a single disagreeable member, which is important because it illustrates the potentially strong effect one person can have on team performance (pg. 388).” Others (Neumann & Wright, 1999; Van Vianen & De Dreu, 2001; Halfhill, Nielsen, Sundstrom, & Weilbaecher, 2005) have replicated this finding which portrays the highly disagreeable teammate as the quintessential ‘anti-team player.’ However, despite the empirical findings that a disagreeable member leads to poor team performance, what has not been demonstrated is how this impact occurs. This gap in the literature is characteristic of much of the literature on team personality as evidenced by the following quote from Moynihan and Peterson:

“future research...should focus on refining our understanding of how personality traits are related to the task and interpersonal behaviors in group processes...The inattention to mediating mechanisms is exacerbated in the literature by the tendency to focus on desirable behaviors (e.g., helping, cooperation). For the most part, undesirable behaviors such as malingering, social loafing, dishonesty, and sabotage have been

ignored....We suspect, in short, that many of the process theories need to explicate the negative individual behaviors that cause poor group performance (Moynihan & Peterson, 2001; pg. 340).”

This gap in the current literature prevents researchers from pursuing ways to limit the negative effects of the disagreeable team member. Hence, my first research question is as follows:

Research Question #1: How does a disagreeable team member damage the performance of the team? In essence, what are the intermediary mechanisms that link a disagreeable team member to team performance?

Recently Felps, Mitchell, and Byington (2006) proposed a model of how one “bad apple” damages team performance (Appendix A). They discussed the bad apple in terms of a highly ‘negative’ teammate which is quite similar to a highly ‘disagreeable’ teammate and argue that three intermediary variables link the bad apple to team performance. First, teammates react psychologically with negative emotions and feelings of inequity and damaged trust. Second, these affective reactions lead to defensive behaviors such as emotional explosions or withdrawal from the team. Third, these defensive behaviors damage team processes such as communication and cooperation which then directly impact the performance of the team. The intermediary variables of psychological reactions, defensive behaviors, and team processes show how a disagreeable teammate damages team performance. Affective events theory (Weiss & Cropanzano, 1996) also argues that psychological or emotional reactions mediate the impact of negative interactions at work and defensive behaviors.

Affective Reactions

Research on emotions in teams has increased over the last decade (Kanfer & Klimoski, 2002; Lazarus, 1999). One popular perspective is affective events theory

(Weiss & Cropanzano, 1996) which holds that affective reactions are the proximal outcomes of work events. Experiencing a disagreeable coworker, especially in an interdependent team setting, can be seen as a series of negative work events. Thus, integrating the model of the bad apple phenomenon (Felps, et al, 2006) with affective events theory (Weiss & Cropanzano, 1996) leads to the conclusion that affective reactions of teammates play an important role in explaining the impact of a disagreeable teammate on team performance. Next, the affective reactions of teammates are argued to give rise to defensive behaviors.

Defensive Behaviors

Weiss and Cropanzano (1996) argued that affective reactions have a direct impact on ‘affect driven behaviors’ such as confrontation or withdrawal. They state that “people in an emotional state tend to be controlled by that state, they tend to be preoccupied by the emotion and there is a persistence to behaviors designed to deal with the emotion (Weiss & Cropanzano, 1996, pg. 54).” These efforts to deal with the emotion correspond to ‘defensive behaviors’ in the model of the bad apple phenomenon (Felps, et al, 2006). In addition, the literature on psychological stress (Lazarus, 1991) indicates that people respond to experiences of stress-emotions with coping behaviors. Coping has to do with the way people manage life conditions that are stressful and can be directed at the cause of emotion or the emotion itself. Weiss and Cropanzano (1996) also state that “in most cases the emotion responses will tend to be incompatible with behavior in the job domain, producing performance decrements (Weiss & Cropanzano, pg. 55).” Thus, I integrate research from the bad apple phenomenon (Felps, et al, 2006), affective events theory (Weiss & Cropanzano, 1996), and stress research (Lazarus, 1991) to argue that

teammates' affective reactions to a bad apple lead to defensive behaviors such as emotional explosions or withdrawal. Team process makes up the final intermediary mechanism linking the disagreeable teammate to the performance of the team.

Team Processes

The impact of defensive behaviors on 'performance decrements' should be mediated by team processes. A focus on processes as mediators in team research stems from the wide spread use of the inputs-processes-outputs (I-P-O) model in the research on small groups and teams (McGrath, 1984; Hackman, 1987; Steiner, 1972) which has shown that processes lead to performance (Kozlowski & Bell, 2003). Researchers using this model argue that processes mediate the impact of team inputs such as personality on team outputs such as performance. Processes refer to the behavioral interactions among the members of a group including coordination, cooperation, communication, and conflict. Defensive behavioral responses begin to impact these important processes of the team by (a) decreasing beneficial process behaviors such as communication and cooperation and (b) increasing detrimental process behaviors such as relationship-focused conflict. Thus, according to the model of the bad apple phenomenon (Felps, et al, 2006), I included the long-studied construct of team process as the final intermediary mechanism linking the disagreeable teammate to team performance. In summary, I argue that a disagreeable 'bad apple' in a team will impact teammates' affective states which will then impact teammates' defensive behaviors. These defensive behaviors will impact team processes which will in turn impact team performance.

The intermediary mechanisms that link the bad apple to team performance serve to answer the first research question. However, an additional pursuit of this study is

discovering moderators of the bad apple effect. Because team affective reactions are the first step in the progression of the bad apple's impact, I focus on a specific moderator of this relationship. Thus, my second research question is as follows:

Research Question #2: Which variables moderate the impact of a bad apple on the affective reactions of teammates?

Interdependence

Interdependence is one of the most fundamental elements of small groups (Johnson & Johnson, 1989) and has been found to have contingency effects on team performance (Gibson, 1999; Barrick, Bradley, Kristof-Brown & Colbert, 2007) leading a recent team review to conclude that it is a defining characteristic of teams (Kozlowski & Bell, 2003). Interdependence is defined as the extent to which contextual features outside the individual and his or her behavior (i.e., tasks and outcomes) require a collection of individuals to interact and depend on each other for information, motivation and support (Barrick, et al., 2007; Wageman, 2001; Campion, Medsker, & Higgs, 1993). Interdependence, then, is not an interactional process (i.e., behaviors) and is not an emergent state (i.e., attitude or affect) but rather the requirement to interact and depend on each other (Barrick, et al., 2007).

When teammates are highly interdependent they must work together closely in order to perform well as a team. This may be due to dispersed knowledge, information or skills that must be shared to complete tasks. On the other hand, when teammates are not interdependent they do not need to work together closely to complete the tasks of the group. Individuals can work mostly alone and coordinate efforts at only a minimal level in order to perform well (Barrick, et al, 2007). The need to interact makes team processes such as communicating and cooperating critically important in highly

interdependent team settings. However, in minimally interdependent settings these processes are not as important. In teams that have a disagreeable teammate this minimal need to interact will mean less exposure to and spreading of the negativity of the disagreeable teammate. In discussing the impact of bad apples on teams Taggar and Neubert (2000) concluded that “the behaviours of one person, if left unchecked, can affect the whole team....To ultimately realize the potential of teams, we need to be proactive in ensuring that one “bad apple” doesn’t ruin the whole barrel (pg. 53).” Therefore, teams with less interdependence among teammates should be less effected by the bad apple because team members will be less compelled to interact and depend on the disagreeable person. Thus, I propose that the impact of a highly disagreeable team member on other members’ affective reactions to this bad apple depends on the level of interdependence within the team setting. Specifically, that teams with lower amounts of interdependence will have less negative affective reactions to the bad apple than teams with higher amounts of interdependence.

Appendix B depicts the proposed model. First, a disagreeable team member negatively influences the average level of affective states of other teammates. Second, these affective reactions lead to higher levels of average defensive behaviors within a team. Third, the team defensive behaviors negatively influence team processes. Fourth, team processes impact the performance of the team. Finally, interdependence moderates the relationship between the disagreeable teammate and the team’s affective reactions. Thus, one contribution of this study is to show how a disagreeable ‘bad apple’ spoils team performance and another contribution is to show that the level of interdependence among teammates changes how much the ‘bad apple’ can impact the team.

CHAPTER II

LITERATURE REVIEW

One of the major trends in organizations today is the increase of work done in small groups (Ilgen, et al, 2005). A recent review stated that “the last decade and a half has witnessed a remarkable transformation of organizational structures worldwide....one of its more compelling aspects has been an ongoing shift from work organized around individual jobs to team-based work structures (Kozlowski & Bell, 2003; pg. 333).” This quote is one of many from organizational behavior scholars recognizing the increased use of team-based work structures in organizations. With this rise comes an increase in the dependence workers have on others to do their jobs and despite the productivity benefits (Wageman, 1995), an increase in worker interdependence is not without a negative side (Sinclair, 1992). One of the ways doing work in teams can be detrimental to both individual satisfaction and team productivity is through experiencing a highly disagreeable team member. For example, Barrick and colleagues (1998) found that teams with one very disagreeable team member performed worse than teams without a highly disagreeable team member. They reasoned that this “bad apple” may make team membership too costly in terms of social rewards and thus destroy interpersonal relationships within the team. But, how does a bad apple spoil the team? In order to answer this question I will review pertinent literature according to the model presented in the preceding chapter (Appendix B) and propose specific hypotheses about the nature of the impact of the bad apple and what can be done about it.

This chapter is organized as follows. First, I define teams and discuss the nature of the team setting. Second, I review the personality literature on agreeableness, evaluate

the findings that one highly disagreeable team member damages team performance, and develop a profile of disagreeableness. Third, I integrate the profile of disagreeableness with the three theoretical models of the bad apple phenomenon in teams (Felps, et al, 2006), affective events theory (Weiss & Cropanzano, 1996), and psychological stress (Lazarus, 1991) to propose that team affective reactions, team defensive behaviors, and team processes are the intermediary mechanisms linking the bad apple to team performance. Finally, I review the literature on interdependence and argue that it will moderate the impact of disagreeableness on team-level state affective. Hypotheses are developed according to these reviews and are presented after the corresponding sections.

What Are Teams?

The title of ‘team’ has been applied to small groups, small businesses, business units, and even entire organizations. This proliferation of the team title is no doubt partly attributed to the increased use of teams to get work done and the increased attention to them in the management literatures. In this study, I view a team as a small group of people interacting to complete a task. Specifically, I define a team as a social system of two or more individuals who interact by taking on different roles to perform complex tasks, share responsibility for outcomes, and are embedded in a larger social system such as a business unit or an organization (Kozlowski & Bell, 2003; Cohen & Bailey, 1997; Hackman, 1987). The essence of a team is the requirement to interact because of shared goals, responsibilities, and outcomes.

Many scholars draw a distinction between teams and groups. For example, a team is a specific kind of group that exists within an organization and pursues specific goals. Management and organization researchers studying teams are often most

concerned with a team's effectiveness and what can be done to improve it. On the other hand, groups are much broader and include families, groups of friends, and even co-located strangers, in addition to work groups. Small group researchers, often based in social psychology, tend to focus on group processes such as interactions and interpersonal attraction and are less concerned with the effectiveness, or performance, of the group (Cohen & Bailey, 1997). On the other hand, the emphasis of team research in the organizational literatures tends to focus on task driven processes and their causes and consequences, namely inputs and outputs (Bettenhausen, 1991). In this research I plan to utilize an inputs-processes-outputs framework in a lab study with artificially created teams to study phenomena found in real work teams within organizations.

The I-P-O Framework for the Study of Teams

The input-process-output (IPO) framework was first applied in the functional perspective of small groups. This perspective is a normative approach to describing and predicting group behavior and performance that focuses on the functions of inputs and/or processes (Hollingshead, Wittenbaum, Paulus, Hirokawa, Ancona, Peterson, Jehn, & Yoon, 2005). The functional perspective assumes a causal string from inputs to processes to outputs and has four main assumptions. First, groups are goal oriented. Second, group behavior and performance varies and can be evaluated. Third, interaction processes have utility and can be regulated. Fourth, internal and external factors influence group performance via interaction. Given its strength in predicting and explaining task-oriented group performance it is no wonder that most research on team effectiveness incorporates a functional perspective, often through the IPO framework.

The IPO framework (McGrath, 1984; Hackman, 1987; Steiner, 1972) includes inputs, processes, and outputs. Inputs include individual, team, and environmental elements that make up the context for the team. For example, the intelligence and personality of team members, the size and structure of the team, and the reward and control structure of the organization, i.e., the environment of the team. Processes, on the other hand, help or hinder the team's ability to convert these inputs into outputs. Most researchers agree that processes refer to interactions among the members of a group including coordination, cooperation, communication, and conflict. Outputs, then, are the outcomes of the effects of inputs on processes and represent the criteria for judging the effectiveness of a team. Team effectiveness can be organized into internal and external categories. Internal outcomes are often satisfaction or team viability, while external outcomes are often performance or productivity (Kozlowski & Bell, 2003). The ubiquity of this framework is evidenced in its reference in current team reviews (Kozlowski & Bell, 2003; Cohen & Bailey, 1997; Ilgen, et al., 2005).

In addition to the functional perspective of small groups, a second perspective is relevant to the current paper. The psychodynamic perspective focuses on the impact of individuals' emotional, nonconscious processes and the conscious, rational processes on interpersonal interactions. This perspective has three main assumptions. First, social behavior has roots in biological instincts. Second, group mind exists. Third, unawareness of emotional processes inhibits effectiveness and bringing these processes to awareness improves effectiveness. Because the affective and emotional side of groups is a central concern in the psychodynamic perspective, I aim to integrate elements from it into the functional perspective of this paper. I do it by arguing that, in addition to

traditional team processes, team affective reactions play a central role in explaining how a bad apple damages team performance.

As team research advances toward the conceptualization of teams as complex, adaptive, dynamic systems (Arrow, McGrath, Berdahl, 2001) the need is heightened for the field to pursue more complex interrelationships among inputs and processes and to expand the array of team processes studied (Hollingshead, et al., 2005). One such advancement is the recent distinction being made in the teams literature regarding interactional processes and affective or attitudinal emergent states. This growing distinction represents prior research working to integrate elements of the psychodynamic perspective into traditionally functional team research. For example, Marks, Mathieu, and Zaccaro (2001) emphasized team processes as interactional in nature and emergent states as cognitive, motivational, and affective states of teams. They note that many constructs used by researchers to represent 'process' in the IPO model are in fact emergent states. In their review of group effectiveness research, Cohen and Bailey (1997) also drew the distinction between processes and 'group psychosocial traits.' Processes, again, were described as interactions such as communication and conflict while group psychosocial traits were described as "shared understandings, beliefs, or emotional tone (pg. 244)." Finally, Ilgen, and colleagues (2005) drew a similar distinction while reviewing the research on teams in organizations. They argued that many of the mediational factors that intervene and transmit the influence of inputs to outputs are not processes at all but emergent cognitive or affective states. These three reviews recognize that a major trend in the field of team research is an effort to integrate affective elements from the psychodynamic perspective into traditional team research that

uses a functional perspective. In the current study, I argue that the effects of a disagreeable member on the team's performance go through the affective states, defensive behaviors, and interactional processes of the team members. I next review team personality research, the findings of agreeableness, and construct a profile of disagreeableness to characterize the bad apple.

Individual-Level Personality Research

While the domain of individual personality is quite broad, personality research has increasingly centered on the five factor model, or Big 5 taxonomy, in recent years (Digman, 1990). The five factor model (FFM) of personality consists of conscientiousness, emotional stability, extraversion, agreeableness and openness to experience. Conscientiousness refers to an active process of planning, organizing, and carrying out tasks. People who are described as conscientious strive for achievement and are said to be competent, orderly, dutiful, self-disciplined, and deliberate. Neuroticism (emotional stability is its opposite) refers to the general tendency to experience negative emotions such as fear, sadness, embarrassment, guilt, and disgust. In addition, neurotic individuals tend to be less able to control impulses and cope with stress than others. Neurotic people tend to be self-conscious and vulnerable and experience anxiety, anger, and depression more than others. Extraversion refers to sociability and enjoying being in large groups of people. Extraverts are assertive, active, and talkative and tend to have a cheerful disposition. These individuals tend to be enterprising and so it's no surprise that sales people typify this personality trait. Extraverts tend to seek excitement and be warm, gregarious, active, and experience positive emotions more than others. Agreeableness, like extraversion, is mostly a dimension of interpersonal tendencies. These people are

thoughtful, sympathetic, and cooperative. Agreeable people are trusting, straightforward, altruistic, compliant, modest, and tender-minded and tend to see others this way as well. Finally, openness to experience refers to creativity, curiosity, and divergent thinking. Open individuals tend to be unconventional, question authority, and focus on aesthetics and action. These individuals experience fantasy, feelings, and ideas more than other people (Costa & McCrae, 1992). In addition to its emergence as the standard for the study of normal personality traits, the five factor model also appears to be a human universal (McCrae & Costa, 1997).

Findings regarding the FFM of personality and work outcomes have been accumulating for years. In a seminal meta-analysis on the FFM and work outcomes, Barrick and Mount (1991) showed that across work situations and types of jobs, conscientiousness and extraversion were valid predictors of job performance with conscientiousness having the strongest relationship. Conscientiousness, emotional stability, extraversion, and openness to experience have been linked to leadership (Judge, Bono, Ilies, & Gerhardt, 2002). Openness has also been shown to relate to performance on brainstorming tasks (Bolin & Neuman, 2006). However, agreeableness has not shown effects on many of these important individual work outcomes. One reason for the lack of findings regarding agreeableness and important individual work outcomes is due to the social nature of this trait, making it a prime trait to study in the team context.

Agreeableness

Agreeableness is likely the FFM trait most closely associated with interpersonal interaction (Graziano, Jensen-Campbell, & Hair, 1996) which helps explain the paucity of findings relating it to individual-centered work outcomes such as job performance. As

previously stated, agreeable people are thoughtful, sympathetic, and cooperative. They also tend to see other people this way. Costa and McCrae (1992) list six sub-facets of agreeableness as: trust, straightforwardness, altruism, compliance, modesty, and tender-mindedness. Graziano, et al. (1996) described agreeableness as reflecting internal tendencies in the regulation of anger and frustration and go on to say that agreeableness allows humans to capitalize on the advantages of group living. On the other hand, a disagreeable person is antagonistic, egocentric, skeptical of others' intentions, and competitive rather than cooperative. Disagreeableness has also been linked to narcissism, paranoia, and antisocial behaviors (Costa & McCrae, 1992).

Findings concerning a relationship between agreeableness and socially oriented outcomes are now accumulating in the social psychology, industrial-organizational psychology, and management literatures. These findings show why agreeableness is important in teams because they represent the underpinnings of team process behaviors. For example, agreeableness has been shown to be a key trait predictor in contextual performance and extra-role behaviors. In addition, evidence shows a negative relationship between agreeableness and relationship conflict, and counterproductive behaviors. I now review these findings to more fully paint the picture of the trait of agreeableness.

Expanding the domain of job performance, Hertz and Donovan (2000) found meta-analytic evidence that agreeableness was the strongest personality trait relating to interpersonal facilitation, a key factor in contextual performance. Borman and Motowidlo (1993) note that in addition to task-focused performance, contextual performance is likely a key criterion in jobs that center around interpersonal interaction.

Contextual performance is characterized by helping other employees and being cooperative and inclusive. In addition, agreeableness has been found to be the highest FFM trait predictor of cooperative behavior (LePine & Van Dyne, 2001b), another important element of contextual performance. Others have also found that agreeableness is the most important personality trait predictor of contextual performance (Mohammed, Mathieu, & Bartlett, 2002).

Agreeableness also relates positively to organizational citizenship behaviors (OCBs). For example, Ilies, Scott, & Judge (2006) found that agreeableness and state positive affect interacted to predict OCBs. This indicates that low agreeable (disagreeable) people are more impacted by negative moods or emotions in terms of the OCBs they display. In addition, meta-analytic evidence shows a relationship between agreeableness and the OCB facets of altruism and generalized compliance (Organ & Ryan, 1995). In the team setting contextual and citizenship behaviors such as cooperating, helping, complying and being altruistic fall within the domain of team process showing why these behaviors improve team functioning and performance. Agreeableness is negatively related to relationship-focused conflict. It has been shown to moderate the impact of fairness perceptions on retaliation (Skarlicki, Folger, & Tesluk, 1999) and to moderate the relationship between affective responses and tactical choices during conflicts (Jensen-Campbell & Graziano, 2001). More agreeable people are also more likely to engage in conflict cooperatively rather than competitively. Amongst conflict strategies, they tend to choose compromising or problem solving while disagreeable people tend to choose outcome fighting and threats, and avoid accommodating or problem solving (Van de Vliert & Euwema, 1994). Disagreeable

partners also tend to elicit more conflict from their partners than do high agreeable partners (Graziano, et al., 1996). Finally, agreeable people are less likely to be involved in quarrelsome behaviors (Cote & Moskowitz, 1998). Thus, not only do agreeable people engage in less conflict, they also tend to behave more civilly during conflict.

Agreeableness is also negatively related to workplace deviance, or counterproductive behaviors (CPBs). Many scholars make the distinction between interpersonal-focused CPBs and organization-focused CPBs. For example, Mount, Ilies, and Johnson (2006) found that agreeableness negatively relates to the interpersonal form of CPB while Liao, Joshi, and Chuang (2004) found that agreeableness negatively relates to both; however, after controlling for other important constructs only the relationship with organization-focused CPBs remained. Finally, highly agreeable people have been found to be less likely to hold attitudes of ethnic prejudice (Jackson & Poulsen, 2005). The authors made this conclusion based on evidence that highly agreeable people were more likely to initiate contact with dissimilar others and interpret these interactions favorably. In the team setting, conflict and deviant behaviors are counterproductive and damage the functioning and performance of teams. Hence, agreeableness is a critical personality factors in teams because it (a) increases beneficial processes such as contextual and citizenship behaviors and (b) decreases detrimental processes such as relationship conflict and deviant behaviors.

Although most evidence shows that agreeableness does not have a meaningful impact on individual-level job performance, it has been shown to moderate the impact of conscientiousness on individual-level job performance (Witt, Burke, Barrick, & Mount, 2002; Chowdhury & Amin, 2006). For example, Witt and colleagues (2002) concluded

that “highly conscientious workers who lack interpersonal sensitivity may be ineffective, particularly in jobs requiring cooperative interchange with others (pg. 164).” The majority of the impact of the personality trait of agreeableness clearly appears to be in social contexts; yet, it should not be dismissed in individual-focused contexts that require social interaction. I now review research and findings of personality at the team-level of analysis.

Team-Level Personality Research

Personality effects in teams are studied within the group composition framework which focuses on how team member characteristics impact team processes and outcomes. Much like a chemist studying the elements of a physical substance, researchers interested in groups and teams seek to understand the characteristics of the elements that make up a team and how these elements interact to impact processes and outcomes. In viewing the history of group composition research, McGrath (1998) noted that composition research is less studied than it should be and is scattered among many domains. He indicated four types of composition variables that make up different areas within this field. First, the knowledge, skills, and abilities that members bring to the team. Second, the values, beliefs, and attitudes of team members. Third, the personality, cognitive and behavioral styles of team members. Fourth, the demographic characteristics of the members such as race, age, and sex. Composition research has been dominated by demographic and knowledge diversity despite a large personality literature showing effects of team member personalities on teams (Moynihan & Peterson, 2001). In order to study personality in teams some form of aggregation must be used to understand the inherently

individual phenomena of personality at the team level (Klein & Kozlowski, 2000; Stewart, 2003).

Various aggregation methods are possible depending on the characteristics of the team's task. Steiner (1972) proposed that team tasks can be disjunctive, additive, compensatory, or conjunctive. A disjunctive task implies that the team needs only one key member that ranks high on the critical input. An additive task implies that the ultimate outcome is dependent upon the summation of the inputs from each member. A compensatory task relies on the averaging of diverse inputs. Finally, a conjunctive task implies that no member can compensate for any other member and hence the ultimate outcome is dependent upon the weakest link in the team (Stewart, 2003). Due to the differences in each task type, unique methods of aggregating individual personality in order to represent team personality are required. For additive tasks the average or mean is appropriate given the pooled nature of its inputs. For a disjunctive task the high score from the team is suitable because the team only needs one really strong member. For a compensatory task the variance is most suitable because of the need for a wide range of inputs. Finally, for a conjunctive task the minimum score of a team is the correct method of aggregation because it's the lowest or weakest team member that matters. Most researchers use the average of personality scores to operationalize team personality. However, as will be shown, other strategies are important in certain contexts.

In addition to the previous findings that agreeableness influences social interaction variables important in team processes (e.g., cooperation and conflict), research shows that agreeableness influences team performance as well. For instance, Barrick, et al. (1998) found that the average level of agreeableness of work teams is related to team

performance. In addition, Neuman, Wagner, & Christiansen (1999) found that agreeableness was the strongest predictor of all FFM traits of supervisor rated team performance. Also, Halfhill and colleagues (2005) found that average agreeableness was related to supervisor ratings of team performance for intact military service teams. Hence, research suggests that agreeableness relates to team performance.

While the overwhelming majority of past research on personality in teams uses the average of member's personality scores to represent team personality (Halfhill, et al, 2005), calls are coming forth to more fully pursue the pattern of personalities in teams. For example, McGrath (1998) noted that "Whatever the program of research used to explore the expanded conception of group composition...it must recognize that composition effects derive from patterns of relations among attributes over time – not just the sum or average amounts of those attributes (pg. 269)." By using other aggregation strategies to study personality, such as the high or low score on a team, a broader understanding of the nature of personality in teams can emerge.

Very few studies use pattern representations to better understand personality in teams. However, studies are now accumulating given the recent calls to use broader aggregation strategies. The most common alternatives to the use of averages to represent team personality appear to be the use of variances to indicate the spread of a certain trait in a team, or the use of a minimum team member score on a trait. The use of the variance of personality allows researchers to understand how the range on certain personality dimensions impacts processes and performance while the use of a minimum score allows detection of a team's weakest link or "bad apple." A few studies have calculated variances when studying personality effects in teams. For example, Barrick, et al. (1998)

found that for intact work teams, more variance on agreeableness translated into less social cohesion, less communication, and less workload sharing. In addition, others have found that more variance on agreeableness translated into worse team performance (Halfhill, et al., 2005; Mohammed & Angell, 2003). These results show that all members on a team should be agreeable. In addition, research on the minimum score of agreeableness in teams shows that one person who is very disagreeable damages the performance of the team. While the preceding findings relate to the positive end of agreeableness, the following findings relate to disagreeableness.

Disagreeableness

The findings on the minimum score of agreeableness demonstrate quite clearly that teams with one highly disagreeable team member have poorer performance than teams without such a “bad apple.” Recent meta-analytic evidence shows that one highly disagreeable member damages the performance of the team (Bell, 2007). In addition, four separate author teams have replicated the finding that the minimum team member score on agreeableness (indicating a highly disagreeable team member) relates positively to team performance (Barrick, et al, 1998; Neuman & Wright, 1999; Van Vianen & De Dreu, 2001; Halfhill, et al., 2005). The damage to team performance of a disagreeable member is indicated by a positive relationship between the minimum score and team performance because the more disagreeable this person is (or the lower the minimum score), the lower the team’s performance. In addition, two other author teams have shown that the minimum team member score on agreeableness is positively related to important team process behaviors that mediate the impact of inputs on outcomes in teams (Chatman & Barsade, 1995; Bolin & Neuman, 2006). I will now review all six articles.

Barrick and colleagues (1998) studied 51 intact maintenance teams and teams that assembled small appliances and electronics. They found that the minimum agreeableness score related positively to (indicating that the disagreeable team member damaged) supervisor ratings of team performance ($r = .32$). They also found that the minimum score related positively to social cohesion ($r = .38$), communication ($r = .50$), and workload sharing ($r = .62$). It also related negatively to team conflict ($r = -.51$), indicating that teams with a highly disagreeable team member were far more likely to engage in team conflict.

Neuman and Wright (1999) studied 79 intact human resource teams from a large wholesale department store organization. They found that the minimum agreeableness score related positively to (again, indicating that the disagreeable team member damaged) task performance ($r = .36$), interpersonal skills ($r = .39$), and work completed ($r = .37$).

Halfhill and colleagues (2005) studied 47 intact U.S. military service teams. They found that the minimum agreeableness score related positively to (again, indicating that the disagreeable team member damaged) the performance of the team ($r = .37$) as rated by their supervisor.

Van Vianen and De Dreu (2001) aimed to replicate findings from Barrick, et al. (1998) using a sample of 24 drilling teams in the U.S. and 25 student teams in the Netherlands. They found that the minimum agreeableness score related positively to (again, indicating that the disagreeable team member damaged) supervisor ratings of team performance ($r = .19$) and self-ratings of task cohesion ($r = .32$). Although only the relationship on task cohesion was significant, the small sample size could have played a role in not detecting the correlation of .19 as technically significant.

In addition to these four articles finding that a highly disagreeable person damages the performance of a team, two articles have shown that a disagreeable person damages important team processes as well. Chatman & Barsade (1995) studied 139 MBA students' dispositions in terms of agreeableness and the impact it had on cooperative behavior as rated by coworkers. Across three measures of cooperative behavior, they found that less agreeable people cooperated less. They concluded that "these perspectives paint a picture of people with a cooperative disposition as motivated to understand and uphold group social norms, satisfied by group interaction, and expecting cooperative behavior from others (pg. 427)."

In addition, Bolin & Neuman (2006) studied 78 four person teams engaged in a lab experiment on brainstorming activity in teams. They found that the minimum agreeableness score related negatively to group social loafing indicating the disagreeable team member contributed to this counterproductive behavior. This process variable has long been studied in social psychology and has been found to negatively impact the performance of small groups. However, the authors did not find that a team's minimum agreeableness score related to performance measures of quantity and quality of ideas generated in the brainstorming task. They speculated that this was the case because of the additive nature of the brainstorming task indicating that the best aggregation measures in this study were means not minimum scores.

The findings of agreeableness in team settings clearly indicate that agreeableness improves the functioning and performance of teams and that a team will suffer when the team has one highly disagreeable member. But why does the bad apple spoil the team? To answer this question I will first construct a profile of disagreeableness which will

show that the disagreeable teammate is the essence of an “anti-team player.” I will then integrate this profile with the theoretical models of the bad apple phenomenon in teams (Felps, et al, 2006), affective events theory (Weiss & Cropanzano, 1996), and psychological stress (Lazarus, 1991) to argue that the intermediary mechanisms linking the bad apple to team performance are team affective reactions, team defensive behaviors, and team processes.

The Profile of Disagreeableness

To understand how a disagreeable team member negatively impacts team processes and performance it is necessary to gain a deeper understanding of disagreeableness, which is the negative side of agreeableness. In order to do this I will review the personality literature on the FFM for descriptions of the high and low end of agreeableness to construct a profile of disagreeableness. The majority of descriptions are from the positive perspective; however, some authors describe the opposite end of the agreeableness dimension as well. For example, Digman (1990) describes the low end of agreeableness (disagreeableness) as hostility, indifference to others, self-centeredness, spitefulness, and jealousy while Goldberg (1993) describes it as hostility, selfishness, and distrust. A useful starting point in constructing this profile is Costa and McCrae’s revised NEO personality inventory, the NEO-PI-R, and corresponding manual.

Costa and McCrae (1992) list six sub-facets of agreeableness according to the NEO-PI-R which are as follows: trust, straightforwardness, altruism, compliance, modesty, and tender-mindedness. According to the authors, low scorers on the trust facet tend to be cynical and skeptical and assume that other people may be dishonest or dangerous. Low scorers on the straightforwardness facet are more willing to manipulate

other people through flattery, craftiness, or deception. Low scorers are not necessarily dishonest but they view these tactics as necessary social skills and tend to regard more straightforward people as naïve. Low scorers on the altruism facet tend to be more self-centered and reluctant to get involved in the problems of others. Low scorers on the compliance facet are aggressive, they prefer to compete rather than cooperate, and don't shy away from expressing anger when seen as necessary. Low scorers on the modesty facet consider themselves superior and tend to be seen as conceited or arrogant. This pathological lack of modesty is related to narcissism. Finally, low scorers on the tender-mindedness facet are more hardheaded than others and less moved by pity.

Costa and McCrae (1992) also list adjectives that correlate with the NEO-PI-R facets of agreeableness. (The negative sign, -, indicates a description of a disagreeable person.) Adjectives relating to trust are forgiving, warm, sociable, cheerful, -aloof, affectionate, and outgoing. Adjectives relating to straightforwardness are -complicated, -demanding, -clever, -flirtatious, -charming, -shrewd, and -autocratic. Adjectives relating to altruism are warm, soft-hearted, gentle, generous, kind, tolerant, and -selfish. Adjectives relating to compliance are -stubborn, -demanding, -headstrong, -impatient, -intolerant, -outspoken, and hard-hearted. Adjectives relating to modesty are -show-off, -clever, -assertive, -argumentative, -self-confident, -aggressive, and -idealistic. Finally, adjectives relating to tender-mindedness are friendly, warm, sympathetic, soft-hearted, gentle, -unstable, and kind. From these descriptions it seems reasonable that the opposite of the agreeableness facets are as follows: distrust (trust), complicated (straightforwardness), self-centered (altruistic), noncompliance (compliance), arrogance (modesty), and indifference (tender-mindedness).

In addition to the analysis of the NEO-PI-R facets of agreeableness and a consideration of their ‘opposites,’ I also reviewed the literature to make a list of adjectives used by personality researchers to describe agreeableness. I then qualitatively analyzed the list to come up with a set of categories that summarize the descriptions. I scanned additional articles and listed the positive and negative descriptors of agreeableness found in these articles (Digman, 1990; McCrae & Costa, 1996 and 1997; Barrick & Mount, 1991; Goldberg, 1993) or any of the articles reviewed previously under the sections of team personality and agreeableness. The list was dominated by positive descriptors of agreeableness such as considerate, courteous, flexible, supportive, tolerant and cooperative; however, negative descriptors were given in the literature as well such as hostile, spiteful, and ready to express verbal aggression. From the positive descriptors I inferred a likely opposite and added these inferred opposites of agreeableness descriptors to the reported negative descriptors. After eliminating duplicate descriptors the list contained 40 adjectives. I then analyzed the list for categories in which to organize the large amount of adjectives and came up with five categories of descriptions.

The five categories that emerged and their adjectives are listed in Appendix C. The categories and their adjective descriptors are as follows. Hard-hearted (indifferent, uncaring, thoughtless, inconsiderate, unkind, cold, unsociable, unfriendly, unlikable, hard-hearted, unpleasant, and ill-natured). Hard-minded (inflexible, stubborn, uncooperative, noncompliant, harsh, rough, dominance, arrogance, narrow-minded, and impatient). Mean (hostile, spiteful, quarrelsome, hurtful, aggressive, rude, vengeful, relationship conflict). Insecure (paranoid disposition, suspicious, jealous, distrustful,

complicated, emotionally unstable, and insecure). Selfish (unforgiving, ungrateful, pessimistic, tightfisted, self-centered, and selfish).

Comparing the inferred opposites of the six agreeableness facets of the NEO-PI-R with the five categories derived from an analysis of stated and inferred descriptors of the low end of agreeableness (disagreeableness) reveals some interesting points. First, I connected the most likely corresponding categories as follows, with the ‘negative’ categories derived from the ‘positive’ NEO-PI-R facet listed first. Costa and McCrae’s (1992) facet of distrust (trust) appears to correspond to my category of insecure, complicated (straightforwardness) appears to correspond to hard-minded, self-centered (altruism) appears to correspond to selfish, noncompliance (compliance) also appears to correspond to hard-minded, arrogance, (modesty) appears to correspond to hard-hearted, and indifference (tender-mindedness) appears to correspond to my category of mean. Second, my category of hard-minded appeared to correspond to both the complicated (straightforwardness) and noncompliance (compliance) facets on the NEO-PI-R. The final point of interest is the NEO-PI-R facet of tender-mindedness. I concluded that its opposite is “indifference” which characterizes a neutral position; however, this facet corresponded to the “mean” factor derived from the literature search which clearly indicates a negative, not neutral, position. This factor may be of particular importance to understanding how a highly disagreeable person behaves and ultimately damages team performance. Going forward I will use the five categories listed in Appendix C as the basis of the profile of the disagreeable person because they related well to the NEO-PI-R derived negative facets. In order to train a confederate to consistently enact these behaviors within a lab setting I will, in the methods chapter of this paper, extend this

profile to establish characteristic attributes of the disagreeable team member using the structure of the lab design and the proposed task.

The profile of disagreeableness begins to indicate that this trait is destructive in social settings like teams because of the way others react to the bad apple. To understand how team members react to disagreeableness it is helpful to look at work on attributions of poor performers. For example, LePine and Van Dyne (2001b) argued that team members react differently to different types of poor performers. Members tend to be empathetic toward a poor performer who appears to lack intelligence because this shortcoming is seen as out of the person's control. On the other hand, members tend to be angry toward a poor performer who appears to lack conscientiousness because this shortcoming is seen as more controllable. Team members of a disagreeable person are more likely to see these negative behaviors as controllable and thus their affective reactions are likely to be negative (Felps, et al, 2006). Team members will likely react by feeling threatened, upset, stressed, nervous, and tense (Barrett & Russell, 1998) which will lead to defensive behaviors such as lashing out and withdrawal. In time, these negative affective reactions should also damage the process and performance of the small group.

The presence of disagreeableness damages the heart of team dynamics which are the positive affective states and harmonious interactional processes of team members. Disagreeable teammates are self-oriented as opposed to collective-oriented, they are emotionally unstable, and they don't trust their teammates. These individual behaviors tend to increase negative affect and defensive behaviors like lashing out and withdrawal. Disagreeable teammates are also rude and unforgiving and treat teammates in mean and

hurtful ways which diminishes the sense of cooperation and sharing in teams. Finally, they are inflexible, uncooperative, and arrogant which further damages team affective states and behavioral processes. Other team members will likely consider these behaviors as controllable, expect them to eventually change, and get more frustrated when they don't. This picture paints a highly disagreeable member as the essence of an "anti-team player" because s/he enacts the opposite of team-oriented behaviors.

I now review research on the bad apple and focus on a recent theoretical model (Felps, et al, 2006) which argues that psychological reactions represent the first step in a bad apple impacting team performance. The theory goes on to argue that these reaction lead to defensive behaviors which in turn damage team processes. Thus, the bad apple spoils the team's performance because (a) other members respond with negative affective reactions and defensive behaviors and (b) these responses sabotage important team processes. After reviewing this research I will review affective events theory (Weiss & Cropanzano, 1996) and stress research (Lazarus, 1991) which contribute to the argument that the three intermediary mechanisms are team affective reactions, team defensive behaviors, and team processes.

Bad Apple Phenomenon

Using the term "bad apple" to describe a problem person on a team likely stems from the saying that 'the bad apple spoils the bunch.' This phrase typifies the focus of the current study which is to show how a highly disagreeable member damages team performance. Recent theoretical work on the bad apple phenomenon (Felps, et al, 2006) argues that state negative affect is a critical intermediary mechanism in explaining the damaging effect of one highly negative teammate on team outcomes. Before I review

this recent theoretical perspective I will review the use of the term ‘bad apple’ in the literature.

Although I use ‘bad apple’ to describe a highly disagreeable teammate, the term has been used to describe a number of types of people that can negatively impact the functioning of a small group. For example, groups containing a deviant as a bad apple tend to be rated by the group members as less cohesive (Wellen & Neale, 2006) and tend to have worse unit performance (Dunlop & Lee, 2004). In addition, Camacho and Paulus (1995) found that individuals with low levels of the beneficial characteristic of social anxiousness (similar to emotional stability from the FFM taxonomy) perform worse on a group brainstorming activity when team members are highly socially anxious. The authors concluded that personality factors of bad apples may account for productivity losses in interactive groups. Finally, bad apples have been studied from an ethical decision making standpoint with individual’s locus of control and cognitive moral development impacting the ethicalness of their decisions (Trevino & Youngblood, 1990; Ashkanasy, Windsor, & Trevino, 2006). However, given the importance of quality social interactions in teams characterized by meaningful levels of interdependence, one of the most promising avenues of understanding the bad apples in teams and how to deal with it is through the personality trait of agreeableness.

One of the most meaningful advances in the study of bad apples is the recent theoretical model proposed by Felps and colleagues (2006). Their model is presented in Appendix A and forms the foundation for the current study. The authors reasoned that psychological reactions such as negative emotions of other team members play a key role in linking a bad apple’s negative behavior to the team’s outcomes. They identified three

categories of difficult team member behavior which are especially likely to damage a team if left unchecked. Withholding effort, being affectively negative, and violating important interpersonal norms. The highly disagreeable person corresponds closely to the categories of 'being affectively negative' and 'violating important interpersonal norms.' They go on to describe the affectively negative person as continually expressing a negative mood or attitude, frequently exhibiting an awkward interpersonal style, and frequently expressing irritation, pessimism, anxiety, and insecurity. In addition, people that detract from the contextual environment by violating interpersonal norms are thought of as interpersonal deviants. They cite the work by Bennett and Robinson (2000) indicating seven deviant behavior types which they use to define this category. These categories are: making fun of someone, saying something hurtful, making an inappropriate ethnic or religious remark, cursing at someone, playing mean pranks, acting rudely, and publicly embarrassing someone. These behaviors are similar to the disagreeable profile discussed earlier.

The main consequence of having an affectively negative or interpersonal norm violator on a team appears to be the adverse impact on the affective states (emotions, moods, and strain) of other team members (Felps, et al., 2006). Maintaining the delicate social balance in teams is critical because interdependence requires members to interact and depend on each other to accomplish their work (Wageman, 2001). However, these bad apples spread their disagreeableness to others through emotional contagion processes, causing other members to experience negative affective reactions. The authors go on to argue that teammates react to a bad apple with defensive behaviors such as

explosions, revenge, or withdrawal. In time, these behaviors impact the performance of the team through team processes.

Because this theoretical model is so recent, the literature has not had adequate time to test and publish findings supporting or refuting it. However, the focus on a bad apple as a single team member that disrupts team dynamics and performance makes it the primary theoretical perspective that explains how the bad apple phenomenon occurs. They argue that the negativity of the bad apple impacts affective reactions of others through the process of emotional contagion. The authors go on to argue that as members react psychologically to the bad apple they counter with their own defensive behaviors. They may get angry with the bad apple, seek to undermine him or her, or withhold effort from the team. All these behaviors diminish healthy internal dynamics of the small group and eventually contribute to poorer team performance (Felps, et al., 2006). The contagious nature of emotions allows negative affect to spread from a bad apple to the rest of the team. Thus, before I discuss the construct of affect, affective events theory (Weiss & Cropanzano, 1996), and stress research (Lazarus, 1991) I will review the nature of this spreading phenomenon known as emotional contagion.

Emotional Contagion

“The emotional display of a person may be the stimulus that triggers emotions in other people (Arvey, Renz, & Watson, 1998, pg. 130).” Thus, negativity from a highly disagreeable team member spreads to other teammates and impacts their state affective, and ultimately the team’s performance. Tyler (2004) stated that bad apples are “like a cancer that spreads throughout the entire workplace (pg. 77)” not only “making the supervisor’s life miserable, [but] also making the other employees miserable (pg. 79).”

This spreading process of emotions in social situations is known as emotional contagion and Schoenewolf (1990) defined it as “a process in which a person or group influences the emotions or behavior of another person or group through the conscious or unconscious induction of emotion states and behavioral attitudes (as quoted in Barsade, 2002, pg. 50).” In order for a target individual to spread disagreeableness to others, the other team members must perceive the negative emotions and/or behavior. Perceiving occurs mostly through nonverbal signals such as facial expression, body language, and tone. From here, the emotional contagion process contains two main parts. First, other team members tend to subconsciously mimic the perceived behavior which is known as primitive emotional contagion. It can manifest itself in similar responses such as people smiling, or as complementary responses such as feeling scared when someone yells in anger. Evidence also shows that mimicry leads others to experience the effects of the emotion as well (Barsade, 2002).

Second, more conscious emotional comparison occurs with cognitive processes such as judgment and appraisal by the impacted persons. Teammates appraise the situation by assessing the personal significance, or how they will be impacted. In some instances the disagreeable teammate may pose little threat or challenge to team processes and outcomes valued by team members, but in other instances the challenge of coping with this bad apple will put team dynamics and performance in real jeopardy (Hatfield, Cacioppo, & Rapson, 1994). Finally, the level of contagion depends on the attentional processes others give to the target or person spreading the affective state. More interdependence among team members means they must give more attention to the disagreeable person.

Evidence exists that peoples' emotions, or affective states transfer to other members of the team (Barsade, 2002; Totterdell, Kellett, Teuchmann, & Briner, 1998; Totterdell, 2000; Sy, Cote, & Saavedra, 2005; Neumann & Strack, 2000). For example, Barsade (2002) found that positive emotional contagion, by way of an increase in positive mood, lead to greater cooperativeness, less group conflict, and higher ratings of task performance. She concluded that people are "walking mood inductors, continuously influencing the moods and then the judgments and behaviors of others (pg. 667)." Totterdell and colleagues (1998) found a significant association between the team's mood and that of individual team members and concluded that people's mood at work becomes linked to the mood of their teammates. Totterdell (2000) also found that the subjective performance of professional athletes was associated with the collective happy mood of their teammates, even after controlling for hassles and favorable standing in the match. Thus, the evidence on emotional contagion shows that positive behavior and emotions of team members are likely to transfer and impact the affective states of other members of the team. However, evidence exists that negative behavior is more contagious than positive behavior.

Various authors have theorized and found that negative emotions of team members are more contagious and more strongly impact others than positive emotions (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Gersick, Bartunek, & Dutton, 2000). Bartel and Saavedra (2000), for example, found that work groups were more likely to converge toward unpleasant moods than towards pleasant moods. Labianca and Brass (2006) found that negative relationships are rare (between 1% and 8% of all relationships studied) but they have a greater impact on job satisfaction and

organizational commitment than do positive or neutral associations. Dunlop and Lee (2004) found that counterproductive behaviors explained a lot more variance in subjective and objective work group outcomes than did OCBs, leaving them to conclude that competitive behavior is more contagious than cooperative behavior. Finally, in arguing why a negative team member has such an asymmetric effect on team processes and outcomes, Felps and colleagues (2006) concluded that indeed, bad is stronger than good. Thus, research indicates that negative emotions from one team member are likely to spread to the other teammates. As the members of the team experience these negative affective reactions the team processes are damaged as well.

The emotional contagion process represents the avenue by which a highly disagreeable teammate impacts a team. These bad apples spread negative emotions to others causing them to experience negative emotions and shift resources from accomplishing tasks to dealing with the bad apple and their own negative emotions. This shift in resources from task to maintenance efforts takes capacities such as time, effort, motivation, and stamina away from performance behaviors resulting in poorer performance for these teams. Having reviewed the research on emotional contagion I now review the general research on affect and emotions and then review three theoretical perspectives that argue that affect mediates the impact of a disagreeable person on team performance: affective events theory (Weiss & Cropanzano, 1996), stress research (Lazarus, 1999), and a recent theory about the bad apple phenomenon (Felps, et al., 2006). These theoretical perspectives form the underpinnings of my argument that team affective reactions represent the first step in linking a bad apple team member to team performance.

Affect in Organizations

“Affect permeates organizations. It is present in the interdependent relationships we hold with bosses, team members, and subordinates. It is present in deadlines, in group projects, in human resource processes like performance appraisals and selection interviews. Affective processes (more commonly known as emotions) create and sustain work motivation. They lurk behind political behavior; they animate our decisions; they are essential to leadership. Strong affective feelings are present at any time we confront work issues that matter to us and our organizational performance (Barsade & Gibson, 2007, pg. 36).”

The preceding quote from a recent review of affect clearly portrays affect as an important part of an employee’s organizational life, especially in small group settings where task and outcome interdependence require members to interact and depend on each other to get work done. The beginning of the study of affect in the modern era started with such seminal work as Hersey’s (1932) study of the emotional reactions of workers and the ensuing effects of emotional experiences on the workers and their productivity. But, after this great beginning the study of affect was relegated to an implicit place within the study of job satisfaction (Weiss, 2002). However, the last 30 years has seen what many scholars have called an “affective revolution” as the phenomena has been lifted up to the status previously enjoyed only by cognition and motivation (Barsade & Gibson, 2007; Kanfer & Klimoski, 2002). In hindsight, this rebirth (Weiss, 2002) was inevitable, given the critical role of affect (i.e., emotional experiences) in home and work life.

The nature of affect is complex because “affect can be thought of as an umbrella term encompassing a broad range of feelings that individuals experience (Barsade & Gibson, 2007, pg. 37).” In their review of affect, Barsade and Gibson (2007) indicate that the four general categories of affect are meta-emotional abilities, dispositional traits, moods, and discrete emotions. Meta-emotional abilities include such topics as emotional

intelligence and emotional regulation (Gross, 1998). Dispositional traits refer to the tendency of an individual to experience positive or negative emotions. The terms trait positive or negative affect are often used to describe these general dispositions (e.g., Barsade, Ward, Turner, & Sonnenfeld, 2000). While dispositions are stable within and individual and across time affective states such as moods and emotions are not.

According to Weiss and Cropanzano (1996) moods are differentiated from emotions according to the intensity, duration, and diffuseness of the affective state. Moods are less intense, last longer, and lack specificity (e.g., Bartel & Saavedra, 2000). Often, more general terms such as happy or sad, or positive or negative are used to characterize mood. On the other hand, discrete emotions would include feelings such as love, joy, and excitement or anger, sadness and anxiety (e.g., Brown, Westbrook, & Challagalla, 2005). Thus, affect includes not only meta-emotional abilities and traits, but also moods and emotions.

Affect plays an important role in the team with a highly disagreeable member because the source of negative affective reactions is clear. The object on which the negative affective states of the other team members are focused is the disagreeable team member. Frijda (1993) argues that the specificity of the source of affect is the most important component that distinguishes mood and affect. Thus, given the specificity of the disagreeable team member, emotions rather than moods appear to be the most important type of affective state in this context.

Emotion is most often thought of as a type of affect. Despite the ubiquity of emotions in daily life and in the literature, the concept has been notoriously difficult to define. In explaining why this task has been so difficult Weiss (2002, pg. 23) stated that

“part of the problem is that emotion is not really one thing but a constellation of physiological, subjective, and behavioral responses that cohere as a unified construct.” Some discuss the multidimensional nature of emotion in terms of the “response system coherence” assumption which refers to the association of a person’s physiological, experiential, and behavioral responses as the emotion unfolds over time. The assumption has been supported empirically (Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005) although critics remain. Thus, while affect has four broad categories as outlined earlier, it is widely understood that emotion has multiple components as well.

Four specific components have been argued as encompassing the various aspects of emotion, or emotional experiences (Frijda, 1993; Weiss & Cropanzano, 1996). First, the experiential, non-cognitive component of affect. This piece is the feeling component which corresponds generally to the term ‘affect.’ Second, the cognitive appraisal of the event, which is believed to be a part of the conceptual structure of emotions (Weiss, 2002). A person experiencing an emotion, or feeling, cognitively assesses the context in terms of personal meaning and what can be done to cope with the situation (Lazarus, 1999). Third, the wide variety of physiological bodily changes that co-occur with emotional experiences (Cacioppo, Bernston, Larsen, Poehlmann, & Ito, 2000). These include the release of cortisol in the body’s nervous system. Fourth, an action readiness which is a general readiness to deal or cope with the environment through increased arousal and vigilance. Frijda (1993) describes this action readiness as action tendencies or coping resources, and argues they represent the motives for behavior to cope with the emotional event. Even though there is widespread agreement on the multi-component nature of emotion, and that an emotional experience includes these four elements

(Barsade & Gibson, 2007; Cote, 2005; Arvey, et al., 1998), the experience or feeling of emotion, sometimes referred to as core affect (Seo, Barrett, & Bartunek, 2004) or affect proper (Frijda, 1993), is the heart of the emotional experience and has been the focus of most research on emotions.

‘Core affect’ is emerging as a useful unit of analysis of the broad emotion-related phenomena (Russell, 1979; 1980; Frijda, 1993; Seo, et al., 2004). Seo and colleagues (2004) conclude that “core affect is the appropriate place to start thinking scientifically about emotion-related phenomena, because it is the “core” of all emotion-laden events. It is what makes an event “hot” or “emotional” (pg. 424).” The authors go on to define core affect as “momentary, elementary feelings of pleasure or displeasure and of activation or deactivation (Seo, et al., 2004, pg. 424).” This definition points out its two dimensions, namely pleasantness versus unpleasantness and activation versus deactivation. Russell (1980; Barrett & Russell, 1998) has long argued that core affect is best represented with a circumplex model with pleasantness and unpleasantness situated on the X axis and activation and deactivation situated on the Y axis. Although the bi-dimensional view of affect is by no means universally accepted (for example, Tellegen, Watson, & Clark, 1999) its premise and corresponding circumplex model are widely advocated (i.e., Weiss, 2002). The circumplex model, depicted in Appendix D, illustrates that various specific emotions lie between these poles. The affective reactions of teammates of a highly disagreeable person are likely unpleasant and activated. The corresponding emotions are upset, stressed, nervous, and tense. These emotions, then, should be characteristic of the reactions of teammates to the bad apple. Thus, following

guidance in the literature I will use core affect as the construct representing affective reactions in the model because it is the heart of emotional experiences.

Although I will use core affect to represent affective reactions, research on discrete emotions is worth mentioning. In contrast to the study of core affect which studies affect at a very general level (only two dimensions or factors) others study affect by focusing on specific, discrete, or basic emotions. This perspective assumes that there are a set of basic emotions such as happiness, sadness, fear, anger, and disgust and that all emotional experiences are built from these building blocks and their interactions with cognitions (Frijda, 1993). This perspective also searches for differential causes, covariations, and consequences of these unique emotions. One challenge of this perspective is the never-resolved issue regarding which emotions are basic. Various authors have lists ranging from five or six to ten or even fifteen basic emotions (Eckman, 1982; Izard, 1977; Plutchik, 1994). Although the search for unique causes and consequences of elemental emotions can be useful, this study's purposes warrant the use of a general conception of affect, that is core affect.

Although the research and theory on affect is substantial, one of the most important limitations in this body of research is the lack of work on affect in teams. For example, in their review on affect Barsade & Gibson concluded that

“there are few studies examining how affect operates as an explicit factor within team development, behavior, and outcomes. This is surprising given that in the process of getting work accomplished, groups offer a prime place for intense interactions involving individuals with their own emotional histories, emotional agendas, and affective personalities confronting positive and negative group events (Barsade & Gibson, 2007, pg. 49).”

I integrate research on disagreeable teammates with the need to better understand how affect functions in teams by arguing that disagreeable teammates impact the affective states of their teammates. In addition to the theoretical model of the bad apple phenomenon (Felps, et al, 2006) two other theories and their findings suggest that a highly disagreeable teammate will impact the affective states of the other team members: affective events theory (Weiss & Cropanzano, 1996) and stress research (Lazarus, 1999). I will now review each perspective, integrate the disagreeable profile into key elements from each to finalize my argument, and then formally state the hypothesis that having a highly disagreeable teammate will lead to negative team affective reactions. Following this section I will discuss the role of defensive behaviors in response to these negative emotional experiences, the role of team processes in determining team performance, and finally that the amount of interdependence among teammates should moderate the impact of the bad apple on team affective reactions (see the proposed model in Appendix B).

Affective Events Theory

As previously mentioned, research on emotions in teams has increased over the last decade (Kanfer & Klimoski, 2002; Lazarus, 1999) with one of the more highly used frameworks being affective events theory (Weiss & Cropanzano, 1996). This theory provides a plausible explanation of how a highly disagreeable team member negatively impacts team performance – that is through the affective reactions of other team members. The model proposed by Weiss and Cropanzano is depicted in Appendix E. In addition to the theoretical model of the bad apple phenomenon (Felps, et al, 2006), this theory will help guide the study of moderators on the effect of a highly disagreeable team member.

Affective events theory (AET, Weiss & Cropanzano, 1996) holds that work events are the proximal causes of affective reactions. People experience various types of stressful events at work and react to them. Events can range from a passed promotion, to failure on a project, to a difficult coworker. In teams with a highly disagreeable member, team members must interact with the bad apple because of the interdependence that requires members to interact and depend on each other for information, motivation, and support. This interaction can be seen as a negative work event or rather a series of negative work events. The daily interactions likely cause teammates to experience negative emotions that emanate from the bad apple. Hence, I propose that a highly disagreeable team member impacts the affective reactions (i.e., core affect) of other team members that must work with the disagreeable member.

In addition to a large empirical literature, AET has influenced other theoretical perspectives. These other theories likewise propose that affect is a critical mediator variable. Within the management literature, Ballinger and Schoorman (2007) theorize that the relationship quality with previous leaders should impact employee affective reactions to leadership succession which should then impact job satisfaction, turnover, trust, task commitment, OCBs, and motivation to perform. In addition, Kane and Montgomery (1998) reason that disempowerment is a process where work events lead to affective responses which impacts attitudes and behaviors and then lead to individuals task motivation. Finally, researchers in fields beyond management have also used the affective events framework. For instance, researchers in the field of marketing incorporated the framework with aspects of two other theories to better explain consumer responses to organizational mishaps (Hartel, McColl-Kennedy, & McDonald, 1998).

The research on affective events theory (AET) is vast and the findings largely supportive. As of 6/13/08 the article advancing AET (Weiss & Cropanzano, 1996) has been cited 216 times. Many results support the main hypotheses that affective reactions mediate the impact of work events on behavioral and attitudinal outcomes. To review this vast research I will first review findings within the AET framework that support the assertion that affective reactions are the proximal outcomes of work events. Second, in order to comprehensively review the theory, I will briefly discuss other relationships and findings within the framework. For example, that affect mediates the relationship between work events and job attitudes (i.e., job satisfaction) and findings that work environmental factors impact work events and work attitudes. Although these final linkages in the theory fall outside the scope of the current study, they are assessed in order to provide a more comprehensive review of AET.

Various authors have continually found that negative work events lead to employees' negative affective reactions (Brown, et al, 2005; Zohar, Tzischinski, & Epstein, 2003; Miner, Glomb, & Hulin, 2005; Fuller, Stanton, Fisher, Spitzmuller, Russell, & Smith, 2003; McColl-Kennedy & Anderson, 2002; Pirola-Merlo, Hartel, Mann, & Hirst, 2002). Negative events like interpersonal work conflict (Lubbers, Loughlin, & Zweig, 2005), unfair treatment of a coworker (Wiesenfeld, Brockner, & Martin, 1999), experiencing an organizational acquisition (Scheck & Kinicki, 2000), being laid off (Barclay, Skarlicki, & Pugh, 2005) or being passed for a promotion (Schaubroeck & Lam, 2004) have all been shown to lead to negative affective reactions of employees. For example, Brown and colleagues (2005) studied the sales force of two

industrial firms and found that losing a major sale impacted the emotions of those experiencing the event.

Lubbers and colleagues (2005) studied full time workers and found that interpersonal conflict among coworkers lead to those employees experiencing negative emotional reactions. Also, Pirola-Merlo and colleagues (2002), studied intact R&D teams over five months and found that negative events, or obstacles, such as technical problems, staff availability, and team member relationship problems negatively impacted the teams' affective climate. Finally, Schaubroeck and Lam (2004) studied promotions among bank tellers and found that tellers who expected to be promoted but were not (constituting a negative work event) reacted with envy – a negative affective reaction. Given these findings, it is clear that “in small groups and teams, the teamwork may be altered....In essence, the emotional display of a person may be the stimulus that triggers emotions in other people (Arvey, et al, 1998, pg. 130).” Thus, affective reactions have been found to be proximal outcomes of negative events at work. These findings support the argument that experiencing a disagreeable teammate acts as a work event that impacts the affective states of others. Before reviewing stress research, which also argues that the bad apple impacts affective reactions, I will quickly cover other AET relationship to fully review the theory.

Other AET Relationships

AET also argues that dispositions have a direct impact on affective reactions and also affect how work events impact these reactions. For example, neuroticism, which is closely related to trait negative affect (Meyer & Shack, 1989; Watson & Clark, 1984), has been found to increase the experience of stress during a difficult exam (Bolger,

1990). In addition, work environmental factors are considered to make events more or less likely but are not considered to have direct effects on affective reactions. These affective reactions then lead to attitudes such as job satisfaction which, the theory argues, is not affect but rather a positive or negative evaluative judgment of one's job or job situation. This attitude then impacts judgment driven behaviors where more thought tends to go into the behavior.

Not only does AET assert that affective reactions mediate the impact of work events on behaviors but also that it mediates the impact of work events on job attitudes. This linkage in the theory is not a key part of the current study but findings are briefly reviewed for completeness. The most widely studied attitude outcomes within the AET framework are job satisfaction and commitment. For example, Fuller and Colleagues (2003) incorporated a daily diary method with university employees and found that stressful events such as remodeling the office or covering for an absent coworker impacted the strain employees perceived. Strain then impacted the level of satisfaction the employees had in their jobs. In addition, Mignonac and Herrback (2004) studied managers and found that the impact of work events on job attitudes was mediated by affective reactions. They found that employees experiencing such events as receiving an undesired assignment or problems getting along with coworkers were more likely to experience a negative affective reaction and that those affective reactions had a subsequent impact on job satisfaction and organizational commitment. Others have also found a link between affective reactions and job satisfaction (Judge & Ilies, 2004; Fisher, 2000) and commitment (Herrback, 2006; Wegge, Van Dick, Fisher, West, & Dawson, 2006). Finally, Cole, Bruch, and Vogel (2006) studied employees at a medical

technology company and found that during an organizational crisis, employees' negative emotions impacted cynical attitudes toward the organization.

Work environmental factors have also been found within the AET framework to impact work events and work attitudes. This linkage in the theory is also not a key part of the current study but findings are briefly reviewed for completeness. For example, Saavedra and Kwun (2000) found that various job characteristics impacted affective states. Studying managers in multiple organizations they found evidence that task significance and task autonomy had a positive impact on activated pleasant affect and that task identity and task feedback had a negative impact on activated unpleasant affect while skill variety had a positive impact on activated unpleasant affect. In addition, Wegge and colleagues (2006) studied call center representatives and found that work features such as participation, autonomy, and welfare impacted affective reactions (positive and negative moods) which then had an impact on job satisfaction and commitment. Others have found support for the assertion that features of the work environment impact work events and work attitudes (Giardini & Frese, 2006; Judge, Scott, & Ilies, 2006). In addition to the theoretical model of the bad apple phenomenon offered by Felps and colleagues (2006) and affective events theory offered by Weiss and Cropanzano (1996), research on stress provides a third literature supporting the argument that a highly disagreeable teammate impacts the affective reactions of others on the team.

Stress Research

Research on stress in the workplace provides insight into how the bad apple damages teams because in interdependent contexts, interacting with the bad apple is stressful which causes teammates to experience strain. Weiss (2002) argued that stress is

a third subcategory of affect, in addition to mood and emotion. On the other hand, Lazarus (i.e., 1999) views stress as a subcategory of emotion (called stress emotions) and argued that, although the research on emotion and stress have unique literatures, the two are very similar phenomena and should be considered together. His foundational work on 'stress emotion' dates back to at least 1964 with the publication of "A Laboratory Approach to the Dynamics of Psychological Stress" in the *American Psychologist*. This work throughout the last four decades has contributed critical elements such as appraisal and coping to the understanding of affective or emotional experiences. I first review the traditional stimulus-response model. Second, I discuss appraisal and the importance of individual differences to the experience and assessment of stress-emotions. Third, I review findings in the stress literature that experiencing negative stress damages team processes and performance. Finally, I link these contributions to the current study and the impact of a bad apple within a team.

The majority of past research on stress has taken some form of the 'stimulus-response' approach to the study of stress (Cooper, Dewe, & O'Driscoll, 2001; De Jonge, & Dormann, 2006; Fox, Dwyer, & Ganster, 1993). The stimulus in stress research is often referred to as the stressor, or the object or person creating stress for others. On the other hand, the response is usually referred to as the stress response, or strain. It is in this stimulus-response, or stressor-stress reaction relationship that the stress literature contributes to the current study. Stressors can be physical like heat, exercise, or hunger or they can be psychological. Psychological stress defines an unfavorable person-environment relationship and social stressors, such as a highly disagreeable team member, become psychological stressors through interaction. In order for a person to

perceive a social situation as negatively stressful (i.e., distress), the person must appraise the situation as personally significant. This evaluative component of the experience of emotion is known as appraisal.

A discussion of stress emotions would be incomplete without examining appraisal because, as Lazarus (1999) stated, “the essence of emotion is how human relationships are appraised (pg. 69).” Lazarus (e.g., Lazarus & Folkman, 1984) has long argued for a cognitive mediation model as an alternative to the common stimulus-response perspective because of the importance of individual differences in peoples’ thoughts while experiencing stress emotion. This cognitive perspective places the organism between the stimulus and the response and argues that this stimulus-organism-response approach to the study of stress is critical to better understanding how, when, and why stressors translate into stress reactions. He states that “it is the meaning constructed by a person about what is happening that is crucial to the arousal of stress reactions (Lazarus, 1999, pg. 55).” Thus, the personal meaning of a potentially stressful situation, or the person’s appraisal of the situation, is a main indicator whether the person will perceive the situation as stressful. Appraisal is usually instantaneous and unconscious rather than deliberate and has two fundamental parts: primary appraisal which I discuss here and secondary appraisal which I discuss in the section arguing that affective reactions lead to defensive behaviors.

Primary appraisal refers to a person’s assessment of the relational meaning of a situation or event and refers to the person’s sense of the harms and benefits in a particular person-environment situation. Primary appraisal has three main components: goal relevance, goal congruence or incongruence, and type of ego involvement. People ask:

do I have a goal at stake, or are any of my core values engaged or threatened? If there is a stake, what might the outcome be? If not there is no stress reaction. If the stressful situation has personal significance for the individual the alternatives are harm/loss, threat, or challenge. Harm and loss refer to damage that has already occurred. Threat refers to the anticipation of harm that has not yet taken place but is imminent. Finally, challenge results from difficult demands that an individual feels confident about overcoming by effectively mobilizing and deploying coping resources. Lazarus states that “when the person-environment relationship is combined with the subjective process of appraising, we speak of relational meaning, which is centered on the personal significance of that relationship (Lazarus, 1999, pg. 61).” Hence, the core of primary appraisal is the personal meaning of the situation to the individual.

The heart of the model of the current study is the strain or experience of negative affect by teammates of a disagreeable person (See Appendix B for the model). As team members appraise the situation as personally significant the team’s tasks, goals, and rewards are put in jeopardy because the bad apple becomes a threat to team interactions and performance. This stressful experience translates into strain for individual team members as they experience negative affect and the demand to deal with the bad apple because team work is more interdependent than individual work. Thus, stress research helps elucidate that a bad apple ultimately impacts team performance by first causing teammates to experience strain or negative affective reactions, and this strain comes about as teammates appraise the bad apple as a personal threat.

Each of the three theoretical perspectives reviewed (the bad apple model, AET, and stress research) helps explain how bad apples begin to spoil the barrel. In

interdependent contexts, bad apples are appraised as threats to shared tasks, goals, and rewards (stress research) and team members react affectively to experiencing events filled with displayed negativity (AET). These emotional reactions are brought about through the processes of emotional contagion as team members of the bad apple observe the anti-team behaviors. The highly disagreeable person behaves in a rude, unpleasant, stubborn, and insecure way and members take in some of the negativity. In addition, teammates recognize that they must interact with and engage the bad apple because of the interdependent nature of the context. In time, anticipation of a threat becomes real as these exchanges play out, eventually damaging the processes and performance of the team. Thus, I conclude that the first step in the process of a highly disagreeable team member damaging the team will be the impact on the affective states of the other teammates. Formally stated:

Hypothesis 1: A highly disagreeable teammate will impact team affective reactions such that teams with a highly disagreeable teammate will have lower core affect, more members with increased cortisol levels, and lower team affective culture than teams that don't have a highly disagreeable teammate.

Defensive Behaviors

Negative “emotions have the power to interrupt existing actions, redirect attention, and initiate, direct, and sustain behaviors aimed at rectifying the underlying problem (Arvey, et al., 1998, pg. 111).” Thus, feeling negative emotions signals that things need attention and results in a shift of resources from task-focused efforts to maintenance-focused efforts as members react to and attempt to deal with the bad apple. According to Felps and colleagues (2006) these behavioral responses to the experience of negative emotions are “self-protective efforts to cope with a negative internal state (pg.

193).” Thus, they are defensive in nature and work to protect the team members from the effects of these negative emotions.

Felps and colleagues (2006) discuss six potential defensive behaviors that can be externally or internally focused. Internally focused defensive behaviors are similar to what the stress literature calls emotion-focused coping and include mood maintenance, denial, slacking off, and withdrawal. To maintain positive moods people may seek out positive social interaction at work or at home which, at the individual-level may be productive. However, at the team-level mood maintenance will often take precedence over task-focused efforts and thus shift resources from beneficial team functioning and task performance to mood maintenance efforts (Tice, Bratslavsky, & Baumeister, 2001). In addition, people may respond to the experience of negative emotions by denying the existence of the problem. Denial is seen as a primitive and desperate measure that will only protect the individual for a short period of time “because one can only override genuine emotions for so long (Felps, et al, 2006, pg. 195).” Also, people might slack off at work due to the energy given to dealing with the negative emotion. For example, one study found that feelings of anxiety, anger, or sadness tended to distract and demotivate employees (George & Brief, 1996). Finally, people may withdraw from full engagement in team activities due to the experiences of negative emotions caused by a bad apple. People may responded by ceasing voluntary efforts or refusing to help newcomers or colleagues (Pearson, Andersson, & Porath, 2000).

Externally-focused defensive behaviors are similar to what the stress literature calls problem-focused coping and include explosions, and covert revenge. When the source of frustration is clear, such as the case of the bad apple in teams, people may

respond by lashing out at the source of the negativity (Berkowitz, 1989). However, these explicit displays of defensive behaviors will likely cause more negative emotions and further damage the team because of the likelihood of retaliation from the bad apple. Also, people may respond to negative emotions through covert revenge. Morrill (1995) described subtle and ingenious ways coworkers responded to a bad apple by giving distorted files, false information, or even sending them off on 'wild goose chases.' However, these defensive behaviors also damage team processes and performance due to the redirected efforts and wasted energies. In addition to the bad apple theory arguing that affective reactions to a bad apple lead to defensive behaviors, the literatures on stress and affective events theory also suggest the same.

Stress Research

In addition to the importance of team members' affective reactions to the bad apple, the way a person copes with the negative emotional reactions plays an important role in linking the bad apple to team performance. Coping corresponds to defensive behaviors in the bad apple theoretical model (Felps, et al, 2006) and secondary appraisal paves the way for coping to occur. While primary appraisal is an assessment of the personal significance of a situation, secondary appraisal is a cognitive-evaluative process that refers to the evaluation of coping options and is focused on what can be done about a stressful person-environment relationship. It isn't coping but is usually the cognitive underpinnings for coping and corresponds to Frijda's (1993) idea of action readiness, or coping resources, from the emotions literature. Secondary appraisal has three basic issues to evaluate: blame or credit for an outcome, coping potential, and future expectation. A person asks: What can be done? Is it feasible? Am I capable of doing

that? What are its costs and benefits? This second type of appraisal indicates that when a situation is appraised as personally threatening, individuals respond by defending themselves in various ways. These defensive responses correspond to what the stress literature refers to as coping.

Coping has to do with the way people manage life conditions that are stressful. Lazarus and Folkman (1984, pg. 141) define coping as “constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person.” The two fundamental parts of coping are problem-focused coping and emotion-focused coping which relate to Felps and colleagues (2006) external- and internal-focused defensive behaviors. Problem-focused coping predominates when a person feels they can control the situation and refers to their attempts to change the relationship with the environment. For example, a teammate may confront a bad apple in an attempt to change their behavior. On the other hand, emotion-focused coping predominates when a person feels the conditions are unchangeable and refers to their attempts to change the way they attend to or interpret what is happening. A teammate of a bad apple may try to change their moods by interacting with other people, deny that there is a problem, or withdraw from the team.

Research shows that experiencing a stressful encounter leads to coping with defensive behaviors, and reduced performance (Lazarus, 1999). In the stress literature the effects of stress are often measured in terms of strain and strain has encompassed “virtually any (negative) reaction to stressors (Cooper, et al, 2001, pg. 67).” Fox and colleagues (1993) found that physiological measures of stress reaction related negatively to job satisfaction and job performance. Finally, in a recent review of small group

research Kerr and Tindale (2004) concluded that stress tends to increase the performance quantity with an accompanying decline in quality, that stress tends to narrow attention onto more vital task features, and that stress tends to prompt more simplified, heuristic information processing. They referred to the Yerkes-Dodson law and its inverted U hypothesis to argue that increases in stress from low to moderate levels are beneficial while increases in stress from moderate to high levels are detrimental. Taken together, these findings indicate that although a little bit of stress may be helpful, high levels of stress damage performance (Cooper, et al., 2001). Hence, the findings of the impact of stressors on performance show that experiencing stress damages performance.

However, while strain is often measured using job dissatisfaction, tension/anxiety, or a reduction in performance, some researchers have operationalized it in terms of behavioral factors (Jackson & Schuler, 1985). In their review of stress in organizations, Kahn and Byosiere (1992) concluded that stress was associated with, among other things, work role disruptions such as mistakes and accidents, aggressive behavior such as rumor spreading, and counterproductive behaviors. Also, Spector and Fox (2002) found that a stressful work environment increased discrete negative emotions, which ultimately increased deviant organizational behaviors of employees. Thus, in addition to the bad apple theory (Felps, et al, 2006) the theory and research on stress and coping also indicate that experiencing the negative affective reactions to bad apple in a team leads to defensive-minded counterproductive behaviors. I now review theory and findings from the literature on affect to further support this argument.

Affective Events Theory

According to this theory, affective reactions have a direct impact on affect driven behaviors which are less thought out than judgment driven behaviors and correspond to defensive behaviors in the bad apple theoretical model (Felps, et al, 2006). Affect driven behaviors correspond to defensive behaviors proposed by Felps and colleagues (2006) and coping behaviors in the stress literature (Lazarus, 1991). The connection from events to affective reactions to affect driven behaviors is the portion of this theory that facilitates the explanation of how a highly disagreeable teammate damages the performance of the team. The authors state that “the effects of emotions tend to be more targeted toward dealing with either the source of the emotion or the emotional state (p. 19)” which indicates that the other team members who are experiencing the stress emotion are going to deal with their emotional state through (a) interactions with their team members, including the disagreeable teammate, or (b) through internal, emotion-focused coping. These relationship- and emotion-focused efforts take valuable resources away from the task. First I review findings that affective reactions impact performance and then I focus on the findings that affective reactions lead to defensive behaviors. These findings are critical to my argument that defensive behaviors (in response to experiencing negative emotional reactions to a bad apple) precipitate team process and performance losses.

Hersey (1932) is often attributed as the seminal work regarding the impact of emotions at work. He found that productivity was lessened by the experience of negative emotions. Others have found that negative emotions damaged work performance (Brown, et al, 2005). The impact of negative emotions on performance occurs through the disrupted attention and effort of team members. The authors concluded that the study

provided clear “evidence of the importance of affective influences on performance (pg. 797).” Finally, reviewing research on the impact of emotions on performance, Arvey, et al (1998, pg. 139) concluded that ample evidence indicates that “emotions are both theoretically and empirically related to job performance and other organizationally relevant outcomes.”

In addition, research testing affective events theory has continually shown that affective reactions to negative work events lead to damaged performance (Brown, et al, 2005; Zohar, Tzischinski, & Epstein, 2003; Miner, et al., 2005; Fuller, et al., 2003; McColl-Kennedy & Anderson, 2002; Pirola-Merlo, et al., 2002). For example, Brown and colleagues (2005) studied the sales force of two industrial firms and found that the emotional reactions to losing a major sale impacted the performance of sales associates. The authors concluded that the study provided clear “evidence of the importance of affective influences on performance (pg. 797).” In addition, Lubbers and colleagues (2005) studied full time workers and found that negative emotional reactions to interpersonal conflict among coworkers impacted employee job performance. Pirola-Merlo and colleagues (2002), studied intact R&D teams over five months and found that teams’ affective climate due to negative events or obstacles such as technical problems, staff availability, and team member relationship problems impacted team performance. Finally, Schaubroeck and Lam (2004) studied promotions among bank tellers who expected to be promoted but were not and found that envy from tellers lead to poorer performance. Thus, affective reactions have been found to impact job performance for individuals and teams. These findings support the argument that experiencing a disagreeable teammate eventually damages the team’s performance. However, findings

also show that affective reactions give rise to defensive behaviors which likely precipitate team process and performance losses.

Research on AET shows that negative affective reactions relate to behavioral outcomes such as withdrawal behaviors (Miner, et al, 2005; Kiefer, 2005), workplace deviance (Lee & Allen, 2002; Judge, et al., 2006), and self-oriented behaviors (Rhoades, Arnold, & Jan, 2001; Perrewe & Zellars, 1999). For example, Miner and colleagues (2005) used experience sampling to study the correlates of moods over time among employees in a light manufacturing facility. They found that employee's affective states due to work events such as negative encounters with supervisors or coworkers lead to withdrawal behaviors such as doing personal tasks at work, taking extra breaks, or talking excessively to a friend. In addition, Lee and Allen (2002) studied registered nurses and their coworkers and found that nurses experiencing negative affect (specifically the discrete emotion of hostility) were more likely to engage in deviant behaviors such as falsifying receipts for reimbursement, consuming alcohol on the job, or dragging out work to get paid for overtime. Finally, Rhoades and colleagues (2001) used daily diaries to study affective reactions of employees in various jobs. They found that employees experiencing negative moods due to conflict among supervisors or coworkers were more likely to be self-oriented and competitive while resolving conflict rather than being other-oriented or cooperative.

Evidence also exists to show that state negative affect reduces behaviors useful to teams and increases behaviors that are detrimental to teams. For example, George (1990) found that a team's state negative affect reduced the amount of pro-social behavior of team members. Another study (Wright, Cropanzano, & Meyer, 2004) found that state

negative affect impacted performance measures in the expected directions, even after controlling for trait affect. Thus, Barsade and Gibson (2007, pg. 52) concluded that “the evidence for the deleterious effects of individual negative affect is substantial.” Spector and Fox (2002) found that a stressful work environment increased discrete negative emotions, which ultimately increased deviant organizational behaviors of employees. In addition, Barclay and colleagues (2005) found that fairness perceptions regarding the experiencing of being laid off impacted outward-focused negative emotions of anger and hostility, which ultimately impacted retaliation. Retaliation included an assessment of how the employee reacted, if they considered retaliating, and whether or not they acted on the consideration.

In addition to these findings from affective events theory, recent meta-analyses confirm the conclusion that state negative affective leads to more defensive behaviors and less cooperative behaviors. For example, Dalal (2005) found that state negative affect was related positively to counterproductive work behaviors ($\rho = .41$) but only a much smaller negative relationship to organizational citizenship behaviors ($\rho = -.10$). In addition, Thoresen, Kaplan, Barsky, Warren & de Chermont, (2003) found that state negative affect lead to job burnout which is linked to withdrawal behaviors. The three facets of job burnout (with the relationships found in parenthesis) are emotional exhaustion ($\rho = .69$), depersonalization ($\rho = .35$), and personal accomplishment ($\rho = -.20$). Finally, Barsky & Kaplan (2007) found that state negative affect was related to justice perceptions. The facets of justice perceptions are distributional ($\rho = -.25$), procedural ($\rho = -.21$), and interactional ($\rho = -.37$). Feelings of injustice likely contribute to defensive behaviors such as lashing out or withdrawal. Thus, the literature shows that

negative affective reactions lead to various types of behavioral responses that correspond to what Felps and colleagues (2006) refer to as defensive behaviors.

In addition to explaining that affective reactions play an initial role in linking the bad apple to team performance, each of the three theoretical perspectives reviewed (the bad apple model, stress research, and AET) helps explain that team members who experience negative affective reactions to a bad apple likely respond with defensive behavior to cope with the situation such as retaliation, lashing out, counterproductive behaviors, or withdrawal. As time goes by, team members realize that the anticipated threat of the bad apple is real and they must now cope with this person and their own negative emotional reactions. People may retaliate against the bad apple, confront him or her in hopes of changing their behavior, or withdraw from the team by reducing voluntary behaviors. In time, these responses to experiencing negative affective reactions to the bad apple will begin to damage the processes and eventually the performance of the team. Thus, negative affective reactions amongst teammates of the disagreeable person will lead to team defensive behaviors like lashing out at the bad apple or withdrawing from the team. Formally stated:

Hypothesis 2: Team affective reactions will relate to defensive behaviors such that the average level of core affect and affective culture will relate positively to the average level of team defensive behaviors and the proportion of teammates with a cortisol increase will relate negatively to the average level of team defensive behaviors.

Team Processes

The distinction between affective and behavioral intermediary mechanisms in the model of the current study (see Appendix B) corresponds to the distinction in the small groups and teams literature between attitudinal or affective emergent states and

interactional processes (Cohen & Bailey, 1997; Ilgen, et al, 2005). Marks and colleagues (2001) emphasized that emergent states describe cognitive, motivational, and affective states of teams and are different from true “process” variables that describe behaviors such as communication, cooperation, and conflict management. The current model follows guidance from the bad apple theory (Felps, et al, 2006), affective events theory (Weiss & Cropanzano, 1996), and stress research (Lazarus, 1991) to argue that the initial linking mechanism between a bad apple and team performance is the aggregated affective reactions of others on the team. The team’s affective tone in turn leads to defensive behaviors. However, given the current study’s focus on the ‘team’ impact of a bad apple, traditional team processes must also be accounted for in the model. Thus, according to the theoretical model of the bad apple in teams (Felps, et al, 2006) I include team process as the final linking mechanism between the bad apple and team performance.

Team process has long been studied in the small groups and team literatures as the center of the IPO model. At a general level team process is defined as “members’ interdependent acts that convert inputs to outcomes through cognitive, verbal, and behavioral activities directed toward organizing task work to achieve collective goals (Marks, et al, 2001, pg. 357).” Hence, the essence of team process is the quantity and quality of interpersonal interaction which transforms a wide array of useful inputs into team outputs like performance. In addition to the study of team process at a general level, many large sub-literatures focusing on an exact process behavior have been created. Examples include cooperation (Chatman & Flynn, 2001) communication (Barrick, et al, 2007) and conflict (Jehn, 1995), to name a few. However, while the focus on specific processes has lead to important discoveries, in some instances a general

measurement of process is warranted. Interactional team processes are important in explaining how bad apples spoil the bunch; but, in the current study the primary focus is on the little studied affective mechanisms and not the long studied interactional processes. So, I take a general approach to the evaluation of team process as opposed to a specific one.

Team process research has a long history of findings and concludes that processes indeed mediate the impact of team inputs such as personality on team outcomes such as performance. However, I will only review a few illustrative findings because this literature is mature, the findings are well grounded, and while team process is important, it is not a primary focus nor contribution of this study. Jones and George (1998) found that trust in teams improved the communication and teamwork processes of the team which improved performance. In addition, Pelled, Eisenhardt and Xin (1999) studied intact working groups and found that task and emotional conflict mediated the impact of demographic diversity on team performance. Finally, Mathieu, Heffner, Goodwin, Salas, and Cannon-Bowers (2000) studied mental models and found that processes such as strategy formulation, cooperation, and communication mediated the impact of team's shared mental models on team performance. In addition to specific team process variables, some researchers measure team process generally. For example, Peterson, Smith, Martorana, and Owens (2003) combined eight categories of processes into one measure of top management team process: intellectual rigidity-flexibility, sense of control-crisis, optimism-pessimism, leader weakness-dominance, factionalism-cohesion, legalism-corruption, decentralization-centralization of power, risk aversion-risk taking.

They found that this general construct of top management team process mediated the impact of CEO personality on firm performance.

While the inclusion of team process in the model of the current study is warranted given its importance to the study of teams and its place in the theoretical model of the bad apple in teams (Felps, et al, 2006) it is necessary to understand why defensive behaviors such as retaliation, counterproductivity, and withdrawal damage team process. These behaviors are the antithesis of harmonious team process behaviors and are the underpinnings of team process losses. In addition, defensive behaviors as the antithesis of harmonious team process harkens back to the profile of the personality trait of disagreeableness. The disagreeable person is the ‘anti-team player’ because s/he tends to be quarrelsome, inconsiderate, jealous, and insecure. These behaviors are exact opposites of the behaviors of ideal team members. In time, teammates pick up on these demonstrations through emotional contagion processes such as mimicry of the initial bad apple behavior. When defensive behaviors of teammates of the bad apple are similar to the initial disagreeableness, like fighting fire with fire, the initial input of disagreeableness spreads to the team. Team process is damaged because (a) teammates task-focused efforts are redirected toward maintenance-focused efforts dealing with the bad apple, and (b) they themselves participate in the negativity of the bad apple through defensive behaviors. Beneficial process behaviors such as cooperation, communication and coordination are reduced and detrimental process behaviors such as relational-conflict are increased.

I conclude that “in small groups and teams [with a bad apple], the teamwork may be altered (Arvey, et al, 1998, pg. 130)” because the essence of teamwork is interaction,

and it is in the team's interactions that the bad apple spoils the team. Thus, the average level of teammates' defensive behaviors such as lashing out at the bad apple and withdrawing from the team will influence team process. Stated formally:

Hypothesis 3: The average level of team defensive behaviors will be negatively related to team process.

The presence of a highly disagreeable teammate will eventually damage team performance through its impact on team affective states, team defensive behaviors, and team process. The final step in the model linking the bad apple to team performance is the connection between team processes and performance. This relationship is well documented in small groups and teams research using the IPO model (Cohen & Bailey, 1997; Kozlowski & Bell, 2003; Ilgen, et al, 2005). Hence, I don't review this extensive literature here but conclude that team processes will impact the performance of the team. Stated formally:

Hypothesis 4: The average level of team process, as rated by each team member, will be positively related to team performance.

Moderators of the Bad Apple Phenomenon

In the preceding sections I laid a foundation showing that the behaviors of one person, if left unchecked, can seriously damage the performance of the team through team's negative affective states, defensive behavioral responses, and interactional processes. However, "to ultimately realize the potential of teams, we need to be proactive in ensuring that one "bad apple" doesn't ruin the whole barrel (Taggar & Neubert, 2000, pg. 53)." Following the call from these authors, I now proceed to discuss potential moderators of the bad apple phenomenon. First, I will review the moderator findings in affective events theory (Weiss & Cropanzano, 1996) and the suggested

moderators in the theoretical model of the bad apple phenomenon (Felps, et al, 2006). Second, I will focus on team interdependence and discuss how it should moderate the effects of the bad apple on team affective states.

Affective Events Theory – Moderators

Working within the AET framework, various constructs have been shown to moderate the relationship between work events and affective reactions or the relationship between affective reactions and behavioral outcomes such as job performance and attitudinal outcomes such as job satisfaction. The moderators can be aggregated into four categories: different levels of team interdependence (Bartel & Saavedra, 2000; Totterdell, Wall, Holman, Diamond, & Eitropaki, 2004), the traits or dispositions of the individuals (Judge & Ilies, 2004; Hochwater & Treadway, 2003; Lam, Yik, Schaubroeck, 2002; Judge, Ilies, & Scott, 2006), leadership effects (Dasborough, 2006; Morgeson, 2005; Holman, Chissick, & Totterdell, 2002; Cole, et al., 2006; de Jonge & Dormann, 2006; Pirola-Merlo, et al, 2002), and finally the emotional capacity of the individuals to effectively deal with negative events or negative affective reactions (Jordan, Ashkanasy, & Hartel, 2002; Giardini & Frese, 2006; Zohar, et al, 2003; Zohar, Tzischinski, Epstein, & Lavie, 2005).

The more interdependent the members of a team are, the more negative events will impact members' affective reactions and the more affective reactions will impact important outcomes like performance. For example, Bartel and Saavedra (2000) found that task and social interdependence increased members' mood convergence in a team setting. In addition, Totterdell and colleagues (2004) found that affective reactions were more shared among work interaction groups than groups with little interdependence or

interactions. These findings are consistent to the findings supportive of emotional contagion; that a group of individuals needs to be interdependent for emotions to spread from one person to another. Thus, findings indicate that team interdependence is a critical moderator in the AET framework.

Individual differences impact an individual's affective experiences. According to AET, dispositions should moderate the relationship between work events and affective reactions and also have direct effects on affective reactions. For example, Judge and colleagues (2006) found that trait guilt and trait hostility moderated the impact of work-family conflict on emotional reactions such that individuals who were more prone to feelings of guilt and hostility reacted with more negative affect to the conflict. In addition, Lam and colleagues (2002) found that trait negative affect moderated the impact of favorable performance feedback on job attitudes such that individuals with a propensity to experience negative emotions were less positively impacted by favorable feedback than people not as inclined to experience negative emotions. Finally, Judge and Ilies (2004) found that trait negative affect moderated the relationship between negative moods and job satisfaction and that trait positive affect moderated the relationship between positive moods and job satisfaction. Thus, findings indicate that trait affectivity is another important moderator in the AET framework.

Leaders influence followers' experiences of affective events. For example, Holman and colleagues (2002) found that supportive supervisors lessened the negative impact of the perceived intensity of performance monitoring by the organization on employees' affective states. In addition, Dasborough (2006) found that leaders dampened the negative impact of workplace hassles on employees' reactions. Also, de

Jonge and Dormann (2006) found that resources such as social support (i.e., the presence of a strong team leader), moderated the impact of stressors on the strain felt by health care workers over time. Finally, Morgeson (2005) found that active leadership interventions reduced the damaging effects of disruptive events experienced by work teams. Thus, findings indicate that leaders can moderate the impact of events on affective reactions.

Individuals that have more capacity to positively deal with emotional experiences are less impacted affectively by negative work events and have less impacts on behavioral and attitudinal outcomes. For example, Zohar and colleagues (2003) found that individuals who had better availability of energy resources due to less workload experienced lessened negative emotional reactions from daily work events. Zohar and colleagues (2005) also found that sleep loss among medical residents moderated the impact of goal-disruptive events on negative emotions and fatigue. Finally, Giardini and Frese (2006) found that emotional competence influenced the impact of emotional dissonance on important outcomes. Thus, findings indicate that individual capacity to deal positively with emotional experiences is another important moderator in the AET framework.

The Bad Apple Phenomenon – Moderators

In addition to the findings from AET, Felps and colleagues (2006) argued that there are four main moderators of the impact of a bad apple on individual and team outcomes. These moderating influences come from team interdependence, personal coping abilities, the intensity of the negative behavior, and the valence of recent outcomes. The authors argue that “if the group is highly interdependent, then

dysfunctional behavior is of more consequence (Felps, et al, 2006, 197)” because there is more interaction among members. In addition, people high in personal coping abilities such as core self-evaluations should experience negative affective reactions less often and less severely. Core self-evaluations (Judge, Erez, Bono, & Thoreson, 2003) represent a meta-construct made up of self-esteem, generalized self-efficacy, locus of control, and emotional stability. People high in core self-evaluations may experience a bad apple as a mere nuisance rather than a significant threat. Also, the intensity of the negative behavior of the bad apple should moderate the impact of the behavior on teammates affective reactions. Finally, the value placed on recent outcomes will impact teammates reactions. If failure on an important project has occurred and a sizeable bonus is missed, for example, teammates are far more likely to react more negatively than if the outcome was less personally significant for the members of the team.

A few other theoretical perspectives add possible suggestions of moderators in the model of the current paper. For example, Gross (1998) suggested emotional regulation strategies such as situation selection, situation modification, attentional deployment, and cognitive change should limit emotional reactions. In addition, other constructs seem plausible such as the amount of trust in teams (Jones & George, 1998), within-team participation (De Dreu & West, 2001), and team size. However, among all these possibilities, team interdependence seems particularly useful.

Interdependence

Research on interdependence suggests a team variable that can mitigate or exacerbate the negative effects of an individual’s disagreeableness on the affective experiences of other teammates (research question #2). Interdependence is the genesis of

teamwork synergies such as gains in satisfaction and productivity. Yet, it is also the genesis of many problems individuals and organizations experience from work being done in teams (Sinclair, 1992). Some people in organizations prefer to work alone because they either don't like social interaction or they feel the requirement to work interdependently with others holds them back. When the negative aspects of team work are great, such as being required to interact and depend on a highly disagreeable team member, these reservations about working in the team are, no doubt, heightened. Thus, because it is the interdependence of the team situation that causes team members to be wary of working on a team with a disagreeable team member, interdependence should moderate the impact of the disagreeable team member. Hence, interdependence represents a useful moderator in the bad apple model.

Interdependence is one of the most fundamental elements of small groups (Johnson & Johnson, 1989; Stewart, 2006) and has been found to have contingency effects on team performance (Gibson, 1999; Barrick, et al, 2007) leading a recent team review to conclude that it is a defining characteristic of teams (Kozlowski & Bell, 2003). Interdependence is defined as the extent to which contextual features outside the individual and his or her behavior (i.e., tasks and outcomes) require a collection of individuals to interact and depend on each other for information, motivation and support (Barrick, et al., 2007; Wageman, 2001; Campion, et al, 1993). Interdependence, then, is not an interactional process (i.e., behaviors) and is not an emergent state (i.e., attitude or affect) but rather the requirement to interact and depend on each other (Barrick, et al., 2007).

Wageman (2001) and others (Campion et al., 1993) argue that interdependence is a multidimensional construct with three fundamental components: task interdependence, goal interdependence, and reward interdependence. Task interdependence is defined as “features of inputs into the work itself that require multiple individuals to complete the work (Wageman, 2001, pg. 198).” Task interdependence has its theoretical roots in work by Thompson (1967) and others who focused on the nature of interdependencies in organizations with complex technologies. Thompson specified three types of interdependence depending on the complexity of the coordination required among unit members: pooled, sequential, and reciprocal. Pooled interdependence is similar to additive tasks where the output is simply all inputs added together. Sequential interdependence refers to one way dependence like a production line. Finally, reciprocal interdependence was considered the highest level of technological interdependence where dependence could come from any direction. Later, Van de Ven, Delbecq, & Koenig (1976) added another higher level called ‘team interdependence’ to Thompson’s list arguing that some technological applications were so interdependent they required ‘teams’ of people working together for effective completion.

Goal interdependence refers to the degree goals are defined collectively or individually (Wageman, 2001). Much work has been done on the impact of goals on performance at the individual level (Locke & Latham, 2002) and work is accumulating at the group level as well (O’Leary-Kelly, Martocchio, & Frink, 1994; Mitchell & Silver, 1990; DeShon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004). Finally, reward interdependence refers to the extent rewards that an individual obtains depend on the performance of his or her coworkers. Members of a team could be compensated

individually or as a team. All three dimensions of interdependence are believed to impact team member behaviors (Wageman, 2001). In addition, although some have argued that each facet of interdependence can have independent effects, research has shown that the three tap into a general interdependence factor (Gully, Incalcaterra, Joshi, & Beaubien, 2002).

The literature on team interdependence is converging on the assessment that interdependence plays a critical contingency role in teams. Gully and colleagues (Gully, Devine, & Whitney, 1995; Gully, et al, 2002), in two separate meta-analyses, found that interdependence moderated the relationships between cohesion and performance and also between team-efficacy and performance. Cohesion had a stronger impact on team performance when teams were highly interdependent. In addition, Barrick and colleagues (2007) found that the same finding held in top management teams in credit unions. Specifically, they found that interdependence moderated the relationship between processes such as communication and team and organizational performance. Others have found that interdependence among teammates moderates the impact of conflict on performance (Jehn, 1995), group efficacy on group effectiveness (Gibson, 1999), and autonomy on job motivation (Janz, Colquitt, & Noe, 1997). Thus, the wider literature of team interdependence shows that interdependence is an important moderator variable within the IPO model of teams.

Team member affective reactions occur out of current and past interactions along with future requirements to interact with other team members to complete work (Weiss & Cropanzano, 1996). When a disagreeable member is identified, the team members will likely recognize that their tasks, goals, and rewards are in jeopardy. A disagreeable team

member represents a threat (Lazarus, 1999) to these tasks, goals, and rewards because interacting with the bad apple takes up resources that could contribute to these outcomes. Not only is time and effort diverted, but an individual's motivation to perform is also likely reduced. Therefore, interdependence is important to addressing the bad apple problem because it makes a disagreeable member a threat. Thus, in addition to its contingency role in process and performance relationships, it is reasonable to conclude that interdependence will play a role in moderating the impact of emotions on team functioning and outcomes. The following four research streams also suggest this conclusion: emotional contagion, emotion regulation, theoretical work on bad apples, and personality in teams.

As discussed previously, emotional contagion is the process by which a person influences the emotions or behavior of others through consciously or unconsciously inducing emotional states or behavioral attitudes (Hatfield, et al, 1994; Schoenewolf, 1990). Observers undertake emotional mimicry and/or emotional comparison and the ultimate degree of contagion depends on the attention observers give to the source of the affective state. Emotional contagion is well supported in the literature (Barsade, 2002; Totterdell, et al, 1998; Totterdell, 2000; Sy, et al, 2005; Neumann & Strack, 2000) and boundary conditions of the contagion effect are also being explored. One key element to emotional contagion is the interdependence of the individuals involved. With interdependence there is contagion, and without interdependence there is not. For example, Bartel and Saavedra (2000) found that task interdependence increased the convergence of moods in teams. Also, Williams (2001) argued that for trust and affect to have an impact on teams, the members must be interdependent. Thus, theory and

research on emotional contagion indicates that interdependence moderates the relationship between a disagreeable team member and teammates' affective reactions.

Emotion regulation refers to “the processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions (Gross, 1998, pg. 275).” In his review of the field, Gross categorized four types of antecedent-focused emotion regulation tactics: modification of the situation (problem-focused coping), selection of the situation (approaching or avoiding), deployment of attention (distraction, concentration, or rumination), change of cognitions (denial, isolation, or intellectualization), and one type of response-focused emotion regulation tactic: modulations of responses (regulating emotion-expressive behavior). Reducing the level interdependence among a disagreeable team mate and others on the team constitute modifying the situation “so as to alter its emotional impact” on team members (Gross, 1998, pg. 283). Thus, this research stream also indicates that changing the level of interdependence among team members is one way to reduce the negative impact of the bad apple team member.

In addition to the research streams of emotional contagion and emotion regulation, as previously mentioned theoretical work on bad apples in teams indicates that interdependence should moderate the relationship between a disagreeable team member and the affective reactions of the other members (Felps, et al, 2006). The authors reasoned that “in interdependent teams where people depend on each other, these intense psychological reactions are more likely to spill over beyond dyadic interactions to include the broader social environment (Felps, et al, 2006, pg. 190).” Interdependent tasks require that teams maintain higher quality social relationships in order to effectively

coordinate their activities (Gittell, 2003); thus, negative effects are more pronounced in high interdependence situations (Gersick, et al., 2000). Hence, the research stream on bad apples in teams also argues that interdependence will moderate the impact of a disagreeable team member on the affective reactions of other teammates.

Finally, research on personality in organizations hints that interdependence acts as a moderator as well. Moynihan and Peterson (2001) reasoned that “interdependence can lead to more destructive aggression and poor interpersonal relations in the group when personalities are not compatible (pg. 352).” Also, Stewart, (2003) argued that situations that are not highly interdependent “allow team members to compensate for the shortcoming of individuals (Stewart, 2003, pg. 195).” Thus, situations of low interdependence should also allow team members to be less impacted by the bad apple through avoidance.

So, what is it about interdependence that makes it useful in protecting the team from the bad apple? Felps and colleagues (2006) stated that “when ostracism is unfeasible due to organizational constraints such as seniority or formal role sets, the difficult person may be “rejected” in more subtle ways. Teammates can restructure work to decrease task interdependence, or segment responsibilities so that goals and rewards are less interdependent (Felps, et al, 2006, pg. 186).” In addition, Arvey and colleagues (1998), while reviewing the effects of emotionality on performance, reasoned that emotional reactions to a difficult event or situation can be changed “by altering the expected rewards from a course of action (pg. 128).” Hence, if task, goal, and reward interdependence is minimal among teammates then each member doesn’t have to rely on the other members as much to complete their tasks and teammates can therefore interact

less. If teammates interact less there will be less opportunity for the negativity of the disagreeable teammate to spread to others, impact their affect and attitudes, and damage the team's processes and performance. Thus, I conclude that the level of interdependence within teams will moderate the impact of a disagreeable bad apple on the team's affective reactions. The pursuit of this moderator opens the door to a better understanding of how the damaging effects of the disagreeable team member can be reduced.

Hypothesis 5: Interdependence will moderate the impact of a highly disagreeable team member and team affective reactions such that the negative relationship between disagreeableness and average core affect and average affective culture will be less negative and the positive relationship between a highly disagreeable team member and the proportion of teammate cortisol increases will be less positive in a low interdependence context as opposed to a high interdependence context.

In this chapter I reviewed research that showed that one highly disagreeable teammate damages team performance. Using the theoretical model of the bad apple phenomenon in teams suggested by Felps and colleagues (2006) I laid out a model of three intermediary mechanisms that link the bad apple to ultimate team performance. In addition, I reviewed affective events theory (Weiss & Cropanzano, 1996) and stress research (Lazarus, 1991) to support my claim that the bad apple destroys team performance through (1) team affective reactions, (2) team defensive behaviors, and (3) team processes. Finally, I reviewed various moderators in the literature and argued that interdependence will moderate the bad apple's impact on teammates' negative affective reactions. In the following chapter I outline the experimental design of a lab study devised to test the preceding five hypotheses.

CHAPTER III

METHODOLOGY

In the last chapter I integrated the finding that one disagreeable teammate damages team performance with the team bad apple model theorized by Felps and colleagues (2006), affective events theory (Weiss & Cropanzano, 1996), and stress research (Lazarus, 1991) to derive hypotheses explaining how the bad apple damages team performance. Based on these literatures I also derived the hypothesis that interdependence moderates the impact of the bad apple on team affective reactions. The model depicting the hypothesized relationships is depicted in Appendix B. In this chapter I describe a lab study used to empirically test these hypotheses. The hypotheses stated in the previous chapter are restated here for review. They are:

Hypothesis 1: A highly disagreeable teammate will impact team affective reactions such that teams with a highly disagreeable teammate will have lower core affect, more members with increased cortisol levels, and higher team affective culture than teams that don't have a highly disagreeable teammate.

Hypothesis 2: Team affective reactions will relate to defensive behaviors such that the average level of core affect and affective culture will relate positively to the average level of team defensive behaviors and the proportion of teammates with a cortisol increase will relate negatively to the average level of team defensive behaviors.

Hypothesis 3: The average level of team defensive behaviors will be negatively related to team process.

Hypothesis 4: The average level of team process, as rated by each team member, will be positively related to team performance.

Hypothesis 5: Interdependence will moderate the impact of a highly disagreeable team member and team affective reactions such that the negative relationship between disagreeableness and average core affect and average affective culture will be less negative and the positive relationship between a highly disagreeable team member and the proportion of teammate cortisol increases will be less positive in a low interdependence context as opposed to a high interdependence context.

I designed a lab experiment (University of Iowa IRB # 200706778) with a confederate, or trained research participant, to test these hypotheses for several reasons. First, the low base rate of teams with a highly disagreeable team member made a field study particularly difficult. Using a lab study allowed me to avoid this obstacle. Second, randomly assigning participants to the various experimental conditions allowed for various exogenous variables to be controlled. It also eliminated systematic bias in the composition of the groups because each participant had an equal chance of being assigned to each condition. Third, I studied personality in the lab setting by creating disagreeableness, rather than studying naturally occurring personality in a lab setting.

In the experiment, a team interacted for 20 minutes on a group task. An undergraduate student majoring in theater arts was trained to act out the disagreeable profile. This confederate enacted disagreeable language and behaviors in the disagreeableness condition and enacted language and behaviors that were not disagreeable in the non-disagreeable condition. Using the profile of the disagreeable person I constructed in the preceding chapter as a basis, I trained the confederate to enact the five facets of this behavior: hard-hearted, hard-minded, mean, insecure, and selfish. Later in the chapter I present general rules and specific scripts the confederate used in the two conditions. Using the same task, some teams interacted in a highly interdependent situation and some in a minimally interdependent situation, depending on the interdependence condition. In all conditions participants were instructed to give one team recommendation by the end of the 20 minutes. After the team task, participants filled out additional scales and were debriefed on the experimental design.

Typically, when teams are studied in a lab setting the amount of time the team interacts to complete a task depends on the nature of the task. Simpler tasks take less time while more complex tasks require more time for task completion. For example, recently published studies using a simple task have given between 15 and 20 minutes for team task time (Ten Velden, Beersma, & De Dreu, 2007; Sy, Cote, & Saavedra, 2005; Smith-Jentsch, Salas, & Baker, 1996). On the other hand, other studies using more complex tasks have taken 30 to 45 minutes (Porter, 2005; Marks, DeChurch, Mathieu, Panzer, & Alonso, 2005) and studies with very complex tasks often take an hour or more for the team to complete the task (Bacharach, Powell, Collins, & Richey, 2006, Ellis, Bell, Ployhart, Hollenbeck, & Ilgen, 2005; DeChurch & Marks, 2006). In addition, these more complex scenarios often require time for training before interacting on the task. The current study used a simple task relating to a business setting that required teamwork for completion. Hence, the use of 20 minutes for the teams to interact in this study is consistent with published literature studying teams working on a simple task in the lab.

Experimental Design

The design follows a 2 (highly disagreeable teammate vs. absence of highly disagreeable behaviors) x 2 (high interdependence vs. low interdependence) factorial design. The conditions are as follows: one member behaving in a highly disagreeable manner (the confederate) vs. this member NOT behaving in a highly disagreeable manner and teams in a highly interdependent context vs. teams in a minimally interdependent context. These conditions are represented in Table 1. All teams consisted of four people: one member was the confederate who enacted disagreeable behaviors (or not) and three were naïve participants.

Table 1. Experimental Conditions.

<u>Disagreeableness Present</u>	<u>Level of Interdependence</u>	
	High	Low
Yes	Condition 1	Condition 2
No	Condition 3	Condition 4

To calculate the number of teams needed per condition I assumed a power level of 80%, with an alpha level of .05 and a correlation (effect size) of .50. This high anticipated correlation was due to the study being conducted in the lab where control was much greater than in field experiments. Given these assumptions, the needed sample of teams in each of the four conditions was 22. However, I collected data on 97 teams for an average of 24.25 per condition.

Participants

Research participants were recruited from the large, undergraduate course of Introduction to Management in the Business School at the University of Iowa. I visited the class early in the semester to invite students to participate in the experiment for extra credit. They were told an announcement on the class website had a link for electronic sign up. Students were informed that participation was voluntary and not a requirement for the class. (See Appendix A for the recruiting script.)

If students were interested in participating they signed up via the sign up web page (see Appendix B for directions given). I scheduled five or six participants per 1.5 hour time slot even though I needed only three participants per time slot. This over

scheduling helped assure that at least three participants showed up most of the time. I also emailed students two days before and one day before their time slot to remind them of the time, location, and guidelines they should follow in order to participate (see Appendix C for this email script).

Extra participants answered the first packet of questions and were then released. All participants who showed up received extra credit for their course. In addition, those who participated in the 1.5 hour long experiment were paid money. In the high interdependence conditions, participants were told that all teams would be paid a base amount of \$20. In addition, teams that had excellent performance would be paid \$60. “Excellent” performing teams were to be the top 20% (2 teams out of every 10) of teams. On the other hand, in the low interdependence conditions, participants were told that every person would be paid a base amount of \$5. In addition, participants that had excellent individual performance would be paid \$15. “Excellent” performing individuals were to be the top 20% (2 people, per team role, out of every 10 teams). However, all participants were paid \$15 by check a few weeks later. These monetary incentives helped motivate participants to invest themselves in the task which added meaning to the contrived setting. Each participant was randomly assigned a role on the team, based on unique information given, which will be explained under task instructions. I told participants in the low interdependence conditions that their reward would be based on how well they performed within their role so they didn’t feel they were competing with other members on their team, but rather against people on other teams who had their same role.

When participants arrived at the waiting room of the lab they were introduced to the study and given the Informed Consent document (See Appendix D for this form). The confederate was always in the waiting room acting the part of a participant. The researcher asked them to read, sign and return the Informed Consent document. If any participants had questions the researcher answered them before written authorization was given. The Informed Consent document let the participant know about the experiment and the requirement to give a total of three saliva samples throughout the experiment. Participants could withdraw at any time. Participants picked a random number and the lowest four numbers were assigned to one of three individual rooms. Number 3 was missing and was the number the confederate always indicated he had. The researcher then led the participants to their individual rooms where the pre-task questions packet awaited.

Laboratory Resources

The Center for the study of Group Processes, housed in the department of Sociology at the University of Iowa, has dedicated lab space for social science research and the tools that made this study possible. Three rooms and all needed materials (i.e., three tables, three chairs and one video camera) were provided by the lab for this experiment which took place during Fall semester, 2007. Three sessions were scheduled per day, Monday through Thursday from 11:00 am to 12:30 pm, 12:30 pm to 2:00 pm, and 2:00 pm to 3:30 pm.

Task Instructions, Experimental Manipulations, and Dependent Variables

The researcher gave all verbal and written instructions in person when the participant arrived in their individual room (see Appendix E for the full Experimental

Protocol). Each participant was told that the experiment has three parts and looks at how teams make decisions together. In the first part they answered individual questions about themselves for about 10 minutes. Second, they interacted as a team with three other randomly assigned participants for 20 minutes on a task. In the third part they answered questions about the team and their experience participating on this team task. Due to the large number of scales to administer the third part took about 20 to 30 minutes.

After the experiment was introduced the researcher gave each participant a packet with a series of questions to answer about themselves (see Appendix F for this packet containing all pre-task questions). Five scales were included in order to be controlled in the model.

Personality

First, the 44-item Big Five Inventory (John & Srivastava, 1999) was given to each participant to assess their own personality. All five dimensions of the FFM were self-rated because personality traits such as conscientiousness have been shown to have an impact on performance measures. This scale has been shown to be a reliable and valid measure of the five factor model (FFM) of personality. Example items assessing agreeableness include “I see myself as someone who likes to cooperate with others” or who “starts quarrels with others” (reversed).

Initial State Positive and Negative Affect

Second, the 20-item positive and negative affect schedule (PANAS, Watson, Clark, & Tellegen, 1988) was given to assess initial affective state prior to the task. The scale is made up of a list of adjectives with directions asking the participant to rate how they feel today (as opposed to trait measures that ask how the participant feels generally,

or most of the time). It is likely that the initial affective state of the participant would impact their experience of the stressor (the disagreeable teammate) and their emotional reaction. Thus, this scale was included.

Demographics

Fourth, various demographic questions such as age, sex, race, year in school, ACT or SAT score, and current college GPA were included. Intelligence is related to job performance (Barrick & Mount, 1991) and hence should relate to how well the participants do.

Physiological Issues

Fifth, because certain activities can impact the measurement of cortisol in saliva, a series of questions asked participants about recent activities. They were reminded verbally and in writing that answers to these and all questions would be kept strictly confidential. The questions are as follows: How many hours ago was your last major meal? How many hours ago did you last eat or drink dairy products like milk, cheese, etc? How many hours ago did you last brush your teeth? How many hours ago did you last have dental work done? Are you currently taking prescription or over-the-counter medications? If so, what medications are you taking? If you are female, are you taking any oral contraceptives? If you are female, are you currently menstruating? If you are female, when did you last period start? Have you taken any illegal drugs in the last 24 hours? Did you drink alcohol in the last 24 hours?

After completing this packet of questions each participant was asked to provide the first of three saliva samples (see Appendix G for the Saliva Collection Protocol). A two-inch piece of straw and small cylindrical tube was provided for the 'passive drool'

method of saliva collection. Participants were instructed verbally and in writing to allow saliva to pool in their mouth and then place the straw in the mouth to allow saliva to drip into the collection tube. Passive drool is the preferred method of saliva collection.

Procedures were strictly and consistently followed in the collection of this biological fluid including access to a Safety Officer appointed by the Sociology department. The IRB and the Health Protections Office at the university were notified of the collection.

Task Instructions

After the researcher collected the saliva sample a one-page sheet was given to each participant containing the following information introducing the participant to the team task. Each participant was given a name tag with their team role noted (Person A, Person B, Person C, or Person D) and space for their name. In the high interdependence condition this role indicated “unique information” about the case that each participant was given and helped them identify the other participants when it came time to rate teammates. Although no unique information was given in the low interdependence condition, using roles within these teams helped individuals believe they’re not competing against their team members and helped participants identify the other participants when it came time to rate teammates. The instructions for team members in the low interdependence condition are as follows:

Directions

This task is based on a fictional situation and requires a team of four people (you will meet your three teammates soon) to discuss the information presented and make one recommendation as a team on what to do. The case has been given to numerous students and managers in the past so a good answer is well known. Once you are together you will only have 20 minutes to complete the task which means it is critical that you work together well. So, discuss the case for 15 minutes and use the last 5 minutes to write your answer. After you are done with the team

recommendation you will return to your individual room and do an individual recommendation – separate from your team’s recommendation.

Goal

Your goal is to have the best individual recommendation which will be rated after the study, compared to other individuals with the same role (either Person A, B, C, or D) participating in this study. So, you are NOT competing with other members on your team.

Rewards

All participants will be paid a base amount of \$5. However, participants within each team role (either A, B, C, or D) that have excellent individual performance will be paid a total of \$15. “Excellent” performing individuals will be the top 20% or the top two people out of every ten people. Thus, the better your individual recommendation, the more you will be paid!

Information

You are a member of the senior management team from a hypothetical professional sports venue, the Bradford Arena. The arena is the home of the state’s pro basketball team and regularly hosts other events such as concerts, trade shows, and other high profile events. You and your team have just been asked by the president of the arena, your boss, to make a recommendation about how the organization should react to breaking news about your primary benefactor’s arrest.

Your arena is named after Bradford Inc., a Fortune 500 technology company and the largest public company in the state. The arena has carried this name since it was built 15 years ago and the relationship has always been mutually beneficial. In 2005 Bradford was ranked as one of the 100 most powerful men in the U.S. by Forbes magazine (#67). However, the scandal could really hurt the public reputation of the arena. On the one hand, Bradford donated a sizeable sum of money and may continue to do so in the future. On the other hand, Bradford’s troubles could be a big problem for the arena’s public image.

The news story said that Mr. Bradford hired a private investigator to spy on members of the company’s board of directors. The private investigator used illegal surveillance techniques involving wire tapping and identity theft. According to state law, Mr. Bradford would be responsible for any illegal activities of the private investigator firm. In addition to Bradford’s illegal actions, the AC/heating system in the arena is outdated and needs to be replaced. The system was supposed to only last for 10 years but it’s now 15 years old. Recently maintenance inspected the system and advised that it be replaced as soon as possible.

Since the news broke about Mr. Bradford's arrest, Parkers Inc., a large packaging company in the state, has offered a large sum of money to rename the arena after them. Changing the name would mean returning some money to Bradford & Associates. Finally, you were recently contacted by a Public Relations firm who worked for the arena in the past. They are willing to help out and will charge you a lower rate.

The instructions for team members in the high interdependence condition change wording which, coupled with verbal instructions from the researcher, enact the interdependence manipulations. These instructions are as follows:

Directions

This task is based on a fictional situation and requires a team of four people (you will meet your three teammates soon) to discuss the information presented and make one recommendation as a team on what to do. The case has been given to numerous students and managers in the past so a good answer is well known.

Each of the four team members is given mostly the same information in this document about the situation but also some unique information that the other teammates don't have. Once you are together you will only have 20 minutes to complete the task which means it is critical that you work together well. So, discuss the case for 15 minutes and use the last 5 minutes to write your answer. After you are done with the team recommendation you will return to your individual room.

Goal

Your goal is to have the best team recommendation which will be rated after the study, compared to other teams participating in this study. Thus, working together well is critical.

Rewards

All teams will be paid a base amount of \$20. However, teams that have excellent performance (based on your team's recommendation) will be paid a total of \$60. "Excellent" performing teams will be the top 20% or the top two teams out of every ten teams. Thus, the better your team recommendation, the more you will be paid!

Information

You are a member of the senior management team from a hypothetical professional sports venue, the Bradford Arena. The arena is the home of the state's pro basketball team and regularly hosts other events such as concerts, trade shows, and other high profile events. You and your team have just been asked by the president of the arena, your boss, to make a

recommendation about how the organization should react to breaking news about your primary benefactor's arrest.

Your arena is named after Bradford Inc., a Fortune 500 technology company and the largest public company in the state. The arena has carried this name since it was built 15 years ago and the relationship has always been mutually beneficial. In 2005 Bradford was ranked as one of the 100 most powerful men in the U.S. by Forbes magazine (#67). However, the scandal could really hurt the public reputation of the arena. On the one hand, Bradford donated a sizeable sum of money and may continue to do so in the future. On the other hand, Bradford's troubles could be a big problem for the arena's public image.

In addition to this information that all received, in the high interdependence conditions a small yet critical amount of unique information was given to each participant that paints only a portion of the picture of what happened in the hypothetical case. In the low interdependence conditions all of the following information was given to all the participants. The unique paragraph will be placed at the end of the 'Information' section.

Unique Information

Person A: The news story about Mr. Bradford's arrest said that he hired a private investigator to spy on members of the company's board of directors. The private investigator used illegal surveillance techniques involving wire tapping and identity theft. According to state law, Mr. Bradford is responsible for any illegal activities of the private investigator firm.

Person B: Since the news broke about Mr. Bradford's arrest, Parkers Inc., a large packaging company in the state, has offered a large sum of money to rename the arena after them. Changing the name would mean returning some money to Bradford & Associates.

Person C: You were recently contacted by a Public Relations firm who worked for the arena in the past. They are willing to help out and will charge you a lower rate.

Person D: In addition to Bradford's arrest, the AC/heating system in the arena is outdated and needs to be replaced. The system was suppose to

only last for 10 years but it's now 15 years old. Recently maintenance inspected the system and advised that it be replaced as soon as possible.

Thus, the interdependence manipulation changed five things in the two conditions. First, by giving participants unique information, the need for these teams to interact and depend on each other is heightened. Second, the goal for the team was either team- or individual-focused. Third, the rewards the participant would receive depended on either team or individual performance. Fourth, the confederate supported the interdependence manipulation by referring to the nature of the team or individual reward system (see Appendix I for the confederate's specific scripts and differences indicated). Finally, the researcher gave team-focused instructions and referred to the team-based reward in the high interdependence condition and gave individual-focused instructions and referred to the individual-based reward in the low interdependence condition (see Appendix E for the experimental protocol with differences indicated). A challenge in this study was to keep the task the same while changing the levels of interdependence across conditions and also measuring comparable team and individual performance across conditions. Wageman and Baker (1997) had a similar challenge and guidance from their study informed decisions here to balance these competing demands. The interdependence manipulation, thus, was similar to other studies manipulating interdependence in the lab.

Team Recommendation

After all materials were collected from each participant, including the description of the task and the unique information, the researcher escorted two participants and the confederate into the room of the third participant where the team interaction would occur.

(Due to space constraints only three total rooms were available for this experiment.)

When all participants were seated in the room the researcher indicated that the team had 20 minutes to discuss the information and what each person thought and then to write their recommendation. The following instructions and a separate blank answer sheet were given to each team. This sheet for teams in the low interdependence condition is as follows:

Instructions

- Introduce yourselves and then discuss what Bradford did and what everyone thinks should be the team's recommendation to your boss.
- Choose one team member to write the team's recommendation on the sheet provided.
- Remember, when you return to your individual rooms everyone will do their own recommendation.
- There is one correct answer and the individuals with the best individual recommendations (top 20%) within each team role (Person A, B, C, and D) get \$15 instead of \$5. So, the better your individual recommendation the more money you alone will be paid.
- You have 20 minutes.

Your Recommendation

Your boss, Ken Smith, has told you that resources are tight right now and that the only extra money was assigned to replacing the arena's AC/heating system. He thinks that \$1,000,000 could be made available for a Public Relations campaign to combat the damage to the arena's image from Bradford's scandal. The AC/heating replacement cost is \$1,000,000, but some short-term repairs could be made with less money.

Your boss wants to know how much, if any, of the \$1,000,000 you think should be spent on the Public Relations campaign and why you think this is the best answer. Write on the sheet provided the percentage of the money you recommend be spent and why you think this is the best decision.

The instruction sheet changed in the high interdependence condition to reinforce the manipulation. This sheet for teams in this condition is as follows:

Instructions

- Introduce yourselves and then discuss what Bradford did and what everyone thinks should be the team's recommendation to your boss.
- There is one correct answer and the teams with the best recommendations (top 20%) get \$60 instead of \$20. So, the better your team's recommendation the more money the team will be paid.
- Choose one person to write the team's recommendation on the sheet provided.
- You have 20 minutes.

Your Recommendation

Your boss, Ken Smith, has told you that resources are tight right now and that the only extra money was assigned to replacing the arena's AC/heating system. He thinks that \$1,000,000 could be made available for a Public Relations campaign to combat the damage to the arena's image from Bradford's scandal. The AC/heating replacement cost is \$1,000,000, but some short-term repairs could be made with less money.

Your boss wants to know how much, if any, of the \$1,000,000 you think should be spent on the Public Relations campaign and why you think this is the best answer. Write on the sheet provided the percentage of the money you recommend be spent and why you think this is the best decision.

After 15 minutes, the researcher entered the room to remind teammates that they had five minutes left and to start writing the recommendation if they hadn't started yet. After the researcher collected the team recommendation the participants returned to their original rooms individually (one participant remained in this room) for the post-task phase of the study. First, the participant took five minutes to complete an individual recommendation – separate from the team's recommendation. Next, the researcher asked each participant to provide the second of three saliva samples. The exact same procedures were used to obtain this saliva sample as were outlined previously in the description of the pre-task phase. Finally, the researcher gave each participant a packet with a series of questions to answer about their teammates, the task, and their personal

experience during the interaction (see Appendix H for the post-task packet of questions). Included in this packet were the following types of questions.

The following six variables (team core affect, team affective culture, confederate's personality, team processes, team interdependence, and teammates defensive behaviors) are all team-level constructs. Thus, data must be aggregated from each teammate to study these variables at the team-level of analysis. After analyzing aggregation statistics in order to justify aggregation I averaged the teammates' scores to represent the variable for the team.

Team Core Affect. Affective reaction is a multidimensional construct consisting of the feeling component which corresponds generally to the term 'affect,' the cognitive appraisal of the event, the wide variety of physiological bodily changes that co-occur with emotional experiences, and an action readiness which is a general readiness to deal with the environment through increased arousal and vigilance (Frijda, 1993). This multidimensionality lead Arvey, et al (1998) to conclude that there are two basic ways to measure emotion, administer some type of self-report instrument or interview, and measure the physiological changes caused by the autonomic nervous system. Thus, I measured affective reactions by assessing core affect and physiological changes of participants' cortisol levels.

First, a pencil and paper scale of core affect was given to each participant after the team task interaction. Russell and colleagues (e.g., Russell, 1980; Barrett & Russell, 1998) have long argued that affect is best represented by two independent dimensions: degree of pleasantness and degree of activation. Pleasantness summarizes how someone feels in terms of a hedonic valence of pleasant-unpleasant, positive-negative, good-bad,

etc. while activation refers to “a sense of mobilization and energy and summarizes one’s physiological state in terms of its level of activation or deactivation (Seo, et al., 2004, pg. 426).” Barrett and Russell (1998) report both adjective and statement based scales to measure core affect. I used the adjective based scale which contains 40 words such as “happy” and “irritable.” Each participant rated their core affect after interacting with the team members on the team task. Individual scores for core affect were averaged to form a team-level variable.

Second, Frijda (1993) describes physiological reactions as one of the four main components of an emotional reaction. Two main hormones are released during the stress response: glucocorticoids and adrenaline. I took three saliva samples from participants in order to assess changes in cortisol level (the primary glucocorticoid). The first sample acts as a baseline measure and two post-exposure measures are recommended to more reliably assess an increase from the first measure. Cortisol increase was aggregated to the team level by using the number of teammates with an increase in cortisol (counts). Research is emerging that uses cortisol levels in saliva as an indication of physiological response to a stressor (Fox, et al., 1993; Miller, Chen, & Zhou, 2007; Lai, et al., 2005). For example, Fox and colleagues (1993) found that work load was related to increased cortisol levels in hospital nurses.

Sapolsky (2002) describes the physiological process when a person perceives a stressor (i.e., the disagreeable team member). The brain releases the hormone CRH (corticotropin-releasing hormone) which stimulates the pituitary gland to release ACTH (adrenocorticotrophic hormone) which then stimulates the adrenal gland to release steroid hormones called glucocorticoids. The dominant glucocorticoid is cortisol. During stress,

the level of CRH increases within seconds, the level of ACTH increases in about 15 seconds, and the level of cortisol increases within a few minutes.

I took a saliva sample from participants at three different times to be able to assess change in cortisol levels as an indication of stress reaction. Three instances is considered the minimum optimum number of instances. I took a total of 873 saliva samples from 291 participants. The first sample was obtained in the pre-task phase where participants are introduced to the experiment and fill out a preliminary survey. The second was obtained directly after the 20 minute team interaction phase, and the third was obtained in the post-task phase, after they had filled out the final surveys and just before they left the lab. Each measurement instance was separated by about 20 minutes. Afterwards I had the saliva samples analyzed for changes in cortisol levels. This measure adds strength to the assessment of affective reactions because physiological changes are also an important dimension of an emotional, or affective, reaction (Frijda, 1993).

When I recruited potential participants I asked them to follow six guidelines to participate in this study. These issues were important because they contaminate the readings of cortisol levels in saliva samples. The participants were asked to please observe the following guidelines for the study; the guidelines are as follows:

- 1.) Avoid alcohol consumption within 24 hours before the experiment.
- 2.) Avoid dental work within 24 hours before the experiment.
- 3.) Do not brush your teeth within 2 hours before the experiment.
- 4.) Do not eat a major meal within 1 hour before the experiment.
- 5.) Do not eat dairy products within 1 hour before the experiment.
- 6.) Do not eat acidic or high sugar foods within 1 hour before the experiment.

Team Affective Culture. In addition to the measure of core affect and salivary cortisol I measured the team's affective culture using the team as the referent instead of

the individual. Researchers argue the benefits of referring to the team when assessing team constructs (Kozlowski & Klein, 2000). Therefore, I included the five item scale for team affective culture used by Barsade, Ward, Turner, & Sonnenfeld (2000). An example item is “the emotional culture of our team is enthusiastic and cheerful.”

Confederate’s Personality. After the task interaction each participant rated the confederate’s personality to check this manipulation. To reduce the time answering questions but also to protect the true nature of the study, each participant was told that they had been randomly assigned to rate only two teammates so that every team member would be rated by two other team member and all teammates would be rated evenly. All nine BFI items measuring agreeableness were included along with seven other items to help protect the confederate’s role in the study. In addition, the researcher assessed participant suspicion during the debrief session. This manipulation check assessed how agreeable/disagreeable the confederate was perceived to be.

Team Processes. I measured team process with a nine-item scale developed and reported by Mathieu, Gilson, and Ruddy (2006). Individual scores for team process were averaged to form a team-level variable. The authors constructed this scale from the taxonomy of team processes provided by Marks and colleagues (2001) who argue for three hierarchical categories of team processes: transition, action, and interpersonal processes. Research is continuing to use this taxonomy as a basis for assessment of team processes. Each of these categories contains sub dimensions as well. The sub dimensions of transition processes include mission analysis and planning, goal specification, and strategy formulation. The sub dimensions of action processes include monitoring progress towards goals, systems monitoring, team monitoring and backup

behaviors, and coordination activities. The sub dimensions of interpersonal processes include conflict management, motivation and confidence building, and affect management. Each participant rated the team's processes in the post-task interaction phase.

Team Interdependence. The interdependence scale developed and reported by Campion, Medsker, and Higgs (1993) was given to check the interdependence manipulation. The scale measures task, goal, and reward interdependence and has been shown to be reliable. Individual scores for team interdependence will be averaged to form a team-level variable. Example items include "within my team, work performed by other team members are dependent on another's work" and "I could not accomplish my task without information from other members of my team." Each participant rated the level of task, goal, and reward interdependence after interacting with the team members on the task.

Team Defensive Behaviors. The study of defensive behaviors in response to experiencing negative affective reactions to a bad apple was exploratory in nature because little research has occurred on their place within the team bad apple model. However, Felps and colleagues (2006) note revenge and withdrawal behaviors as likely defensive behaviors. I adapted two items from a scale for retaliation (Greitemeyer & Rudolph, 2003) and added two items in order to measure possible revenge behaviors. I also adapted two items from a scale for withdrawal (Taris, Schreuders, & Van-Iersel, 2001) and added two items to measure potential withdrawal behaviors of participants. Each participant rated the other three teammates including the confederate on this scale. Individual scores for defensive behaviors were averaged to form a team-level variable.

An example question to measure retaliation is “how much did each teammate show anger?” Also, an example question to measure withdrawal is “how much did each teammate distance him- or her-self from others?”

After the packet of questions was completed the researcher asked each participant to provide the third of three saliva samples. As stated above, the exact same procedures were used to obtain this last saliva sample as were outlined in the description of the pre-task phase.

After all scales were filled out and all saliva samples were obtained the researcher reunited the team (excluding the confederate) to debrief the participants about the confederate’s role, the true nature of the experiment, and why saliva samples were collected (see Attachment F for the Experimental Protocol). The participants were told that the confederate was actually a knowing research participant trained to behave in a certain way - either disagreeable or non-disagreeable depending on the condition. The researcher further explained that the experiment was designed to see how a highly disagreeable teammate impacts other teammates, the team itself, and the performance of the team. Also, a purpose of the experiment was to see if the level of interdependence among team members would moderate the negative impact of the disagreeable teammate on other teammates’ emotional reactions. Two things were manipulated, the disagreeable behavior of the confederate and the level of interdependence, or requirement for interaction among team members. The researcher explained that to effectively study the personality trait of disagreeableness (or the opposite of agreeableness) a trained research participant had to be used and disagreeable speaking and behaving had to be enacted in two of the four conditions.

The researcher told each participant which condition they were in, the nature of the other conditions, and that checks would be mailed in a week or two. Also, the nature of the saliva sample was explained. The researcher told the participants that a hormone found within saliva, called cortisol, is known to be an indicator of an affective, or stress reaction. The purpose of taking these samples was to better measure the individual reaction to having to work with a highly disagreeable teammate. Any questions from the participants were addressed and answered fully before the participants left the lab. Finally, just before participants were released from the experiment, they were asked to not discuss the true nature of the experiment with anyone else until over the end of Fall semester, 2007. This step was critical to lessen contamination of the pool of potential participants.

Enacting the Disagreeable Profile

In order to translate the profile of the disagreeable person into specific behaviors I will first review the profile that I constructed in the preceding chapter. Second, I will describe general rules the confederate used to implement the profile. Finally, I will present the specific scripts of statements and behaviors the confederate consistently enacted. The rules and scripts were derived from the disagreeable profile which is based in the personality/agreeableness literature. The confederate was trained to use these statements and behavior guidelines consistently in the two disagreeable conditions of high interdependence (condition 1) and low interdependence (condition 2). In addition, the confederate was trained to use non-disagreeable statements and behavior in the non-disagreeable conditions of high interdependence (condition 3) and low interdependence

(condition 4). The confederate changed all disagreeable aspects of his character to be non-disagreeable. Also, an average level of natural participation was scripted.

The disagreeable profile is a list of five categories that comprehensively describe the disagreeable person. These categories were constructed from a review of the personality literature that focused on agreeableness, and in some instances on disagreeableness. Each category also contains a list of adjectives that help to more fully describe each category. The categories and adjectives are as follows: hard-hearted (indifferent, uncaring, thoughtless, inconsiderate, unkind, cold, unsociable, unfriendly, unlikable, hard-hearted, unpleasant, and ill-natured). Hard-minded (inflexible, stubborn, uncooperative, noncompliant, harsh, rough, dominance, arrogance, narrow-minded, and impatient). Mean (hostile, spiteful, quarrelsome, hurtful, aggressive, rude, vengeful, relationship conflict). Insecure (paranoid disposition, suspicious, jealous, distrustful, complicated, emotionally unstable, and insecure). Selfish (unforgiving, ungrateful, pessimistic, tightfisted, self-centered, and selfish). These five categories form the basis of the following general rules and specific scripts.

Two levels of manipulations translated the disagreeable profile to the behaviors of a disagreeable team member. The general level is made up of rules used by the confederate to guide his interactions with the participants in both an apparently natural way but also in a way consistent with the disagreeable profile. On the other hand, the specific level is made up of exact scripts that were used consistently within each condition. While the general rules don't pertain to any specific phase of the team's task interaction, the specific scripts pertain to the five stages of group development (Heinen & Jacobson, 1976).

General Rules

Four general rules were given to the confederate to guide his choices of things to say and decisions to make throughout the team task interaction. Applications of these general rules were made as consistently as possible across all teams in the two disagreeable conditions. However, the confederate was also instructed to follow the lead of a team in how the team chose to complete the task and interact with the confederate. The two primary elements of presenting the disagreeable person were through his voice (tone and language) and his behaviors (body language and interactions).

First, the tone of voice the confederate used in his speech and communications with the teammates was an important element of a disagreeable person. According to the profile, the confederate's tone should be rude, inconsiderate, impatient, emotionally unstable, and pessimistic. Adjectives were picked because they most closely matched the profile with the nature of the presentation; the tone of voice in this instance.

Second, slightly vulgar language was used by the confederate in a highly controlled manner. Vulgar language is an important avenue of disagreeableness and typifies being rude, hostile, hurtful, ill-natured, and rough. The importance of representing the disagreeable person according to its true nature requires the confederate use some vulgar language, although some concerns arise. To minimize the negative impact on the participants the confederate only used two minimally offensive words (hell and damn) a total of five times. By controlling the level of slightly vulgar output, the participants were exposed to this display in a modest manner (5 words in 20 minutes) while still being exposed to a necessary amount of disagreeableness. In addition, the

debriefing at the end of the experiment notified participants of the nature of the confederate's role.

Third, the body language of the confederate was another way for the confederate to display disagreeableness. According to the profile the body language should be harsh, unfriendly, cold, arrogant, inflexible, distrustful, and impatient. Disagreeableness was expressed through body language in the following four ways. The confederate was trained to have an irritated, annoyed look on his face (harsh, unfriendly). When the team was sitting at the table he usually sat a little further back from the table (cold, arrogant), with arms and legs crossed (inflexible, distrustful), and was often tapping a leg as if were in a hurry (impatient).

Fourth, the confederate allowed the naïve participants to lead the team during the interactions. Although the negative impact of this teammate is the focus of the study, it was also important to minimize his contamination of team performance by reducing his unintended impact on the team. He was trained to not assume any role of team leadership, facilitation, or the like. By training the confederate to assume a follower role, he was best positioned to show the characteristics of being suspicious, jealous, distrustful, ungrateful, and pessimistic. This general rule acted as guidance for the confederate when he had to make judgments about what to say and how to act. Specific statements will be described in the following section.

Specific Scripts

The five stages of small group development (forming, storming, norming, performing, and adjourning) were used to guide the development of the specific scripts for the confederate (see Appendix I for the full confederate scripts for each condition).

Although all five of these stages weren't represented in the short, 20 minute task, the framework provided a useful structure of the task interaction time. Scripted expressions of disagreeableness were then fitted into the structure.

The forming stage concerns the initial entry of members to a group and centers around members getting to know each other. Members tend to think about what the group can offer them and how their needs will be met. This stage only lasted a few moments in this setting because teams were under a time limit to perform the task. As teammates introduced themselves the nature of the disagreeable teammate was also introduced. For example, the confederate introduced himself with the following phrase, "I'm Brian, and I think this is pretty stupid" (unfriendly, ill-natured, suspicious). In addition, he said "What the hell's up with the spitting" (suspicious, distrustful)?

The storming stage tends to involve tension and invoke emotions as members begin to define the team's task. Internal or external pressures tend to become salient and attention often begins to focus on obstacles that may hinder group performance. In this stage the nature of the disagreeable teammate should not only become clear but also be recognized as an obstacle for the group – a threat to harmonious team dynamics, high performance, and a higher reward. Participants needed to realize very early in the 20 minute team task interaction that one member was highly disagreeable and posed a threat to team goals and rewards. Thus, while the disagreeable teammate introduced himself in a disagreeable way during the forming stage, the storming stage was the most critical timeframe for the confederate to display clearly disagreeable interpersonal interactions.

When the task process was discussed the confederate said things about the nature of the task at different moments when he felt the timing was right and regardless of the

strategy a team decided to follow. For example, he said “I think this is full of crap.” (quarrelsome, spiteful), “I doubt we will be able to do well on this” (pessimistic) and “I think this experiment is a joke” (unpleasant). To minimize the possible leadership impact of the confederate, he did not propose alternative solutions but rather remained quarrelsome and stubborn and allowed the team to deal with him as they wished. Rather than focusing on how to complete the task, the confederate focused on his displeasure with the scenario, i.e., having to decide what is most important, having to interact with others, etc. If teammates told the confederate that he could withdraw at any time, the confederate responded that he needed the extra credit and wanted to win some money. This enactment was designed to take away valuable resources from the team, namely time and effort spent on interacting and dealing with the disagreeable teammate and not focusing on task accomplishment.

For most teams the norming stage occurs when group members come together in working relationships and feel integrated into a collective – the team. Usually the challenges of the storming stage are met with arrangements and understandings as the team begins to focus on task accomplishment. But, because of the presence of the disagreeable teammate and the overt display of disagreeableness in the storming stage, the norming stage may not occur for these groups. It should be characterized more by how the teammates (the experimental participants) dealt with the difficult team member than by the team gaining a true sense of harmony. In fact, limiting the development of a group is one of the central negative implications of having a highly disagreeable member on a team. The confederate was trained to speak and act in an uncooperative, distrustful, unsociable, inflexible, and unforgiving ways. Thus, the disagreeable teammate can be

thought of as the 'anti-team player' because of the negative impact on important within-team process variables like cooperation and conflict management and state variables like cohesion and trust.

The performing stage in typical groups is characterized by an emergence of mature interpersonal relationships and a stable team structure that can deal with complex and challenging tasks. The members tend to be motivated and satisfied and the mature team is now able to adapt to internal and external demands. However, because of the disagreeable member and the time limitation to interact in this study, the teams were not likely to achieve this stage. The members were challenged to deal with the disagreeable teammate and fulfill the requirements of the assignment on time. Thus, teams weren't likely to reach any sense of maturity because effort and time were devoted to managing the disagreeable team member. In this stage the confederate was trained to speak and act in an uncooperative, distrustful, unsociable, inflexible, and unforgiving ways just as under the norming stage. However, in order to maintain some aspect of task contribution, the confederate followed the teams lead on the task. In the performing stage this means he needed to offer his unique information when asked for and do a minimal amount of task contributions. It was critical that this level of task contribution be held constant not only within the two disagreeable conditions but also in the two non-disagreeable conditions.

While working on the task, the confederate stated the following two statements, in addition to other communications to appear natural while also presenting the disagreeable profile. First, "I think this Bradford guy is a jerk." Second, the confederate avoided being the writer in all conditions. Thus, in the disagreeable and high interdependence

condition the confederate stated “there’s no way in hell I’m going to be the writer.” In the non-disagreeable and high interdependence condition he stated “I don’t want to be the writer.”

The adjourning stage was very brief but, just like the forming stage, allowed another opportunity for the confederate to express his disagreeableness. This stage is characterized by the group being able to disband when the time comes and is important for temporary groups in organizations that form and disband in a relatively short amount of time. This stage likely commenced when the researcher entered the room to stop the work on the team task. Teammates concluded their discussions and writing efforts and may have felt a need to offer a conclusion to the task. This opportunity allowed the disagreeable teammate to give one last negative input before the group disbanded and the members returned to their individual rooms for the post-task phase of the experiment. During this stage the confederate made the following statement, “I’m glad I’m done working on this stupid thing (impatient, unfriendly).”

The non-disagreeable aspects of the confederate’s participation were kept constant in the non-disagreeable conditions (see Appendix I for the confederate scripts for the non-disagreeable conditions as well). All disagreeable aspects of the general rules and the specific scripts were removed and the confederate was trained on this condition as well as the disagreeable condition. Just as in the disagreeable conditions, he was trained to allow the teams to take the lead on how to approach the task. He followed their lead and gave an “average” amount of participation, not too much and not too little. He was trained to use an average level of agreeableness in tone, body language, and demeanor. He was also instructed not to use any vulgar language. In addition to general

rules of speaking and behaving, the specific scripts were modified to remove all aspects of the disagreeable profile. For example, he introduced himself by saying “I’m Brian and I’m ready to get to work.” During the adjourning phase, he said “I’m glad I could work on this with you guys.” Also, the purely task related behaviors that were described under the performance stage above were required of the confederate in the non-disagreeable conditions.

Analysis

Two types of intermediate analyses were needed before the data from the study could be analyzed to obtain the final results: performance assessments by two trained coders and salivary cortisol levels from the lab analysis.

Performance. I trained two people to rate the recommendations for this study. The two rated twenty recommendations, their differences were discussed and resolved and then they rated another twenty recommendations. The interrater reliability was .69. I collected 97 team recommendations and 291 individual recommendations. Three aspects of the recommendation were rated to distinguish levels of performance: how well the unique information of the situation was presented and integrated, the quantity and quality of logical justifications or reasons for their decision, and the quantity of the writing by way of a word count. The instructions to the raters are included as Appendix J.

First, 50 percentage points came from how well each recommendation presented and integrated the unique information into the justification for the recommendation of how much to give to the PR campaign. Raters were instructed to award one point when a piece of information was used. Afterward, the 50 percentage points were allotted based on the distribution of points awarded by the raters.

Second, 25 percentage points came from the quantity and quality of the reasons given why their decision was correct. Raters were instructed to give one point for each reason or two points for a detailed reason. They also gave a point if the team stated decisions within the recommendation or two points if it was detailed. This aspect related to a team better presenting their recommendation by way of communicating decisions. It also related to thinking about implications. Raters also awarded one point for well organized recommendations that used bullets or multiple paragraphs. This was a sign of a higher quality recommendation. Just as before, the 25 percentage points were awarded based on the distribution of the raters' scores.

Third, 25 percentage points were attributed to the quantity of information given in the written justification. A word count determined these points. After all recommendations were graded a percentile distribution was created and each recommendation was categorized into one of ten categories. Category #1 was roughly be the top 10% of recommendations in terms of word count and received all 25 points. Category #2 was the next 10% and received 23 points. Category #3 was the next 10% of recommendations and received 21 points. So on until category #10 which was the bottom 10% and these teams received only 7 percentage points.

Team Performance. Team performance is the score of the team's recommendation. Thus, team performance for the two conditions is highly similar in order to reasonably compare teams across all four conditions.

Individual Performance. The individual performance of every participant was measured by the rating of their individual recommendation (same rating scheme outlined for team recommendations). In addition, teammate ratings of their individual

performance contribution to the team help measure individual performance. Thus, just as with team performance, comparable measures of individual performance were obtained in all four conditions. In addition, the 9-item scale for contextual performance from Morgeson and colleagues (2005) was used. An example item is “how much did each teammate go out of their way to help team members with task-related challenges?”

Cortisol Levels. I stored the saliva samples in a freezer in the Sociology department’s ‘SPIT Lab’ because it took about two and a half months to collect all the samples. I transported them via automobile, on dry ice, to a lab at the University of Tennessee medical center where they were analyzed in the lab of Dr. Arnold Postlethwaite, MD. This lab contains all necessary equipment to analyze the enzyme-amino assay (EIA or Elisa test) of the saliva sample including a centrifuge machine and a plate reader.

Expected Budget vs. Actual Expenses

This lab study outlined in this dissertation was expensive. Table 2 presents the estimated budget prepared before the study, assuming 88 teams and 264 participants. Table 3 presents the actual expenses from 97 teams and 291 participants. Knowing that funding was critical for this study I applied to four research grants, receiving three of the four. First, I was awarded a National Science Foundation (NSF) Dissertation Improvement Grant in the amount of \$7,270. Second, I was awarded the Mary Tenopyr 2007 Graduate Student Scholarship from the Society for Industrial and Organizational Psychology (SIOP) in the amount of \$3,000. Third, I was awarded a Graduate College summer fellowship in the amount of \$3,000. I used \$2,000 of this fellowship for living expenses and \$1,000 for expenses. In total, I acquired \$11,270 for this study.

Table 2 – Proposed Budget.

<u>Cost Source</u>	<u>Calculations</u>	<u>Totals</u>
Participant Pay	264 people paid \$15 = \$3,960	\$3,960
Confederate Pay	\$10 per hour Training and piloting = 20 hours Running 88 teams = 88 hours	\$1,080
Saliva Sample Analysis	3 samples from 264 subjects = 792 samples Collection supplies = \$792 Analysis supplies = \$3,045	\$3,837
Raters to Assess Recommendations	352 recommendations at \$2 each (88 team and 264 individual recommendations)	\$704
Other	(Unanticipated costs, 15% of total of \$9,581)	\$1,438
GRAND TOTAL		▶ \$11,019

Table 3 – Actual Expenses.

<u>Cost Source</u>	<u>Calculations</u>	<u>Totals</u>
Participant Pay	291 people paid \$15 = \$4,365	\$4,365
Confederate Pay	155 hours at \$10 per hour	\$1,550
Saliva Sample Analysis	3 samples from 291 subjects = 873 samples Collection supplies = \$500 Analysis supplies = \$3,369 Analysis Trip = \$500	\$4,369
Raters to Assess Recommendations	Lab assistants received lab credit and \$50 388 recommendations (97 team and 291 individual recommendations)	\$100
Other	Printing \$500 Miscellaneous \$300	\$800
GRAND TOTAL		▶ \$11,184

CHAPTER IV

RESULTS

In this chapter I present team-level analyses of the data from the experiment described in the previous chapter. I first review the variables in the study, discuss aggregation, and look at descriptive statistics. I then report results from linear regression analyses testing the five hypotheses outlined in the previous chapter. I conclude by reporting results from mediation and mediated moderation analyses. The model is depicted in Appendix B.

Variables in the Study

The variables measured in the study are reviewed here for a summary before the discussion of aggregation, descriptive statistics, and results. For a more thorough coverage of the measurement of these variables see the previous chapter.

Disagreeableness

The primary predictor hypothesized in the model is the personality trait of disagreeableness. The variable was manipulated in this study using a confederate to enact a situation where a teammate is highly disagreeable as compared to a situation where the confederate is not disagreeable. A more detailed discussion of the enactment of the disagreeable teammate is found in the previous chapter.

Team Interdependence

The moderating variable hypothesized in the model is team interdependence. This variable was also manipulated in this study. As described in the previous chapter I changed the directions, goals, rewards and task information from individual- to team-based in order to create a highly interdependent situation and a less interdependent

situation. These two manipulated variables form the 2x2 design of the study as depicted in Table 1 in the previous chapter. Teammates rate the level of the confederate's agreeableness and the level of the team's interdependence to check the effectiveness of these manipulations. These results will be described later in this chapter.

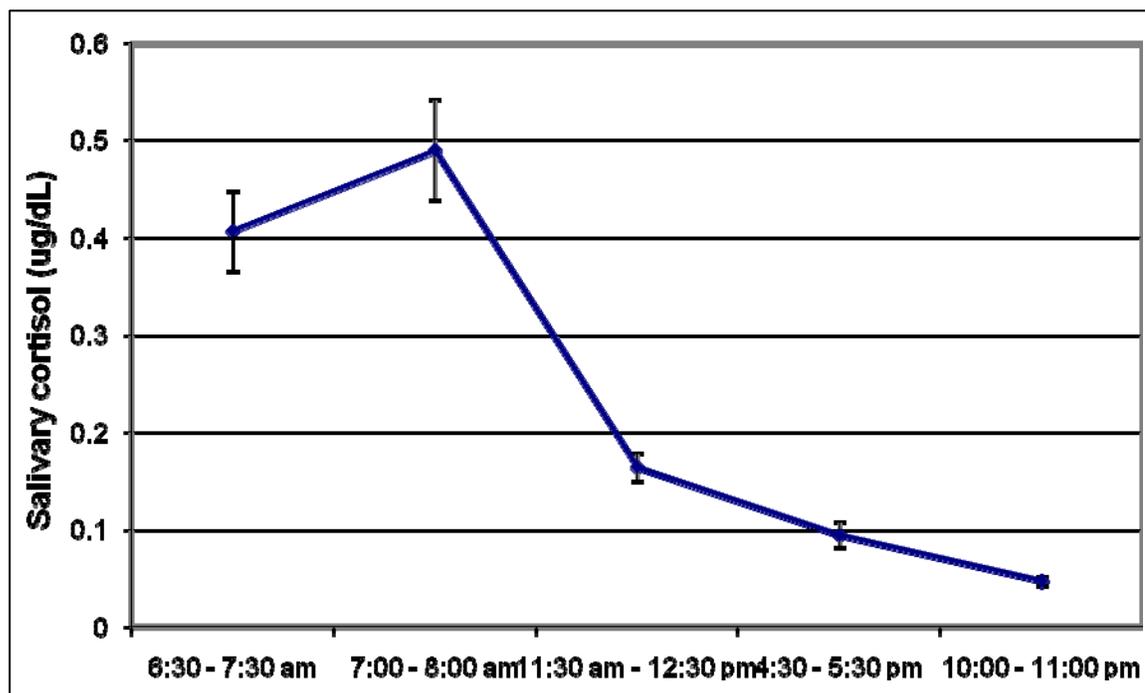
Team Affective Reactions

The heart of the model is team affective reactions because they are the key mediator linking a disagreeable teammate to team process and performance. Due to their importance, and following guidance in the literature (Frijda, 1993), I measure a team's affective reactions multiple ways. First, teammates rate their own positive and negative core affect after the team interaction. Second, teammates provide salivary cortisol samples once before and twice after the team interaction. Third, teammates rate the affective culture of their team using the team as the referent. Including three measures of team affective reactions allows for a more complete measure of this critical variable.

Salivary cortisol has been used extensively as a biomarker of both trait- and state-based individual differences in the psychophysiology literature (e.g., Henning, Boucsein, and Gil, 2001). For example, research shows causes such as physical, psychological, or psycho-social threats relate to sudden increases in cortisol. In addition, ample research evidence clearly concludes that increased cortisol levels over time relate to various negative health outcomes such as cardiovascular problems (Ganster, Fox, & Dwyer, 2001). One of the challenges in the use of salivary cortisol in research comes from the physiological nature of the measure. The circadian rhythms of humans changes cortisol levels throughout the day. This average diurnal cycle of cortisol is well established in the physiology literature and is shown in Figure 1. The figure was supplied by Salimetrics,

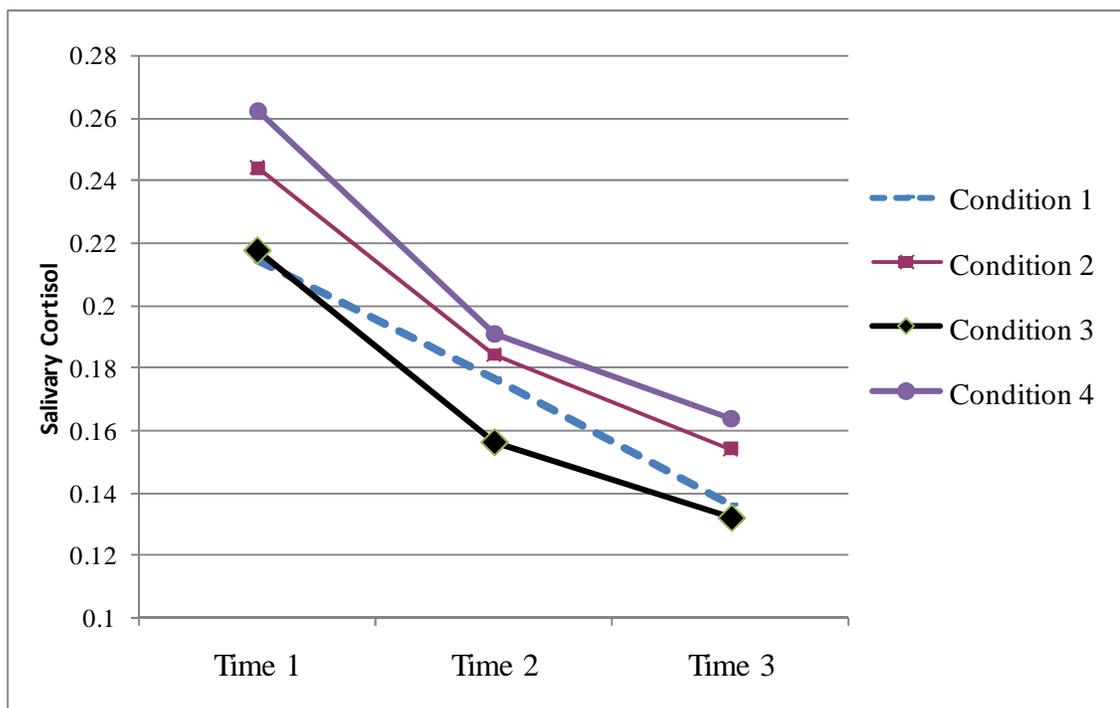
Inc. and shows a quick rise in cortisol, measured in micrograms per deciliter ($\mu\text{g}/\text{dl}$), in the early morning up to about 8 am. Thereafter, cortisol levels decrease and the standard deviations (the error lines in the figure) decrease as well indicating more variation earlier in the day. The cortisol samples from this study follow the diurnal pattern as displayed in Figure 2. This figure charts the average cortisol levels, also in micrograms per deciliter ($\mu\text{g}/\text{dl}$), within each condition for each of the three times of measurement. Thus, despite the fact that measures were restricted between the hours of 11:00 and 15:30, the characteristic drops were evident in the data. The general curve is consistent with reported cortisol research and has a downward slope that is slightly concave up.

Figure 1. Normal Diurnal Cycle of Cortisol Throughout the Day.



Note: Cortisol is measured in micrograms per deciliter and one standard deviation above and below the means is portrayed with the error line. Chart provided from Salimetrics, Inc. based on extensive cortisol data.

Figure 2. Cortisol Measures at Three Times Across Experimental Conditions.



Note: Cortisol is measured in micrograms per deciliter and one standard deviation above and below the means is portrayed with the error line.

Reliability of the salivary cortisol measure is critical to provide assurance in its results (Hruschka, Kohrt, & Worthman, 2005; Hinz, Hueber, Schreinicke, & Seibt, 2002). I will first discuss information pertaining to its analysis and then compute a reliability from the data. Salivary cortisol levels were determined in duplicate using an enzyme-immuno assay kits sometimes referred as EIA, or ELISA kits (Salimetrics, Inc., PA). The lab technicians performing the analyses were well experienced in EIA kit analysis and followed strict protocols for safety and accuracy. The far majority of within-assay coefficients of variation were under 5% which corresponds to acceptable levels reported in the literature (e.g., Matheson, & Cole, 2004). In addition, because participants provided a total of three saliva measures I can compute reliability of cortisol based on

correlations across three measures within each individual. However, reliabilities based on the whole sample would be biased because one of the conditions has both manipulations present (1) and two conditions have one of the two manipulations present (2 and 3). On the other hand, condition 4 serves as a control condition because none of the manipulations (high interdependence or high disagreeableness) were present. The three intercorrelations among cortisol measures in taken in condition 4 were .91 (T1 and T2), .96 (T2 and T3), and .84 (T1 and T3). The final correlation is the lowest because it has the greatest amount of time between the measures and, due to the diurnal cycle is a weaker measure of reliability. Thus, the average of the first two correlations is .94. Finally, the square of this correlation provides me with a cortisol reliability of .88.

Team Defensive Behaviors

Following the theoretical model of a bad apple in a team proposed by Felps and colleagues (2006) I also include defensive behaviors as a mediating variable between affective reactions and team processes. Teammates rate both the retaliation and withdrawal behaviors of their teammates after the team interaction.

Team Process

No study of team dynamics would be complete without team process. As described previously I use one scale to measure process generally rather than multiple scales to measure specific team processes like communication, coordination, or conflict because it is well established in the I-P-O model.

Team Performance

Teams wrote a recommendation based on the task and instructions provided. These recommendations have been coded by two independent coders who were trained to

code the recommendations according to use of information, quality of justifications, and quantity provided. The instruction sheet given to the coders is included as Appendix K.

Covariates to be Controlled

In addition to the primary variables depicted in the model, four important team-level covariates are included in the analyses in order to control for their effects: a team's average initial mood, emotional stability, intelligence, and gender composition (coded 0 for female and 1 for male). This experiment studies the impact of working with a disagreeable teammate on team variables. Because the first mediator that links disagreeableness with team process and performance is team affective reactions (a state measure of affect), it is necessary to control for the participant's mood before exposure to the disagreeableness manipulation. In addition, I control for the personality trait of emotional stability because a team with higher emotional stability should be more resistant to reacting affectively to the disagreeable teammate. Also, the average level of intelligence on a team is controlled because more intelligent teams should perform better. I use a participant's test score on either the ACT or SAT exam as an indicator of intelligence. Thus, by including it I can understand the impact of disagreeableness on team performance, beyond the effects of intelligence. Finally, although the confederate is male I allowed the gender composition of the rest of the team to vary randomly. In order to separate out possible gender effects I control for team gender composition in the analyses.

Aggregation

I aggregate individual-level scores at the team level in order to portray all the variables at the team-level of analysis. All variables except salivary cortisol are

aggregated by averaging the three teammates' scores. In order to aggregate salivary cortisol to the team-level of analysis I must represent the individual data at the team-level in a way that is (a) justifiable statistically and (b) preserves the useful information from the individual data. In this study I am interested in whether a person's cortisol levels go up in response to exposure to the disagreeable manipulation, the interdependence, or both. Thus, a change or difference score (e.g., $T2 - T1$) can portray this information well. However, problems arise when inspecting the change score data. The ICC(1) statistic is .06 and the ICC(2) statistic is .18, both of which are the lowest in this study. In addition, the ICC(1) statistic is not significant, despite it being significant for every other measure in this study. Also, the distribution also exhibits a high level of kurtosis (4.95, standard error of .49). These results indicate high within-unit variance versus between-unit variance. Thus, aggregation of change score data is not justified. On the other hand, counting whether a person has an increase in cortisol is an alternative to using a change score to represent salivary cortisol increase. I will aggregate salivary cortisol increase to the team-level by using counts in subsequent analyses. Two challenges emerged when using a count in this study: adjusting for the diurnal cycle or natural downward slope of cortisol measures throughout the day, and assessing whether the increase is beyond what would be expected given the reliability of salivary cortisol.

In order to adjust T2 measures for the natural diurnal cycle of cortisol I took the difference between T1 and T2 cortisol in condition 4, the default control condition in this study. Looking at changes incorporating other conditions would contaminate the adjustment with the resulting cortisol increase I intend to find. Thus, I adjusted all T2 cortisol levels upward by .074 which is the drop in cortisol from T1 to T2 in condition 4.

In addition, a useful way to assess whether a cortisol increase (or decrease) at time 2 is outside what would be expected given cortisol data at time 1 is to use prediction bands. I constructed 95% confidence intervals around each participant's T1 cortisol measure based on the standard error of measurement (SEM) and standard deviation. The bands add or subtract $1.96 * SEM$ to the score and the SEM is calculated by taking the square root of $1 - \text{reliability}$, and multiplying it by the standard deviation. The band added or subtracted .072 to individual T1 cortisol measures.

According to the above steps, 52 participant's T2 cortisol level were above while 30 participant's T2 cortisol level were below the band. Those above the band were in conditions 1(22 people), condition 2 (10), condition 3 (12), and condition 4 (8). Those below the band were in conditions 1 (6 people), condition 2 (5), condition 3 (7), and condition 4 (12). Thus, two and a half times as many people who had an unexpectedly large increase were in condition 1 versus 4 while twice as many people who had an unexpectedly large decrease were in condition 4 versus 1. Both support the notion that more people will have increased cortisol levels when exposed to disagreeableness. In fact, that twice as many with a large decrease were in condition 4 than condition 1 indicates that the diurnal adjustment to T2 cortisol scores may be conservative.

I report the aggregation statistics $Rwg(j)$, $ICC(1)$, and $ICC(2)$ in Table 4 in order to justify the use of the other aggregated measures at the team level. The $Rwg(j)$ statistic is computed on one team at a time and takes into account within-team agreement but not between team variability. I report the average $Rwg(j)$ for a given variable in the table and find that it is above the .70 standard for all variables indicating justification for aggregation. However, this statistic is often criticized for the assumption of a rectangular

distribution of responses. In order to address this criticism I show how the statistic changes under the assumption of a normal distribution and a slightly skewed distribution of responses. The standard deviation tends to go up but the statistic still remains above .70 for all variables. Thus, the Rwg(j) statistic provides evidence to justify aggregation for all study variables. In addition, I report ICC statistics.

Table 4. Aggregation Statistics: Intraclass Correlation (1), Intraclass Correlation (2), and Mean Rwg(j).

			Rectangular Distribution	Normal Distribution	Slightly Skewed
	ICC(1)	ICC(2)	Rwg(j) Mean (St. Dev.)	Rwg(j) Mean (St. Dev.)	Rwg(j) Mean (St. Dev.)
Disagreeableness	.56	.79	.96 (.03)	.92 (.10)	.87 (.16)
Interdependence	.40	.67	.93 (.06)	.84 (.22)	.80 (.38)
Positive Team Core Affect	.26	.52	.96 (.05)	.88 (.15)	.83 (.36)
Negative Team Core Affect	.12	.28	.98 (.02)	.94 (.11)	.92 (.12)
Total Team Core Affect*	.26	.51	.97 (.04)	.91 (.13)	.88 (.24)
Team Affective Culture	.45	.71	.89 (.12)	.80 (.22)	.73 (.29)
Retaliation	.19	.42	.89 (.16)	.81 (.28)	.82 (.24)
Withdrawal	.19	.42	.78 (.26)	.70 (.34)	.81 (.30)
Team Defensive Behaviors*	.29	.55	.84 (.21)	.76 (.31)	.82 (.27)
Team Process	.26	.49	.95 (.05)	.90 (.14)	.89 (.17)

Note: For aggregation statistics disagreeableness and interdependence are represented by the participants' responses. The F-test for ICC(1) for all variables is significant at the .05 level. * Indicates a total score, combining the previous two measures.

A significant ICC(1) statistic can be interpreted as the proportion of variance explained by team membership while ICC(2) is an estimate of the reliability of team means (Bliese, 2000). The F-test is significant for ICC(1) for all variables in Table 4 indicating a significant proportion of variance explained by team membership. In addition, the ICC(2) statistic is near or above the .70 standard for the two manipulation checks and affective culture, and it is lower for the other variables. This finding is understandable for core affect and defensive behaviors because they are inherently individual-level phenomenon. A person's core affect is a rating of their level of positive and negative affect after interacting with the team. Each person's defensive behaviors were rated by the other two naïve participants and then averaged to form a team composite. Thus, one person's level of core affect or defensive behaviors is impacted by individual drivers in addition to the shared team environment. However, the low ICC(2) for team process of .49 is unexpected, especially given the adequate ICC(2) for team affective culture of .71.

The aggregation statistics provide complete justification for aggregating disagreeableness, interdependence and team affective culture and therefore these variables will be reported as aggregates. In addition, given the nature of the measures for core affect and defensive behaviors, coupled with adequate Rwg(j) and ICC(1) statistics, these variables will be reported as aggregates. Finally, I will report team process as an aggregate because of the adequate Rwg(j) and ICC(1) statistics, despite its low ICC(2) statistic. Thus, while aggregating team process is mostly justified, aggregation for the rest of the study's variables is well justified.

Descriptive Statistics

Table 5 reports the means, standard deviations, and correlations for all variables in the study aggregated to the team-level of analysis. Scale reliabilities are reported on the diagonal and disagreeableness and interdependence are represented by dummy codes (0,1). As expected, disagreeableness correlates with salivary cortisol ($r = .18$), total core affect ($r = -.42$), team affective culture ($r = -.65$), team process ($r = -.63$), and team performance ($r = -.38$). The correlation between disagreeableness and defensive behaviors ($r = .19$) had a p value of .056. Interdependence correlates with salivary cortisol ($r = .24$), defensive behaviors ($r = -.23$), and team process ($r = .29$), but not with total core affect, affective culture, or performance. Team cortisol increase correlates with ACT test score ($r = -.23$) and retaliation ($r = -.18$). Total core affect correlates with defensive behaviors ($r = -.45$), process ($r = .57$), and performance ($r = .24$). Affective culture correlates with defensive behaviors ($r = -.51$), process ($r = .80$), and performance ($r = .38$). Defensive behaviors correlate with process ($r = -.59$) and performance ($r = -.35$) and process correlates with performance ($r = .44$). All scale reliabilities are above the standard .70 and range from withdrawal at .73 to disagreeableness at .94.

Assessment of Manipulations

Disagreeableness was manipulated in this experiment as outlined in the previous chapter. The confederate was given scripts to follow (Appendix J) and was trained to behave in ways that portrayed the characteristics of being mean, inconsiderate, uncooperative, insecure, and selfish. Before assessing the impact of this manipulated variable on team affective reactions it is important to evaluate the effectiveness of the manipulation. As described in Chapter 3, participants rated the personality of two of their

Table 5. Correlations, Means, Standard Deviations, and Reliabilities for all variables.

	M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1. Disagreeableness	.51	.50	.94							
2. Interdependence	.51	.50	.01	.84						
1. Time	1.94	.80	.03	.03						
2. Age	21.0	1.81	.02	.05	.06					
3. Gender	.59	.29	-.13	-.01	.07	.06				
4. Race	.93	.15	.05	.01	.05	-.03	-.09			
5. ACT Test Score	24.9	2.15	.14	.08	.07	-.17	-.02	.21		
6. College GPA	3.18	.22	.00	-.02	.09	.07	-.18	.15	.31	
7. Initial Positive State Affect	2.73	.44	-.07	.13	.11	.08	.06	-.21	-.14	-.09
8. Initial Negative State Affect	1.57	.25	-.00	-.09	-.05	.01	-.08	.02	-.11	.03
9. Initial Mood*	3.58	.25	-.05	.16	.12	.06	.09	-.19	-.07	-.10
10. Extraversion	3.51	.43	-.09	.11	.11	-.19	-.06	.17	.02	.00
11. Agreeableness	3.80	.29	.15	-.01	-.11	.16	-.17	-.15	-.09	-.10
12. Conscientiousness	3.71	.30	-.15	-.10	.05	.10	-.11	-.11	-.16	.32
13. Emotional Stability	3.38	.40	-.04	-.01	.16	-.13	.27	-.02	.13	-.09
14. Openness to Experience	3.35	.32	.04	-.07	.10	-.06	.06	-.23	-.01	-.12
15. Team Cortisol Increase	.54	.66	.18	.24	.00	.06	.04	-.04	-.23	-.08
16. (Team Cortisol Decrease)	.31	.58	-.15	-.08	-.18	-.13	.17	.11	.04	.04

Note: N = 97 teams except for Affective Culture which is 92. Disagreeableness and interdependence are both dummy coded (1, 0). Reliabilities are reported on the diagonal. Correlations between .17 and .19 are significant at the .10 level. Correlations between .20 and .26 are significant at the .05 level. Correlations above .26 are significant at the .01 level. *Indicates a total score of the previous two measures.

Table 5 Continued.

	M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
17. Positive Team Core Affect	2.90	.48	-.41	.02	-.01	.02	.07	-.19	-.10	-.09
18. Negative Team Core Affect	1.50	.29	.29	-.13	-.10	-.03	-.17	.14	.03	.10
19. Total Team Core Affect*	3.70	.33	-.42	.07	.04	.02	.13	-.20	-.09	-.11
20. Affective Culture	3.57	.65	-.65	.11	.04	-.02	.07	.03	-.11	-.01
21. Retaliation	1.75	.30	.16	-.24	.04	-.02	.06	-.11	-.05	-.06
22. Withdrawal	2.14	.40	.19	-.20	-.04	-.06	.21	-.06	-.06	-.05
23. Defensive Behaviors*	1.94	.33	.19	-.23	-.00	-.05	.16	-.09	-.06	-.06
24. Team Process	3.69	.46	-.63	.29	.03	.05	.06	.05	-.00	-.05
25. Team Performance	52.56	23.11	-.38	.11	.06	-.08	-.13	.11	.16	.01

Note: N = 97 teams except for Affective Culture which is 92. Disagreeableness and interdependence are both dummy coded (1, 0). Reliabilities are reported on the diagonal. Correlations between .17 and .19 are significant at the .10 level. Correlations between .20 and .26 are significant at the .05 level. Correlations above .26 are significant at the .01 level. *Indicates a total score of the previous two measures.

Table 5 Continued.

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(9) Initial Positive State Affect	.87								
(10) Initial Negative State Affect	.00	.77							
(11) Initial Mood*	.87	-.49	.82						
(12) Extraversion	.22	.05	.17	.88					
(13) Agreeableness	.21	-.10	.23	.13	.75				
(14) Conscientiousness	.23	-.04	.22	.00	.18	.78			
(15) Emotional Stability	.15	-.44	.35	.24	.20	.11	.81		
(16) Openness to Experience	.14	-.04	.14	.25	.13	.10	.20	.78	
(17) Team Cortisol Increase	-.03	.19	-.12	.03	.00	.00	-.08	.03	.88
(18) (Team Cortisol Decrease)	-.09	-.06	-.05	.00	-.05	.00	.04	-.06	-.11
(19) Positive Team Core Affect	.56	-.10	.53	.30	.19	.24	.33	.15	-.10
(20) Negative Team Core Affect	-.15	.39	-.32	-.04	-.16	-.09	-.29	-.15	.11
(21) Total Team Core Affect*	.47	-.24	.53	.23	.21	.21	.36	.18	-.12
(22) Affective Culture	.09	-.02	.09	.23	-.00	.14	.11	.09	-.10
(23) Retaliation	-.06	.02	-.07	-.22	-.27	-.14	-.14	.07	-.18
(24) Withdrawal	-.12	.10	-.15	-.27	-.23	-.17	-.08	-.11	-.11
(25) Defensive Behaviors *	-.10	.07	-.12	-.27	-.27	-.17	-.12	-.03	-.15
(26) Team Process	.22	-.02	.20	.19	-.04	.18	.12	.04	.02
(27) Team Performance	.01	-.05	.03	.17	-.09	.00	.02	.01	-.07

Note: N = 97 teams except for Affective Culture which is 92. Disagreeableness and interdependence are both dummy coded (1,0). Reliabilities are reported on the diagonal. Correlations between .17 and .19 are significant at the .10 level. Correlations between .20 and .26 are significant at the .05 level. Correlations above .26 are significant at the .01 level. *Indicates a total score of the previous two measures.

Table 5 Continued.

	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
(18) (Team Cortisol Decrease)	.88								
(19) Positive Team Core Affect	-.01	.91							
(20) Negative Team Core Affect	-.02	-.45	.88						
(21) Total Team Core Affect*	.00	.92	-.76	.80					
(22) Affective Culture	.02	.54	-.41	.57	.80				
(23) Retaliation	.05	-.35	.27	-.38	-.47	.83			
(24) Withdrawal	.12	-.42	.33	-.45	-.48	.73	.73		
(25) Defensive Behaviors *	.10	-.42	.33	-.45	-.51	.91	.95	.85	
(26) Team Process	.04	.60	-.31	.57	.80	-.55	-.54	-.59	.86
(27) Team Performance	.02	.20	-.21	.24	.38	-.34	-.31	-.35	.44

Note: N = 97 teams except for Affective Culture which is 92. Disagreeableness and interdependence are both dummy coded (1,0). Reliabilities are reported on the diagonal. Correlations between .17 and .19 are significant at the .10 level. Correlations between .20 and .26 are significant at the .05 level. Correlations above .26 are significant at the .01 level. *Indicates a total score of the previous two measures.

three teammates. They were told the two were selected randomly but one teammate was always the confederate. In total, 16 items from the personality scale were used which consisted of all 9 items for disagreeableness (or agreeableness items reversed) and 7 random items from other personality factors included to avoid revealing the nature of the hypotheses of the experiment. If the manipulation was effective the mean rating of the confederate's disagreeableness will be higher in conditions 1 and 2 than it is in conditions

3 and 4. Table 6 presents the means of the conditions and the last column presents the totals. Disagreeableness was rated on a five point scale.

Table 6. Condition Means for Participant Ratings of the Confederate's Disagreeableness.

<u>Disagreeableness Present</u>	<u>Level of Interdependence</u>		<u>(Total)</u>
	<u>High</u>	<u>Low</u>	
<u>Yes</u>	3.46	3.63	3.54
<u>No</u>	2.27	2.26	2.26

The mean rating of the confederate's disagreeableness in the disagreeable condition (3.54) is more than a full point higher than the mean in the non-disagreeable condition (2.26) for a difference of 1.28. In addition, I use an ANOVA procedure to test the mean differences and it reveals an F statistic of 11.464 ($p < .01$). The significant difference between mean ratings of the confederate's disagreeableness suggests that this manipulation was effective.

Interdependence was also manipulated in this experiment by changing the directions, goals, rewards and task information from individual to team based. The full details of the manipulation are outlined in the previous chapter. As described in Chapter 3, participants rated the team's interdependence after working together on the task. If the manipulation was effective the mean rating of the confederate's disagreeableness will be higher in conditions 1 and 3 than conditions 2 and 4. Table 7 presents the means of the conditions. Interdependence was rated on a five point scale.

Table 7. Condition Means for Participant Ratings of the Team's Interdependence.

<u>Disagreeableness Present</u>	<u>Level of Interdependence</u>	
	<u>High</u>	<u>Low</u>
<u>Yes</u>	3.75	2.98
<u>No</u>	4.00	3.36
<u>(Total)</u>	3.87	3.17

The mean rating of the team interdependence in the high interdependence condition (3.87) is higher than the mean rating of interdependence in the low interdependence condition (3.17) for a difference of .70. In addition, the ANOVA procedure used to test the difference reveals an F statistic of 1.96 ($p = .01$). The mean difference across the interdependence conditions is not as large as the mean difference across disagreeable conditions but the significant difference between participant's ratings of team interdependence suggests this manipulation was also effective.

Team Affective Reactions

Hypothesis 1 states that a disagreeable teammate will impact team affective reactions. Specifically, that the level of average team core affect and team affective culture are lower and team cortisol increase is higher in the disagreeable condition versus the non-disagreeable condition. In addition, Hypothesis 5 states that interdependence will moderate the impact between a disagreeable teammate and team affective reactions. Specifically, that the level of average team core affect and team affective culture will be higher and the count of teammates with an increase in cortisol will be lower in the

disagreeable and low interdependence condition (condition 2) than in the disagreeable and high interdependence condition (condition 1).

Table 8 reports the means and standard deviations of team core affect, team cortisol increase, and team affective culture by disagreeableness conditions. All variables are on 5 point scales. The mean of means column is the mean of the two disagreeable conditions (high and low interdependence) and the two non disagreeable conditions (again high and low interdependence). The differences in the mean of means columns correspond to the nature of Hypothesis 1. Team core affect is .28 smaller, team cortisol increase is .23 higher, and team affective culture is .85 smaller in the disagreeable condition compared to the non-disagreeable condition. Thus, all three mean differences are in the expected direction given Hypothesis 1. In addition, Table 8 shows that team core affect is .07 higher, team cortisol increase is .46 lower, and team affective culture is .14 lower in the low interdependence condition. The differences for team core affect and cortisol increase are in the expected directions given Hypothesis 5 but the difference for team affective culture is not. Also, the magnitude of the mean difference of team core affect is quite small (.07). While observing mean differences provides initial support for Hypothesis 1 and 5, I will also report results from regression analyses to test whether these differences are meaningful.

I use linear regression to test the relationships of disagreeableness and interdependence on team affective reactions. Four different models of results are displayed in Table 9 for each possible dependent variable. The first model includes the four covariates to be controlled, the second model adds the main effects of disagreeableness and interdependence (dummy coded), the third model adds a product

Table 8. Means and Standard Deviations of Team Core Affect, Team Cortisol Increase, and Team Affective Culture by Disagreeableness Conditions.

<u>Condition</u>	<u>Team Affective Reactions</u>					
	Team Core Affect	Mean of Means	Team Cortisol Increase	Mean of Means	Team Affective Culture	Mean of Means
Disagreeable, High Interdependence	3.52 (.29)	3.56 (.30)	.88 (.88)	.65 (.69)	3.21 (.55)	3.14 (.61)
Disagreeable, Low Interdependence	3.59 (.30)		.42 (.50)		3.07 (.66)	
Not Disagreeable, High Interdependence	3.92 (.25)	3.84 (.30)	.50 (.59)	.42 (.54)	4.07 (.34)	3.99 (.37)
Not Disagreeable, Low Interdependence	3.75 (.34)		.33 (.48)		3.91 (.39)	

term of the dummy coded variables to test the interaction. The fourth model includes the controls and adds interdependence represented by contrast codes to test the interaction. The dummy code uses either 0 or 1 to code the experimental condition and tests for overall main effects. On the other hand, contrast codes provide a tighter test for a specific hypothesis relating to the experimental conditions. I am interested in whether the team affective reactions to a disagreeable teammate are different in a low interdependence context versus a high interdependence context. Contrast codes can be $1/2$ and $-1/2$ if the conditions have equal samples; however, the samples in this study for conditions 1 through 4 are 25, 24, 24, and 24 respectively. The contrast code which tests this hypothesis directly compares conditions 1 and 2 by using the fraction $24/49$ in

condition 1, the fraction $-25/49$ in condition 2, and zero in conditions 3 and 4. The contrast code is constructed according to Cohen and colleagues directions for non-equal sample means and satisfies the requirement that all cells for a coded variable add up to zero (Cohen, et al, 2003).

Table 9 reports the regression results of disagreeableness and interdependence on team affective reactions. Results are reported for team positive core affect, team negative core affect, and total team core affect which combines the two into a summary variable. This detailed reporting allows me to assess the relationships of core affect at a general and detailed level. Results are then reported for team cortisol increase and team affective culture. When only controls are included the unstandardized regression coefficients for a team's initial mood ($b = .58$) and trait emotional stability ($b = .18$) significantly predict team core affect (model 1 under team core affect). When disagreeableness and interdependence are added only disagreeableness ($b = -.26$) has a significant coefficient while the coefficients for team initial mood and trait emotional stability remain significant (model 2). The product term of the dummy coded variables is not significant in model 3 nor is the contrast coded variable for interdependence in model 4.

In addition to regression coefficients the R^2 for the model with only controls is .32 (model 1) and increases to .47 when disagreeableness and interdependence are added (model 2) and increases to .49 when the product term is added (model 3). The R^2 is .33 when the contrast code is added (model 4). The F test for the first two models is significant but is not for the last two models. Thus, team initial mood, trait emotional stability and disagreeableness impact total team core affect but interdependence doesn't moderate the effect of disagreeableness on team core affect. Hypothesis 1 is supported

using team core affect to represent team affective reactions but Hypothesis 5 (interdependence as a moderator) is not. The results are very similar for positive and negative core affect as can be seen in the next two sections of Table 9.

The last two sections of Table 9 report results when team cortisol increase and team affective culture are used to represent team affective reactions. Team intelligence significantly relates to team cortisol increase in all models (e.g., $b = -.07$ in model 1) and initial mood predicts it in model 2 and 3. Disagreeableness adds significant strength to the prediction of team cortisol increase ($b = .29$) along with interdependence ($b = .39$) although the main effects and product term are not significant in model 3. Finally, the contrast coded variable testing the interdependence interaction is significant for team cortisol increase ($b = .50$). In addition to regression coefficients the R^2 for the model with only controls predicting team cortisol increase is .07 (model 1) and increases to .20 when disagreeableness and interdependence are added (model 2) and increases to .21 when the product term is added (model 3). The R^2 is .14 when the contrast coded variable is added (model 4). The F test is significant for the models with the main effects added (model 2) and the contrast code added (model 4). The F test is not significant for the models with only controls (model 1) and with the product term added (model 3). Thus, team intelligence, initial mood, disagreeableness, and interdependence impact team cortisol increase and interdependence moderates the effect of disagreeableness on team cortisol increase. Both Hypothesis 1 and Hypothesis 5 (interdependence as a moderator) are supported using team cortisol increase to represent team affective reactions.

Disagreeableness predicts team affective culture in both models 2 and 3 ($b = -.84$ in both models) although none of the controls do in any of the four models.

Interdependence does not predict team affective culture in any model, nor does the product term of disagreeableness and interdependence (model 3) or the contrast code for interdependence (model 4). In addition to regression coefficients the R^2 for the model with only controls predicting team affective culture is .03 (model 1) and increases to .45 when disagreeableness and interdependence are added (model 2) but doesn't change when the product term is added (model 3). The R^2 is .04 when the contrast coded variable is added (model 4). The F test is significant for model 2 only which adds the main effects. Thus, disagreeableness impacts total team affective culture and interdependence doesn't moderate the effect of disagreeableness on team affective culture. Hypothesis 1 is supported using team affective culture to represent team affective reactions; however, Hypothesis 5 (interdependence as a moderator) is not when these variables are used.

I display a bar chart in Figure 3 to visualize the interaction of team interdependence and disagreeableness on team cortisol increase. For this study, bar charts are more accurate than graphing the interaction at one standard deviation above and below the mean because disagreeableness and interdependence are both manipulated at two levels. Thus, no data exists between these two levels (e.g., a team with a medium amount of interdependence) and graphing would make these variables appear continuous when they are not. The difference across the four conditions is significant ($F = 3.54, p = .02$) and noticeable as the condition 1 mean is higher than any of the other condition means. This visual information provides further support for Hypothesis 5 using team cortisol increase to represent team affective reactions.

Table 9. Regression Coefficients for Controls, Disagreeableness, and Interdependence on Team Affective Reactions.

	Total Team Core Affect				Positive Team Core Affect				Negative Team Core Affect			
	1	2	3	4	1	2	3	4	1	2	3	4
Team Initial Mood	.58** (.12)	.56** (.11)	.56** (.11)	.59** (.12)	.88** (.18)	.88** (.16)	.87** (.16)	.90** (.18)	-.28** (.12)	-.25** (.12)	-.25** (.12)	-.25** (.12)
Team Emotional Stability	.18** (.08)	.18** (.07)	.17** (.07)	.17** (.08)	.22* (.12)	.21** (.11)	.20* (.11)	.21* (.12)	-.13* (.08)	-.14* (.08)	-.13* (.08)	-.14* (.08)
Team Intelligence	-.01 (.01)	-.01 (.01)	-.01 (.01)	-.01 (.01)	-.02 (.02)	-.01 (.02)	-.01 (.02)	-.02 (.02)	.01 (.01)	.00 (.01)	.00 (.01)	.00 (.01)
Team Gender	.03 (.10)	-.03 (.09)	-.04 (.09)	.02 (.10)	-.04 (.15)	-.12 (.14)	-.14 (.14)	-.06 (.15)	-.11 (.10)	-.08 (.10)	-.06 (.10)	-.08 (.10)
Disagreeableness (DC)		-.26** (.05)	-.18** (.07)			-.37** (.08)	-.27** (.11)			.15** (.06)	.09 (.08)	
Interdependence (DC)		.01 (.05)	.09 (.07)			-.05 (.08)	.05 (.11)			-.06 (.06)	-.13 (.08)	
Dis X Int (DC)			-.16 (.10)				-.19 (.15)				-.13 (.11)	
Interdependence (CC-Interaction)				-.07 (.08)				.13 (.12)				-.06 (.06)
R ²	.32	.47	.49	.33	.32	.46	.47	.33	.15	.23	.24	.15
ΔR ²	.32**	.15**	.01	.01	.32**	.15**	.01	.01	.15**	.08**	.01	.00
F	10.92	12.65	2.50	.67	10.64	12.15	1.65	1.27	4.09	4.34	1.45	0.00

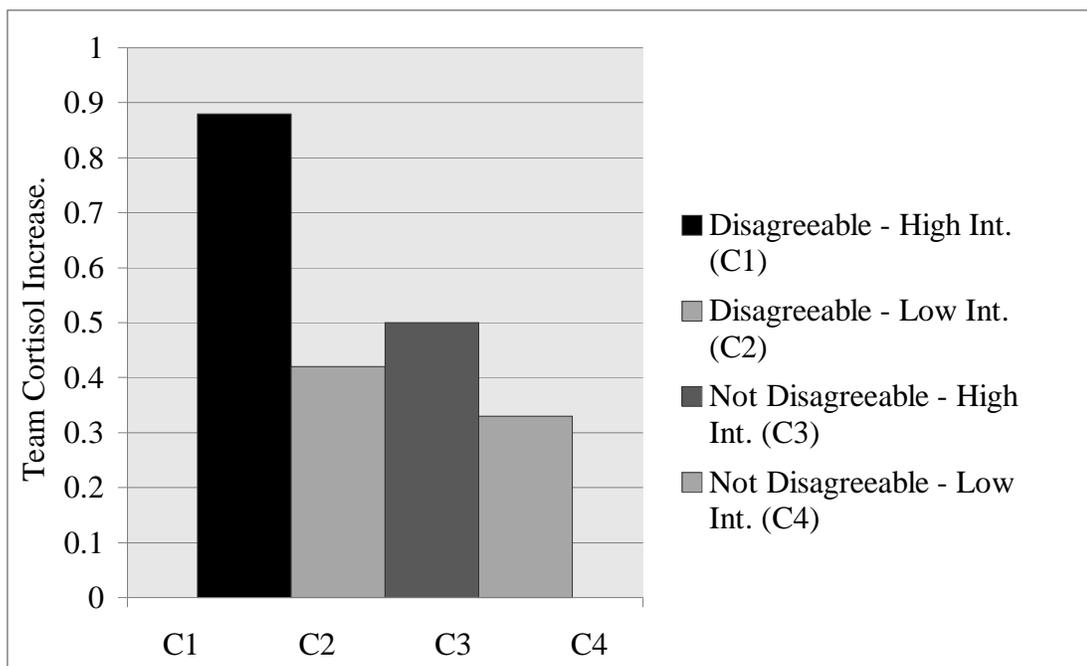
* *p < .05. * p < .10. Unstandardized regression coefficients. Standard errors in parentheses. DC=dummy code. CC=contrast code.

Table 9. Continued.

	Team Cortisol Increase				Team Affective Culture			
	1	2	3	4	1	2	3	4
Team Initial Mood	-.46 (.27)	-.47* (.27)	-.46* (.27)	-.41 (.27)	.10 (.29)	-.01 (.23)	-.01 (.23)	.08 (.30)
Team Emotional Stability	-.05 (.19)	.00 (.18)	.02 (.18)	.01 (.18)	.17 (.20)	.18 (.15)	.18 (.15)	.20 (.20)
Team Intelligence	-.07** (.03)	-.09** (.03)	-.09** (.03)	-.07** (.03)	-.04 (.03)	-.02 (.03)	-.02 (.03)	-.04 (.03)
Team Gender	.14 (.24)	.20 (.23)	.23 (.23)	.19 (.24)	.08 (.25)	-.10 (.20)	-.10 (.20)	.10 (.25)
Disagreeableness (DC)		.29** (.13)	.16 (.18)			-.84** (.11)	-.84** (.15)	
Interdependence (DC)		.39** (.13)	.26 (.18)			.17 (.11)	.16 (.15)	
Dis X Int (DC)			.25 (.25)				.00 (.22)	
Interdependence (CC-Interaction)				.50** (.18)				.19 (.20)
R ²	.07	.20	.21	.14	.03	.45	.45	.04
ΔR ²	.07	.13**	.01	.07**	.03	.42**	.00	.01
F	1.78	7.19	.99	7.55	.72	31.95	.00	.97

* *p < .05. * p < .10. Unstandardized regression coefficients. Standard errors in parentheses.
DC=dummy code. CC=contrast code

Figure 3. Condition Means of Team Cortisol Increase.



Note: Int. indicates team interdependence. C1 is condition 1, etc.

In conclusion, Hypothesis 1 is supported across all measures of team affective reactions. Disagreeableness relates to both positive and negative dimensions of core affect, team cortisol increase, and team affective culture. When the team had a disagreeable member participants experienced negative psychological and physiological reactions. These teams, compared to teams without a disagreeable teammate, experienced less positive affect, more negative affect, and more increased cortisol levels. Their teams also had a worse affective culture than teams without a disagreeable member. On the other hand, when the team did not have a disagreeable member participants did not experience these negative psychological and physiological reactions. In addition, Hypothesis 5 is supported for team cortisol increase but not for team core affect or team affective culture. Participants positive and negative core affect along with their teams'

affective culture were not meaningfully different in the low interdependence condition. However, participants experienced fewer cortisol increases in the low interdependence context when interacting with the disagreeable teammate than in the high interdependence context. Thus, disagreeableness impacted team affective reactions and interdependence moderated the effect on the count of teammates with increased cortisol levels.

Team Defensive Behaviors

Hypothesis 2 states that team affective reactions will impact team defensive behaviors. However, before I report those results I will report the results of disagreeableness and interdependence on team defensive behaviors presented in Table 10. The unstandardized regression coefficients for a team's gender composition significantly predicts defensive behaviors across all four sets of results (e.g., $b = .23$ in model 1). This indicates that males were more likely to exhibit defensive behaviors than females. When disagreeableness and interdependence are added both disagreeableness ($b = .15$) and interdependence ($b = -.15$) have significant coefficients. The product term of the dummy coded variable is not significant (model 3) nor is the contrast coded variable for interdependence (model 4).

In addition to regression coefficients the R^2 for the model with only controls is .06 (model 1) and increases to .16 when disagreeableness and interdependence are added (model 2) and remains the same at .16 when the product term is added (model 3). The R^2 is .08 when the contrast coded variables are added (model 4). The F test is significant for only the model with the main effects added (model 3). The results are somewhat similar for retaliation and withdrawal as can be seen in the next two sections of Table 7. Team

gender composition predicts withdrawal behaviors but not retaliation behaviors and the F test is significant for the addition of the main effects (model 2) for both variables and also for the controls (model 1) for withdrawal. This indicates that males were more likely to withdraw than females, but no gender difference was found for retaliation. Thus, disagreeableness, interdependence and team gender (through its impact on withdrawal) predict defensive behaviors but interdependence does not change the impact of disagreeableness on defensive behaviors.

I now report results in Table 11 pertaining to Hypothesis 2 which states that team affective reactions will impact team defensive behaviors. Each dependent variable has six models of results, one with only controls and one for each of the five representations of team affective reaction: total team core affect, positive team core affect, negative team core affect, team cortisol increase, and team affective culture. Team gender predicts team defensive behaviors in all six models (e.g., $b = .23$ in model 1) indicating that males were more likely to withdraw than females. All five representations of team affective reaction have significant coefficients with total team core affect having the largest coefficient ($b = -.55$) and team cortisol increase the smallest ($b = -.10$). The initial model has an R^2 of .06 with the model including team affective culture having the largest R^2 of .33 and the model including team cortisol increase having the smallest R^2 of .10. In addition, the F test shows that all models but the initial model with controls are significant. The results with retaliation and withdrawal are very similar. All five representations of team affective reactions are significant predictors of both retaliation and withdrawal and team gender composition predicts withdrawal but not retaliation.

Table 10. Regression Coefficients for Controls, Disagreeableness, and Interdependence on Team Defensive Behaviors.

	Team Defensive Behaviors				Team Retaliation				Team Withdrawal			
	1	2	3	4	1	2	3	4	1	2	3	4
Team Initial Mood	-.13 (.14)	-.07 (.14)	-.06 (.14)	-.11 (.14)	-.03 (.13)	.04 (.13)	.04 (.13)	.01 (.13)	-.24 (.17)	-.17 (.17)	-.17 (.17)	-.21 (.17)
Team Emotional Stability	-.11 (.09)	-.12 (.09)	-.12 (.09)	-.12 (.09)	-.12 (.09)	-.14 (.09)	-.13 (.09)	-.13 (.09)	-.09 (.11)	-.10 (.11)	-.10 (.11)	-.11 (.11)
Team Intelligence	-.01 (.02)	-.01 (.02)	-.01 (.02)	-.01 (.02)	-.01 (.02)	.00 (.01)	.00 (.01)	.00 (.02)	-.01 (.02)	-.01 (.02)	-.01 (.02)	-.01 (.02)
Team Gender	.23* (.12)	.26** (.12)	.26** (.12)	.21* (.12)	.11 (.11)	.13 (.11)	.14 (.11)	.09 (.11)	.34** (.15)	.38** (.14)	.38** (.14)	.33** (.15)
Disagreeableness (DC)		.15** (.06)	.13 (.09)			.11* (.06)	.08 (.09)			.18** (.08)	.18 (.11)	
Interdependence (DC)		-.15** (.06)	-.16* (.09)			-.15** (.06)	-.18** (.09)			-.14* (.08)	-.14 (.11)	
Dis X Int (DC)			.03 (.13)				.06 (.12)				.00 (.16)	
Interdependence (CC-Interaction)				-.13 (.09)				-.13 (.09)				-.15 (.11)
R ²	.06	.16	.16	.08	.03	.12	.12	.05	.08	.16	.16	.10
ΔR ²	.06	.10**	.00	.02	.03	.09**	.00	.02	.08*	.08**	.00	.02
F	1.48	5.13	.05	2.05	.73	4.64	.21	2.01	2.09	4.33	.00	1.67

* *p < .05. * p < .10. Unstandardized regression coefficients. Standard errors in parentheses. DC=dummy code. CC=contrast code.

In conclusion, hypothesis 2 is supported for all five representations of team affective reactions on all three representations of defensive behaviors. Total core affect, positive and negative core affect, team cortisol increase, and team affective culture all predicted defensive behaviors among study participants. More negative core affect, and more experiences of increased cortisol along with less positive core affect among study participants related to retaliatory and withdrawal behaviors. In addition, lower team affective culture also led to these defensive behaviors. Finally, both disagreeableness and interdependence impacted defensive behaviors but interdependence did not moderate the impact of disagreeableness on defensive behaviors. Thus, team affective reactions have a meaningful effect on team defensive behaviors.

Team Process

Hypothesis 3 states that team defensive behaviors will impact a team's processes. In Table 12 I report the regression results for disagreeableness and interdependence, team affective reactions, as well as defensive behaviors on team process.

The Impact of Disagreeableness and Interdependence on Team Process

None of the control variables significantly predict team process in any of the first four models. When disagreeableness and interdependence are added both disagreeableness ($b = -.58$) and interdependence ($b = .25$) have significant coefficients. The product term of the dummy coded variables is not significant in model 3 however the contrast coded variable for interdependence ($b = .25$) is significant in model 4. In addition to regression coefficients the R^2 for the model with only controls is .05 (model 1) and increases to .51 when disagreeableness and interdependence are added (model 2) and remains the same at .51 when the product term is added (model 3). The R^2 is .08

Table 11. Regression Coefficients for Controls and Team Affective Reactions on Team Defensive Behaviors

	Team Defensive Behaviors						Team Retaliation					
	1	2	3	4	5	6	1	2	3	4	5	6
Team Initial Mood	-.13 (.14)	.19 (.14)	.17 (.14)	-.02 (.14)	-.17 (.14)	-.10 (.12)	-.03 (.13)	.23* (.14)	.22 (.14)	.06 (.13)	-.06 (.13)	.00 (.12)
Team Emotional Stability	-.11 (.09)	-.01 (.09)	-.03 (.09)	-.06 (.09)	-.11 (.09)	-.06 (.08)	-.12 (.09)	-.04 (.08)	-.06 (.08)	-.08 (.09)	-.12 (.09)	-.08 (.08)
Team Intelligence	-.01 (.02)	-.01 (.01)	-.01 (.01)	-.01 (.02)	-.01 (.02)	-.02 (.01)	-.01 (.02)	-.01 (.01)	-.01 (.01)	-.01 (.01)	-.01 (.02)	-.01 (.01)
Team Gender	.23* (.12)	.24** (.11)	.21* (.11)	.27** (.12)	.24** (.12)	.25** (.11)	.11 (.11)	.12 (.11)	.10 (.11)	.14 (.11)	.12 (.11)	.12 (.10)
Total Team Core Affect		-.55** (.11)						-.44** (.11)				
Positive Team Core Affect			-.35** (.08)						-.28** (.07)			
Negative Team Core Affect				.39** (.12)						.29** (.11)		
Team Cortisol Increase					-.10** (.05)						-.10** (.05)	
Team Affective Culture						-.26** (.05)						-.22** (.04)
R ²	.06	.27	.23	.16	.10	.33	.03	.18	.16	.10	.08	.25
ΔR ²	.06	.21**	.17**	.10**	.04**	.27**	.03	.15**	.13**	.07**	.05**	.22**
F	1.48	26.51	20.48	11.27	3.95	34.13	.73	17.11	14.37	6.74	4.64	25.09

*p < .05. ** p < .01. Unstandardized regression coefficients. Standard errors in parentheses. DC=dummy code. CC=contrast code.

Table 11. Continued.

	Team Withdrawal					
	1	2	3	4	5	6
Team Initial Mood	-.24 (.17)	.16 (.17)	.13 (.18)	-.10 (.17)	-.27 (.17)	-.20 (.15)
Team Emotional Stability	-.09 (.11)	.03 (.10)	.00 (.11)	-.02 (.11)	-.09 (.11)	-.04 (.10)
Team Intelligence	-.01 (.02)	-.02 (.02)	-.02 (.02)	-.01 (.02)	-.02 (.02)	-.02 (.02)
Team Gender	.34** (.15)	.36** (.13)	.33** (.13)	.40** (.14)	.36** (.15)	.37** (.13)
Total Team Core Affect		-.67** (.13)				
Positive Team Core Affect			-.41** (.09)			
Negative Team Core Affect				.49** (.14)		
Team Cortisol Increase					-.10 (.06)	
Team Affective Culture						-.30** (.06)
R ²	.08	.29	.25	.19	.11	.32
ΔR ²	.08	.21**	.16**	.11**	.03	.24**
F	2.09	26.69	19.70	12.29	2.70	30.01

**p < .05. * p < .10. Unstandardized regression coefficients. Standard errors in parentheses. DC=dummy code. CC=contrast code.

when the contrast coded variable is added (model 4). The F test is significant for the models with the main effects added (model 2) and the contrast coded variable added (model 4). However, the F test is not significant for the models with only controls (model 1) and the product term added (model 3).

The Impact of Team Affective Reactions on Team Process

The only control variable to predict team process when an affect variable is included in a model is team initial mood ($b = .27$) when team affective culture ($b = .56$) is included. Team cortisol increase is the only affect predictor that does not have a significant coefficient and total team core affect ($b = .92$) has the largest and negative team core affect ($b = -.44$) has the smallest coefficient, while still being significant. Team affective culture has the largest R^2 of .67 and positive team core affect has the next largest R^2 of .38. The R^2 for negative team core affect is the smallest at .11 while still being significant. The model including team cortisol increase is the only one with a non significant F test.

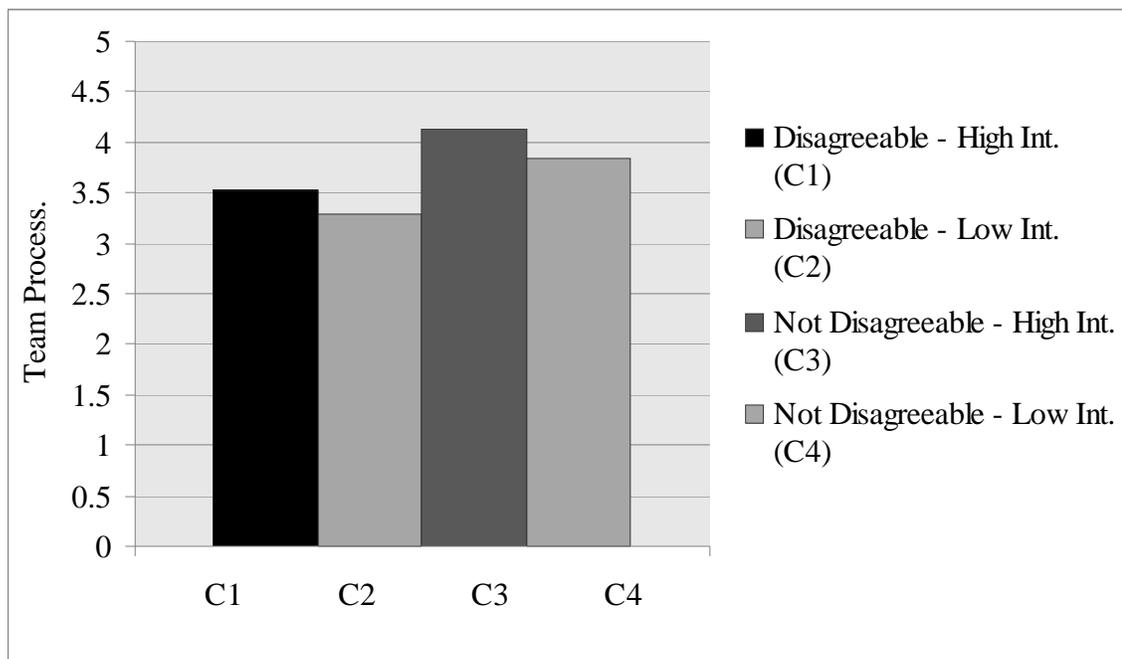
The impact of Team Defensive Behaviors on Team Process

Hypothesis 3 states that team defensive behaviors will impact team process. Regarding the control variables, team initial mood ($b = .31$) predicts team process when retaliation is included (model 11). Also, team gender ($b = .26$) predicts process when withdrawal is included (model 12) indicating that males were more likely to have better team processes than females. Supporting the hypothesis, total team defensive behaviors predicts team process ($b = -.83$) along with both of the specific variables of retaliation ($b = -.83$) and withdrawal ($b = -.63$). Team defensive behaviors have the largest R^2 of .38 and all three sets (models 10, 11, and 12) have significant F tests as noted in the table.

In conclusion, defensive behaviors impact team process which supports Hypothesis 3. Team process is also impacted by disagreeableness and interdependence, and interdependence moderates the impact of disagreeableness on process. Teams with a disagreeable teammate had worse team processes than teams without this difficult member. Also, teams that had a disagreeable member and were in a low interdependence context had worse team processes than those teams in a high interdependence context. However, this change is the opposite of what I predicted – interdependence did moderate the impact of disagreeableness on team process but the change is in the opposite direction as expected. This finding highlights a serious side effect of reducing interdependence in order to protect a team from a disagreeable teammate. Less physiological reactions occur among teammates as was reported earlier; however, team process also suffers. To visualize this moderation effect I include a bar chart in Figure 4 of team process across the four experimental conditions. The contrast coded interdependence variable compares condition 1 versus condition 2 although I report all four condition means for completeness.

Finally, team process was also impacted by team affective culture and total team core affect along with both its specific variables of positive and negative team core affect. However, team cortisol increase did not impact team process. In this study, teams that experienced better core affect and better team affective culture had better team processes. On the other hand, teams that had more members with cortisol increases did not have worse team processes than teams with fewer members with cortisol increases. Finally, team defensive behaviors predict team process which supports of Hypothesis 3. Retaliatory and withdrawal behaviors have a strong negative influence on team process.

Figure 4. Condition Means of Team Process.



Note: Int. indicates team interdependence. C1 is condition 1, etc.

Team Performance

Hypothesis 4 states that team process will impact team performance. Before I report those results I report the regression results for disagreeableness and interdependence, team affective reactions, and defensive behaviors on team performance in Table 13. I then report the regression results of team process on performance.

The Impact of Disagreeableness and Interdependence on Team performance
No control variable predicts team performance when only control variables are included (model 1); however, both team intelligence ($b = 2.22$ and 2.26) and team gender composition ($b = -15.49$ and -14.77) significantly relate to performance when main effects and also the product term are added (models 2 and 3). This indicates that more intelligent teams and more female teams performed better. When disagreeableness and

interdependence are added only disagreeableness ($b = -20.02$) has a significant coefficient. The product term of the dummy coded variables is not significant (model 3) nor is the contrast coded variable for interdependence (model 4). In addition to regression coefficients the R^2 for the model with only controls is .05 (model 1) and increases to .24 when disagreeableness and interdependence are added (model 2) and remains the same at .24 when the product term is added (model 3). The R^2 is .06 when the contrast coded variable is added (model 4). The F test is significant only for the model with the main effects added (model 3).

The Impact of Team Affective Reactions on Team performance

Team intelligence is the only control variable to predict team performance when team affective reactions are included. It is significant when positive team core affect ($b = 1.99$) and team affective culture ($b = 2.27$) are included in the model. Just as with team process, all but team cortisol increase predict team performance beyond the controlled variables. Total team core affect ($b = 24.40$) has the largest unstandardized coefficient and positive team core affect ($b = 13.46$) has the smallest, while still being significant. Team affective culture has the largest R^2 of .21 and total team core affect has the next largest R^2 of .13. The F test is significant for all models except model 8 which added team cortisol increase.

The impact of Team Defensive Behaviors on Team Performance

None of the control variables predict team performance when team defensive behaviors are included. However, just as with team process, all three predict team performance beyond the controls. Team retaliation ($b = -24.86$) has the largest unstandardized coefficient and total team defensive behaviors ($b = -23.34$) has the next

Table 12. Controls, Disagreeableness and Interdependence, Team Affective Reactions and Defensive Behaviors on Team Process.

	Team Process											
	1	2	3	4	5	6	7	8	9	10	11	12
Team Initial Mood	.33 (.20)	.20 (.15)	.20 (.15)	.29 (.20)	-.21 (.18)	-.26 (.18)	.20 (.20)	.34* (.20)	.27** (.12)	.22 (.17)	.31* (.17)	.18 (.17)
Team Emotional Stability	.06 (.13)	.08 (.10)	.08 (.10)	.09 (.13)	-.10 (.11)	-.09 (.11)	.00 (.13)	.06 (.13)	-.04 (.08)	-.03 (.11)	-.04 (.11)	.00 (.11)
Team Intelligence	.00 (.02)	.01 (.02)	.01 (.02)	.00 (.02)	.01 (.02)	.01 (.02)	.00 (.02)	.00 (.02)	.02 (.01)	-.01 (.02)	.00 (.02)	.00 (.02)
Team Gender	.04 (.17)	-.08 (.12)	-.09 (.13)	.07 (.17)	.01 (.14)	.07 (.14)	.00 (.17)	.04 (.17)	.00 (.10)	.23 (.14)	.13 (.14)	.26* (.15)
Disagreeableness (DC)		-.58** (.07)	-.58** (.10)									
Interdependence (DC)		.25** (.07)	.25** (.10)									
Dis X Int (DC)			-.01 (.14)									
Interdependence (CC-Interaction)				.25* (.13)								
Total Team Core Affect					.92** (.14)							
Positive Team Core Affect						.67** (.10)						
Negative Team Core Affect							-.44** (.17)					

** *p < .05. * p < .10. Unstandardized regression coefficients. Standard errors in parentheses. DC=dummy code. CC=contrast code.

Table 12. Continued.

	Team Process												
	1	2	3	4	5	6	7	8	9	10	11	12	
Team Cortisol Increase								.01 (.05)					
Team Affective Culture									.56** (.04)				
Team Defensive Behaviors										-.83** (.12)			
Team Retaliation											-.83** (.13)		
Team Withdrawal												-.63** (.10)	
R ²	.05	.51	.51	.08	.35	.38	.11	.05	.67	.38	.34	.33	
ΔR ²	.05	.47**	.00	.04*	.33**	.34**	.07**	.00	.62**	.34**	.30**	.29**	
F	1.07	43.11	.01	3.75	41.66	49.50	6.72	.20	159.32	49.27	40.89	38.65	

* *p < .05. * p < .10. Unstandardized regression coefficients. Standard errors in parentheses. DC=dummy code, CC=contrast code.

largest coefficient. Total team defensive behaviors and team retaliation both have an R^2 of .15 and team withdrawal has an R^2 of .12. The F test is significant for all three models (10, 11, and 12).

The Impact of Team Process on Team Performance

Hypothesis 4 states that team process will impact team performance. Although this finding has been well demonstrated in the literature I include it in this study to be as complete as possible. Model 13 of Table 13 reports that team process ($b = 23.15$) predicts team performance and has an R^2 of .25 with a significant corresponding F test. This finding supports hypothesis 4 which states that team process will impact team performance.

In conclusion, in this study team intelligence and gender composition impacted a team's performance under varying circumstances indicating that more intelligent teams and more female teams performed better than less intelligent and more male teams. Teams with a disagreeable member performed meaningfully worse than teams without this difficult person, although interdependence did not moderate the impact of disagreeableness on performance. In addition, a team's core affect (both positive and negative) and its affective culture had meaningful effects on performance although increased cortisol levels did not. More positive affect and better affective culture, along with less negative affect, improved the performance of teams in this study. Retaliatory and withdrawal behaviors of teammates also related negatively to team performance. Finally, team processes related positively with team performance, as expected. Thus, teams in this study that communicated and coordinated more, performed at a higher level on the task.

Table 13. Controls, Disagreeableness, Interdependence, Team Affective Reactions and Defensive Behaviors on Team Performance.

	Team Performance												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Team Initial Mood	3.92 (9.99)	1.13 (9.20)	1.46 (9.23)	2.75 (10.02)	-10.27 (10.74)	-7.90 (11.02)	-1.91 (10.04)	3.65 (10.12)	2.38 (9.38)	.86 (9.53)	3.25 (9.49)	-.04 (9.73)	-3.65 (9.07)
Team Emotional Stability	1.41 (6.65)	1.67 (6.04)	2.07 (6.08)	2.37 (6.69)	-2.93 (6.56)	-1.59 (6.63)	-1.33 (6.59)	1.37 (6.69)	-1.15 (6.27)	-1.04 (6.36)	-1.55 (6.38)	-.09 (6.43)	.01 (5.96)
Team Intelligence	1.71 (1.12)	2.22 ** (1.02)	2.26 ** (1.03)	1.66 (1.12)	2.02* (1.08)	1.99 * (1.10)	1.80 (1.09)	1.65 (1.15)	2.27 ** (1.06)	1.55 (1.06)	1.60 (1.06)	1.54 (1.08)	1.70 * (1.00)
Team Gender	-11.14 (8.58)	-15.49 * (7.82)	-14.77 * (7.90)	-10.29 (8.60)	-11.90 (8.25)	-10.59 (8.39)	-13.35 (8.42)	-11.03 (8.64)	-12.30 (8.06)	-5.85 (8.30)	-8.50 (8.19)	-5.39 (8.51)	-12.14 (7.68)
Dis. (DC)		-20.02 ** (4.32)	-23.25 ** (6.11)										
Int. (DC)		4.17 (4.33)	.85 (6.20)										
Dis X Int (DC)			6.51 (8.68)										
Int. (CC)				7.81 (6.69)									

**p < .05. * p < .10. Unstandardized regression coefficients. Standard errors in parentheses. DC=dummy code. DC=contrast code.

Table 13. Continued.

	Team Performance													
	1	2	3	4	5	6	7	8	9	10	11	12	13	
Total Team Core Affect					24.40** (8.30)									
Positive Team Core Affect						13.46** (5.82)								
Negative Team Core Affect							-20.54** (8.53)							
Team Cortisol Increase								-.79 (3.71)						
Team Affective Culture									14.73** (3.43)					
Team Defensive Behaviors										-23.34** (7.04)				
Team Retaliation											-24.86** (7.49)			
Team Withdrawal												-16.80** (5.90)		

* *p < .05. * p < .10. Unstandardized regression coefficients. Standard errors in parentheses. DC=dummy code. CC=contrast code.

Table 13. Continued.

	Team Performance												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Team Process													23.15** (4.72)
R ²	.05	.24	.24	.06	.13	.10	.10	.05	.21	.15	.15	.12	.25
ΔR ²	.05	.19**	.01	.01	.08**	.05**	.06**	.00	.17**	.10**	.10**	.08**	.20**
F	1.09	11.21	.56	1.37	8.65	5.34	5.79	.05	18.44	10.99	11.02	8.12	24.02

**p < .05. * p < .10. Unstandardized regression coefficients. Standard errors in parentheses. DC=dummy code. CC=contrast code.

Mediation Analyses

The first research question of this study asks how a disagreeable teammate impacts team performance which requires finding the pertinent intermediary variables that link disagreeableness to team performance. The regression results reported thus far demonstrate relationships as argued in the hypotheses. I now go beyond these separate analyses to test a mediated model. The theoretically grounded model I present to answer the first research question includes team affective reactions, defensive behaviors, and team process as mediators. To assess this mediational model I will follow the typical guidance from the literature (Baron & Kenny, 1986) and estimate a series of models to evaluate the benefit of assessing team affective reactions and defensive behaviors in addition to team process, when predicting team performance. Mediation is supported if the following four requirements are met. First, the distal predictor must relate to the outcome. Recent guidance from the literature suggests that this relationship is not necessary to establish mediation; however, I include it to be consistent with earlier perspectives. Second, the distal predictor must relate to the mediator. Third, the mediator must relate to the outcome after controlling for the distal predictor. Fourth, if the relationship between the distal predictor and the outcome is null in the presence of the mediator then full mediation occurs. On the other hand, if the relationship between the distal predictor and the outcome remains then partial mediation occurs.

In addition to the primary variables in the model various secondary variables play a role in translating disagreeableness to team performance and therefore should be controlled. As previously discussed, all variables are averaged to represent a team level aggregated variable. The same four variables are controlled in all analyses in this study,

namely team mood before participation, team emotional stability, team intelligence, and team gender composition (coded 0 for female and 1 for male). I first discuss a mediation model predicting team process and then a mediation model predicting team performance.

Team Process as Outcome in Mediation Analysis

In addition to team performance, team process is an important outcome for teams. As reported in Table 12, disagreeableness related to team process ($b = -.58$, $p = .00$) after the controls were included, which satisfies requirement 1. Requirement 2 is also supported for seven of eight possible mediators as noted by significant regression coefficients in Table 12 for all variables except team cortisol increase. Table 14 reports results from hierarchical models adding mediators to controls and disagreeableness in order to predict team process. Because team cortisol increase did not predict team process (Table 12) it is excluded from these analyses. In addition, the results for retaliation and withdrawal are similar to the results with the composite variable included so these additional analyses are also not displayed in the table. Finally, positive core affect better predicted team process than negative core affect or the composite variable of total team core affect so only results for positive core affect are displayed.

According to results reported in Table 14, team initial mood predicts process when disagreeableness (model 2) is added and when team affective culture is added (both models 5 and 6). Team intelligence predicts process only when disagreeableness and team affective culture are included (model 5). Disagreeableness also predicts team process for all models. Positive team core affect predicts team process in model 3 when it is added to disagreeableness ($b = .43$) and in model 4 when defensive behaviors are added to the model ($b = .24$). Defensive behaviors also predict process in model 4 ($b = -$

.55). In addition, team affective culture predicts team process in model 5 when it is added to disagreeableness ($b = .46$) and in model 6 when defensive behaviors are added to the model ($b = .34$). Defensive behaviors also predict process in model 6 ($b = -.38$).

The model adding positive team affect to controls and disagreeableness increases R^2 by .12 to .55 which is a significant increase. The model adding defensive behaviors to this model increase R^2 by .12 to .67 which is also significant. On the other hand, the model adding team affective culture to controls and disagreeableness increases R^2 by .25 to .69 which is a significant increase. The model adding defensive behaviors to this model increase R^2 by .05 to .74 which is also significant. Thus, positive team core affect and team affective culture both add to the prediction of team process beyond controls, disagreeableness, and defensive behaviors (models 4 and 6 respectively).

In conclusion, the control variables of team initial mood, along with the primary variables of disagreeableness, positive core affect, team affective culture, and defensive behaviors all add to the prediction of team process. This findings indicates that the way disagreeableness impacted team process in this study is through the mechanisms of positive core affect, team affective culture, and defensive behaviors. I now analyze the mediation model predicting team performance.

Team Performance as Outcome in Mediation Analysis

The first two requirements for mediation are satisfied given results reported in Table 13. After controls were included, disagreeableness related to team performance ($b = -20.02$, $p = .00$) satisfying requirement 1. Requirement 2 was supported for eight of nine possible mediators as noted by significant regression coefficients in table 10 for all variables except team cortisol increase. Table 15 reports results from hierarchical models

adding mediators to controls and disagreeableness in order to predict performance. The first six models don't include team process while the last six do include this variable. Because team cortisol increase did not predict team performance (Table 13) it is excluded from these analyses. In addition, the results for positive and negative core affect along with retaliation and withdrawal are similar to the results with their respective composite variable included so these additional analyses are also not displayed in the table.

Table 14. Mediation Results for Total Team Core Affect, Affective Culture, and Defensive Behaviors on Team Process.

	Team Process					
	1	2	3	4	5	6
Team Initial Mood	.33 (.20)	.29* (.15)	-.07 (.16)	.02 (.14)	.27** (.12)	.23** (.11)
Team Emotional Stability	.06 (.13)	.05 (.10)	-.04 (.09)	-.06 (.08)	-.02 (.08)	-.04 (.07)
Team Intelligence	.00 (.02)	.02 (.02)	.02 (.02)	.01 (.01)	.02* (.0)	.02 (.01)
Team Gender	.04 (.17)	-.08 (.13)	-.03 (.12)	.09 (.10)	-.04 (.10)	.05 (.10)
Disagreeableness (DC)		-.58** (.07)	-.43** (.07)	-.41** (.06)	-.20** (.07)	-.24** (.07)
Positive Team Core Affect			.43** (.09)	.24** (.09)		
Team Affective Culture					.46** (.06)	.34** (.06)
Team Defensive Behaviors				-.55** (.10)		-.38** (.10)
R ²	.05	.44	.55	.67	.69	.74
ΔR ²	.05	.40**	.12**	.12**	.25**	.05**
F	1.07	64.82	21.52	33.29	68.64	15.74

* *p < .05. * p < .10. Unstandardized regression coefficients. Standard errors are in parentheses. DC=dummy code. CC=contrast code.

According to results reported in Table 15, team intelligence predicts performance in all models (with and without team process included). Also, team gender negatively predicts performance when other variables except defensive behaviors are included (models 2, 3, and 5) indicating that teams with more females performed better than teams with more males. Disagreeableness also predicts performance for all models. When team process is not included team core affect does not add to the prediction of performance beyond controls and disagreeableness (model 3); however, team affective culture does (model 5). In addition, defensive behaviors add to the prediction beyond the controls, disagreeableness, and both team core affect (model 4) and affective culture (model 6). The model adding affective culture to controls and disagreeableness increases R^2 by .03 to .26 which is a significant increase; although, the model adding team core affect does not significantly increase R^2 . In addition, the models adding defensive behaviors to team core affect ($R^2 = .28$) and affective culture ($R^2 = .29$) both significantly increase R^2 .

When team process is included neither team core affect nor team affective culture add to the prediction of performance beyond controls and disagreeableness. Defensive behaviors also do not add to the prediction. The R^2 for the model with controls and process (model 7) is .25 and it rises to .28 when disagreeableness is included (model 8). No other models (9 through 12) add to the prediction of performance.

In conclusion, the control variables of team intelligence and gender composition, along with the primary variables of disagreeableness and team process add a lot to the prediction of team performance. However, neither team core affect nor affective culture added to the prediction beyond these previous variables. Limited power may explain the

Table 15. Mediation Results for Total Team Core Affect, Affective Culture, Defensive Behaviors, and Process on Team Performance.

	Team Performance					
	1	2	3	4	5	6
Team Initial Mood	3.92 (10.00)	2.77 (9.04)	-2.63 (10.32)	.60 (10.18)	2.30 (9.16)	.84 (9.09)
Team Emotional Stability	1.41 (6.65)	1.17 (6.02)	-.50 (6.21)	-.62 (6.06)	-.20 (6.14)	-.90 (6.08)
Team Intelligence	1.71* (1.12)	2.33** (1.02)	2.37** (1.02)	2.13** (1.00)	2.43** (1.03)	2.21** (1.03)
Team Gender	-11.14 (8.58)	-15.49** (7.82)	-15.26* (7.81)	-11.07 (7.85)	-14.63* (7.93)	-11.47 (8.05)
Disagreeableness (DC)		-20.01** (4.31)	-17.54** (4.88)	-17.47** (4.77)	-13.03** (5.71)	-14.81** (5.73)
Total Team Core Affect			9.53 (8.83)	.12 (9.55)		
Team Affective Culture					8.31* (4.37)	3.74 (5.05)
Team Defensive Behaviors				-17.11** (7.43)		-14.06* (8.06)
Team Process						
R ²	.05	.23	.24	.28	.26	.29
ΔR^2	.05	.18**	.01	.04**	.03*	.03*
F	1.09	21.51	1.17	5.30	3.61	3.04

**p < .05. * p < .10. Unstandardized regression coefficients. Standard errors in parentheses. DC=dummy code. CC=contrast code.

Table 15. Continued.

	Team Performance					
	7	8	9	10	11	12
Team Initial Mood	-3.65 (9.07)	-1.69 (8.97)	-2.44 (10.10)	-.31 (10.18)	-1.15 (9.37)	-1.07 (9.39)
Team Emotional Stability	.01 (5.96)	.36 (5.86)	.11 (6.08)	-.19 (6.06)	.09 (6.09)	-.55 (6.10)
Team Intelligence	1.70* (1.00)	2.05** (1.00)	2.06** (1.01)	2.01** (1.00)	2.12** (1.05)	2.06* (1.04)
Team Gender	-12.14 (7.68)	-14.22* (7.62)	-14.22* (7.66)	-11.76 (7.85)	-14.17* (7.88)	-11.89 (8.07)
Disagreeableness (DC)		-11.16** (5.49)	-11.01* (5.60)	-13.33** (5.84)	-10.51* (5.90)	-12.76** (6.16)
Total Team Core Affect			1.54 (9.35)	-1.93 (9.67)		
Team Affective Culture					2.36 (5.83)	-.91 (5.93)
Team Defensive Behaviors				-11.60 (8.69)		-10.86 (8.79)
Team Process	23.15** (4.72)	15.18** (6.08)	14.76** (6.61)	9.39 (7.72)	12.89 (8.85)	9.39 (7.72)
R ²	.25	.28	.28	.29	.28	.29
ΔR ²	.25**	.03**	.00	.01	.00	.01
F	5.89	4.13	.03	1.78	.16	1.53

* *p < .05. * p < .10. Unstandardized regression coefficients. Standard errors in parentheses. DC=dummy code. CC=contrast code.

lack of findings for any team affective reaction adding to the model's prediction because the model includes three mediating variables that link disagreeableness to team performance and the total sample size in the study is only 97 teams. However, another reason for the limited findings of team affective reactions in the overall model may be due to team interdependence not yet being included in the analyses. I argue that team interdependence will moderate the impact of a disagreeable teammate on performance

and I will now analyze a mediated moderation model which adds interdependence as a moderator to the mediation model.

Mediated Moderation Analyses

The second research question of this study asks how the negative impact of a disagreeable teammate can be reduced. This question implies moderation and I argue reducing team interdependence will protect the team by limiting the spread of the disagreeable teammate's negativity. When mediation and moderation are combined in a single model either mediated moderation or moderated mediation can be present (Muller, Judd, & Yzerbyt, 2005). The two possibilities have unique foundations depending on the nature of the research. Mediated moderation shows how a moderator occurs. In this case an overall moderation effect exists that is produced by the mediating process. On the other hand, moderated mediation occurs when the independent variable's effect is mediated differently as a function of the moderator. The same three models are estimated in order to test for either model. First, the distal predictor, the moderator, and the interaction of the two are regressed on the outcome variable. Second, the distal predictor, the moderator, and a product term representing the interaction of the two are regressed on the mediator. Third, the distal predictor, the moderator, and the interaction of the two along with the mediator and the interaction of the mediator and moderator are all regressed on the outcome variable.

Mediated moderation occurs when two requirements are met. First, the impact of the interaction on the outcome is significant in the first model. This provides evidence for an overall moderation effect. Second, one or both of the following pairs must be significant: the interaction term of the mediator and moderator in the second model and

the mediator in the third model are significant. Or, the distal predictor's impact on the mediator in the second model and the interaction of the mediator and moderator in the third model are significant. Both pairs can be significant but at least one has to be in order to establish mediated moderation. As a result, the magnitude of the interaction of the distal predictor and moderator variable will be reduced, and may become non-significant.

On the other hand, to establish moderated mediation the second requirement stays but the first requirement changes. The distal predictor's impact on the outcome must be significant in the first model and now the impact of the interaction on the outcome is not significant. The interaction between the distal predictor and the moderator will usually be significant in the third model although this is not required. As a result of meeting these requirements, moderated mediation is established.

I will present results for mediated moderation because in this study I wish to show how a change in interdependence could protect a team from a disagreeable member. I argue that the mediators of team affect and defensive behaviors characterize how reduced interdependence protects a team – it limits the spread of a disagreeable teammate's negativity to other teammates. As a result, teammates will be less emotionally impacted and avoid retaliatory or withdrawal behaviors that may characterize teammates reacting to a disagreeable teammate. I report results using team process as the outcome because the mediated model with team performance as the outcome was not supported.

Team Process as Outcome in Mediated Moderation Analysis

Mediated moderation requires a significant interaction between disagreeableness and interdependence on the ultimate outcome variable (team process). However,

according to results previously presented, the interaction term of disagreeableness and interdependence is not significant for any variable. This term used the *dummy coded* versions while the *contrast coded* variable representing the interaction hypothesis was significant for team cortisol increase (Table 9) and team process (Table 12). Thus, no mediated moderation models would be supported using the dummy coded interaction for either process or performance, although a significant result for the contrast coded variable on team cortisol increase and team process could be used as evidence for these interactions. Using this evidence I present the mediated moderation results in Table 16 which use team cortisol increase as the mediator and team process as the outcome. Just as before, I include the controls of team initial mood, trait emotional stability, intelligence and gender composition (coded 0 for female and 1 for male). Again, I rely on evidence from the contrast code to support the interaction even though the disagreeableness and interdependence interaction terms are not significant in models 1 and 2. Using this evidence, the mediated moderation model is supported because the effect of cortisol is significant in model 3 ($b = .27$, $SE = .10$, $t = 2.59$). In addition, the interaction between cortisol and interdependence significantly predicts team process ($b = -.24$, $SE = .12$, $t = -2.04$). Thus, evidence exists that the interdependence moderator has an effect on performance through its effect on cortisol levels. No other mediated moderation models of team process or team performance are supported.

In conclusion, the impact of disagreeableness on team process is moderated by interdependence and this moderation occurs through the mediator of team cortisol increase. This finding shows that the way a change in interdependence impacts team process is through the physiological reaction of cortisol increases. However, although the

impact of disagreeableness on team cortisol is in the expected direction, the impact on team process is not. Condition means of team process were reported previously in Figure 4. With regard to teams with the disagreeable confederate, teams in the low interdependence condition experienced fewer teammate cortisol increases than teams in the high interdependence condition. But, this reduction in the proportion of teammate cortisol increases did not improve their teams' processes – team process was actually lower in the low interdependence condition than the high interdependence condition.

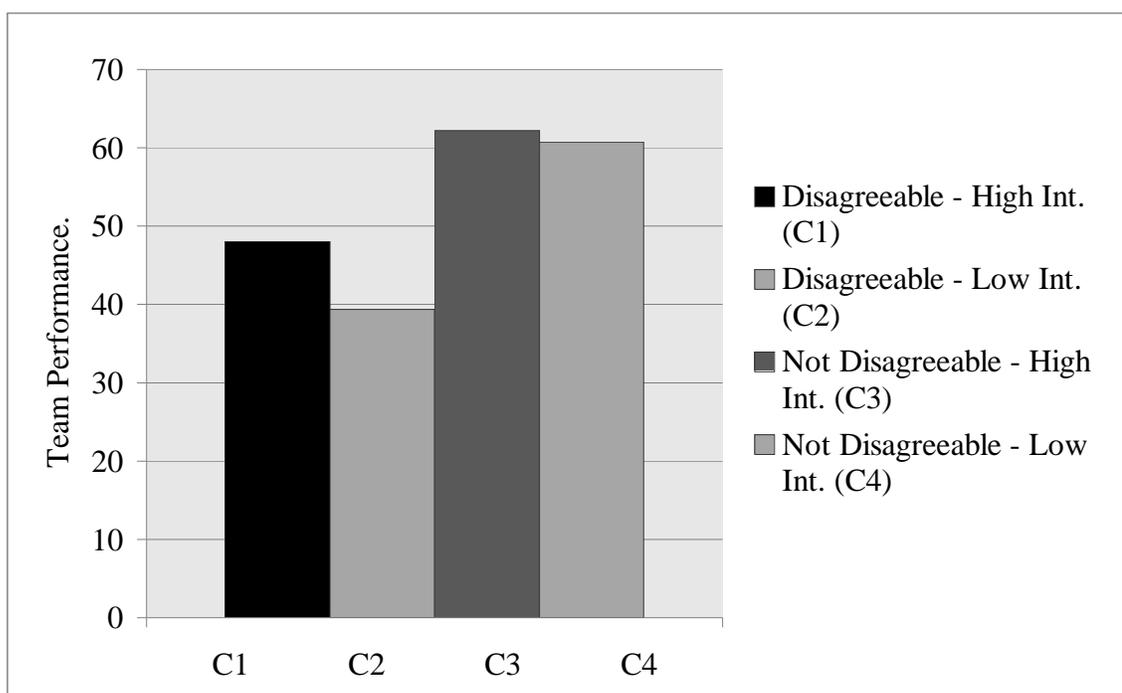
Table 16. Least Squares Regression Results for Mediated Moderation Example with Team Cortisol Increase Mediating the Impact on Team Process.

<u>Predictors</u>	<u>Model 1</u> DV = Process		<u>Model 2</u> DV = Mediator		<u>Model 3</u> DV = Process	
	b	t	b	t	b	t
Team Initial Mood	.20 (.15)	1.35	-.46* (.27)	-1.69	.30** (.15)	2.03
Team Emotional Stability	.08 (.10)	.86	.02 (.18)	.10	.08 (.09)	.84
Team Intelligence	.01 (.02)	.75	-.09** (.03)	-2.91	.03 (.02)	1.51
Team Gender	-.09 (.13)	-.68	.23 (.23)	1.00	-.10 (.12)	-.79
IV: Disagreeableness	-.58** (.10)	-5.97	.16 (.18)	.90	-.61** (.10)	-6.43
MO: Interdependence	.25** (.10)	2.57	.26 (.18)	1.41	.18* (.10)	1.79
IVxMO: Dis X Int.	-.01 (.14)	-.09	.25 (.25)	1.00	-.01 (.14)	.10
ME: Cortisol					.27** (.10)	2.59
MExMO: Cortisol X Int.					-.24** (.12)	-2.04

Note: DV = dependent variable. IV = independent variable. **p<.05, *p<.10.

This counterintuitive finding highlights the side effects of reducing a team's interdependence in order to protect it from a disagreeable teammate. In addition, although no statistical support emerged that interdependence moderated the impact of disagreeableness on team performance, the change in performance across conditions 1 and 2 was also not in the expected direction. The condition means for team performance are shown in Figure 5.

Figure 5. Condition Means of Team Performance.



Note: Int. indicates team interdependence. C1 is condition 1, etc.

The reduction in interdependence didn't improve the teams in the low interdependence condition but actually made them worse. I predicted that this reduction in interdependence would limit the spread of negativity from the disagreeable teammate and thereby improve team process and performance. However, although the teams in

this study experienced more teammate cortisol increases in the high interdependence condition when exposed to the disagreeable teammate, this reaction actually related to better processes and performance. This interesting finding likely comes about through a direct effect of interdependence on process ($r = .29$) and performance ($r = .11$).

Summary of Results

The results show support for all the hypotheses in chapter 3 and partial support for various mediation or mediated moderation models. Hypothesis 1 states that disagreeableness will impact team affective reactions. The results show that disagreeableness impacted team core affect (both positive and negative), team cortisol levels, and team affective culture. Thus, this hypothesis is supported for all three measures of team affective reactions. Hypothesis 2 states that team affective reactions will impact team defensive behaviors. The results support this hypothesis for team core affect (both positive and negative), team cortisol levels, and team affective culture. Thus, this hypothesis is also supported for all three measures of team affective reactions. Hypothesis 3 states that team defensive behaviors will impact team process. The results show that team defensive behaviors (and both retaliation and withdrawal when analyzed separately) impact team process. Hypothesis 4 states that team process will impact team performance and results show support for the hypothesis as well. In addition, Hypothesis 5 states that team interdependence will moderate the impact of disagreeableness on team affective reactions. The results support this hypothesis for team cortisol but not for team core affect (nor positive or negative core affect) or team affective culture. Thus, this hypothesis is supported for one of three measures of team affective reactions.

Finally, disagreeableness impacts performance through team affective reactions, defensive behaviors and processes. However, although a reduction in a team's interdependence reduces the physiological measure of affective reactions, these teams didn't work together as well or perform as well as teams with higher interdependence. This findings is counterintuitive given the theoretical justification for the argument that less interdependent teams will be less impacted by a disagreeable teammate and thus perform better than more interdependent teams. In the next chapter I will expand the discussion of these results and discuss limitations and future research opportunities from this study.

CHAPTER V

DISCUSSION

The use of teams is increasing in organizations and a wealth of findings show that employees can be more productive and satisfied when working in a team structure (Ilgen, et al, 2005). However, researchers have paid less attention to potential problems that arise when work is done in small groups. The classic ‘bad apple’ problem exists when a difficult team member damages the dynamics and hence the performance of the team. For example, team personality research has found that that a highly disagreeable teammate relates to poor team performance (Bell, 2007). However, what is lacking from these findings is an understanding of how a disagreeable teammate damages performance, and what can be done to limit the damage. The team bad apple model proposed by Felps and colleagues (2006) argues that affective reactions, defensive behaviors, and team processes are the mechanisms linking one teammate’s disagreeableness to team performance and that reducing the level of interdependence will reduce the impact of a bad apple on teammates’ affective reactions. Thus, this study aims to answer the two research questions by testing these mediators along with the theoretically supported moderator of team interdependence. The proposed model is depicted in Appendix B.

I designed an experiment to test these relationships. Teams of three participants and a confederate worked together on a task concluding with the teams writing a recommendation. The confederate’s disagreeableness and team interdependence were manipulated at two levels each creating a 2x2 experimental design. To measure a team’s affective reaction, participants rated their own core affect, provided saliva samples for

cortisol analysis, and rated their team's affective culture. In addition, they rated their teammates' defensive behaviors and the team's processes. Team performance was coded at the conclusion of the study. Linear regression results were reported in the previous chapter.

I found that disagreeableness impacted all three team affective reactions, in support of Hypothesis 1. Teammates of the disagreeable confederate experienced more negative affective reactions and less positive affective reactions than teammates of the non disagreeable confederate. These teams had lower positive core affect and affective culture and higher negative core affect and more members with increased cortisol. Thus, all measures of team affective reactions supported the conclusion that the disagreeable teammate impacted team-level affective reactions.

I found that team affective reactions (core affect, salivary cortisol, and affective culture) related to team defensive behaviors, in support of Hypothesis 2. More negative core affect, and more teammates with a cortisol increase along with less positive core affect among study participants led to retaliatory and withdrawal behaviors. In addition, lower team affective culture led to these defensive behaviors. Thus, when teammates experienced negative affective reactions they tended to defend themselves by retaliating or withdrawing from the team. These inherently individual behaviors appear to be the precursors for poor team interactional processes as teammates acted out negative behaviors or withdrew from task participation. By measuring defensive behaviors I can better understand the complex path that links the disagreeable teammate to ultimate team performance.

I found that team defensive behaviors related to team process, in support of Hypothesis 3. Less communication and cooperation occurs as teammates retaliate or withdraw from the team. Team coordination weakens and teams struggle to integrate the various team member inputs. In addition, the impact of a disagreeable teammate on team process likely effects both the social-focused interactions and the task-focused interactions, laying the groundwork for the impact of the disagreeable teammate on team performance.

I found that team process related to team performance, in support of Hypothesis 4. Teams in this study had markedly better performance when the confederate was not disagreeable than when he was. It appears that as team's coped with the disagreeable teammate, time and effort were redirected toward maintenance of the team and away from task accomplishment efforts. Resources that could have been spent on task-focused behaviors like brainstorming better ideas or thinking through implications of decisions were spent dealing with the disagreeable person. In turn, this drawing away of resources by the disagreeable teammate led to poorer performance by the team.

I found that interdependence changed the impact of disagreeableness on one measure of team affective reactions, in support of Hypothesis 5. Despite theoretical arguments, a team's core affect and its affective culture were not meaningfully higher under conditions of low interdependence as opposed to conditions of high interdependence. However, teams with the disagreeable confederate did have fewer cortisol increases in the low interdependence condition than in the high interdependence condition. In fact, about twice as many participants (36%) experienced an increase in cortisol under disagreeableness and high interdependence (condition 1) as opposed to any

of the three other conditions (17%, 21%, and 14% respectively). Thus, although participant's perceptions of their own core affect and the team's affective culture didn't meaningfully change with interdependence, the physiological measure of affect did. This finding highlights the importance of incorporating multiple measures of state affect because of its multi-component nature. By expanding the measurement to salivary cortisol I was able to pick up on the moderating role of interdependence on a measure of team affective reactions when other measures did not show this impact.

I found support for a mediation model with disagreeableness and defensive behaviors, along with either positive core affect or team affective culture predicting team process. Thus, the impact of the confederate's disagreeableness on team processes went through team affective reactions and defensive behaviors. As teammates reacted negatively to the disagreeable teammate they retaliated or withdrew from the context which ultimately damaged team processes. On the other hand, and despite support for the initial hypotheses, I did not find support for the mediation model predicting performance when all variables were included. In the complete model team intelligence and disagreeableness related to team performance but team affective reactions, defensive behaviors, and team process did not. This lack of findings for the mediating model predicting team performance could be due to the sample size of 97 teams coupled with a more complex model using three mediating variables. However, another reason might be the exclusion of team interdependence from this model. Hence, I also analyzed various mediated moderation models.

The mediated moderation model predicting performance was not supported nor was the model predicting process when defensive behaviors were included. However, I

found support for a mediated moderation model that included interdependence moderating the impact of disagreeableness on team cortisol increase which then predicted team process. This model provides evidence that the moderating influence of interdependence on team process goes through team cortisol increase. In other words, this overall moderation effect can be explained by a team's affective reactions. Interdependence changed the way teammates reacted to the disagreeable teammate. Specifically that less interdependence resulted in less of a negative reaction. The unexpected part of this finding is that more cortisol increases among teammates, a negative affective reaction, actually led to better team processes. This finding is unexpected because the reduction of interdependence was thought to protect a team's processes through less negative affective reactions, not weaken them. Thus, the additional affective reactions indicated by the physiological measure of salivary cortisol in highly interdependent teams actually helped them work together better.

This counterintuitive finding points out the side effects of manipulating a team's level of interdependence in order to protect the team from a disagreeable teammate. Teammates experienced less negative affective reactions (Hypothesis 1) but the reduction in team-focused elements also meant the teammates were less team oriented. In this study, team affective states were protected however their processes and to some extent even their performance were damaged beyond whatever benefit they gained from better affective states. This findings could be explained by the positive correlation between interdependence and team process ($r = .29$). Thus, the inherent benefits of being a team that come through interdependence were reduced more than the protection offered by the reduction in teammates' negative affective reactions.

This interesting finding points out the difficulty in attempting to protect a team from a disagreeable teammate. The team bad apple model (Felps, et al, 2006) argues that interdependence will moderate the impact of an affectively negative person on teammates' emotions. Research related to affective events theory (Weiss & Cropanzano, 1996) has also shown that interdependence moderates the impact of a negative work event on affective reactions. These views are in line with the critical assumption in emotional contagion research that individuals need to be interdependent for emotions to spread. Without a need to work together there should be little spreading of negative emotions because people won't have to connect or interact with the difficult person. Thus, the nature of interdependence as a moderator variable in teams research should also be considered in concert with its nature as an important independent variable.

In sum, the bad apple did indeed spoil the barrel. Teams with a disagreeable teammate had worse affective reactions, more defensive behaviors, lower team processes and lower team performance. Thus, one person can indeed damage internal dynamics and reduce the effectiveness of the team. In addition, counter to my theoretically-based claim, increasing (rather than decreasing) the level of interdependence should protect the team from the negativity of the bad apple. I now discuss additional aspects of the findings.

Team coping might explain why teams with a disagreeable member fared better in the high interdependence context than those in the low interdependence context. Team-focused information, goals, and rewards not only require teammates to work together but also should encourage helping behaviors among teammates. These tighter groups can draw strength from each other in order to buffer themselves from the negativity emanating from the bad apple. In fact, average levels were lower for defensive behaviors

and higher for team affective culture, team process, and team performance in condition 1 versus condition 2. This pattern could be due to the increase in helping among teammates due to higher interdependence. In addition, a distinction could be made between coping behaviors aimed at defending ones self and coping behaviors aimed at defending the team. Self-defensive behaviors may damage team variables while team-defensive behaviors may strengthen team variables. High interdependence should promote more team-defensive behaviors and less self-defensive behaviors, thereby strengthening the team. Thus, the reaction of teammates to the bad apple may be of more importance than that actual bad apple.

Another reason why team process was lower in less interdependent teams is because these teams do not need to work together as much to get things done. The very nature of interdependence is that it *requires* teammates to work together to be successful. Inversely then, low interdependent teams don't need as much interaction (team process) to complete their tasks. For example, Barrick and colleagues (2007) found that top management teams that were highly independent needed high team processes to perform well but teams that were low in interdependence did not need high processes to perform well. Thus, it may be that 'working groups' can perform pretty well with lower levels of team process. However, in my study condition 2 had a lower average level of performance than condition 1 indicating that the teams that had a disagreeable teammate and had lower interdependence performed worse than those with high interdependence. It may be that differentiating between the higher and lower performing teams in condition 2 could reveal that better performing teams matched low interdependence and low process, but this possibility does not emerge at the condition level.

Another complexity regarding team process is its placement in the model. The essence of team process is interaction and for members to react affectively to a disagreeable teammate the team must interact. However, following multiple theoretical models I order the mediators from affective reactions to defensive behaviors to team process. For example, the team bad apple model proposed by Felps and colleagues (2006) places psychological reactions as the proximal outcome of having a negative teammate on the team. These reactions then lead to defensive behaviors and team processes. In addition, affective events theory (Weiss & Cropanzano, 1996) argues that affective reactions are the proximal outcomes to negative events at work. These affective reactions then lead to ensuing affect-driven behaviors and attitudes. At a more complex level of analysis I argue that a spiraling effect occurs between the demonstrations of negativity from a bad apple, the impact on teammates, their retaliations to the bad apple, the ensuing worse behaviors from the bad apple, and worsening reactions by teammates. All throughout this cycle team interactions suffer. Future research looking at these team variables over time might be able to shed more light on these complexities.

Another interesting finding is the limited relationships between personality traits and performance. Research shows that conscientiousness relates to performance although in this study the team-level correlation is .00. The correlations between agreeableness (-.09), emotional stability (.02) and openness to experience (.01) are all non-significant. In fact, the only personality trait to correlate with performance is extraversion ($r = .17$). However, in a meta analysis of deep-level composition variables and team performance, Bell (2007) found that while conscientiousness correlated with team performance in field studies (corrected population correlation = .30) it did not

correlate with team performance in lab studies (corrected population correlation = .04). This finding mirrors much of the results of the relationships between personality traits and team performance in lab studies. This lack of an impact is probably due to the limited amount of time teams spend performing tasks in the lab; the relationship likely emerges over larger periods of time than lab studies usually last.

Finally, the non-significant correlations between team cortisol increase and team core affect ($r = -.12$) and team affective culture ($r = -.10$) at first seem surprising given the strong correlation between team core affect and team affective culture ($r = .57$) and because all three are indicators of a team's affective reactions. However, this result is in line with salivary cortisol findings reported in the literature. Psychophysiology researchers continue to debate the response system coherence problem which asks why the four components of an affective reaction (appraisal, core affect, physiological changes, and action readiness) don't correlate higher (e.g., Mauss, et al, 2005). A likely cause for the lack of coherence lies in the complexity of not only the affective reaction process but also the complexity of the process for each of the four components. For example, when a person perceives a stressor the brain first releases the hormone CRH (corticotropin-releasing hormone) which stimulates the pituitary gland to release ACTH (adrenocorticotrophic hormone) which then stimulates the adrenal gland to release steroid hormones called glucocorticoids. The dominant glucocorticoid is cortisol. During stress, the level of CRH increases within seconds, the level of ACTH increases in about 15 seconds, and the cortisol increases within a few minutes (Sapolsky, 2002). Cortisol increases can be detected in the blood in a few minutes but it takes 10 to 15 minutes for

these increases to show up in saliva samples. This slow process is different from a person responding to paper and pencil measures of psychological variables.

Limitations and Future Research

This study has several strengths, although some limitations also exist. First, the sample size was only 97 teams (291 participants) which translated to 25, 24, 24 and 24 teams per condition. For many of the less complex relationships this sample size was adequate. However, for more complex model testing the modest sample size likely played a part in limiting the findings. Nevertheless, important relationships were discovered which contribute to the current literature on team personality and difficult team members.

In addition, the contrived nature of the lab setting and the undergraduate college students used as participants may limit the generalizability of the findings. Although real rewards were at stake, it may be that teammates were less impacted by the disagreeableness knowing that they wouldn't have to interact with this difficult person after the experiment. One of the ways a disagreeable person impacts a team is likely through the anticipation teammates perceive on a daily basis of having to work with the person. The lab setting limited this anticipation which may impact the results of the study. However, this limitation should be taken in light of that fact that teammates clearly perceived the confederate as disagreeable or not depending on the condition.

Various avenues of future research are warranted from this study. First, the purpose of this research was to illuminate the mediating mechanisms which link a disagreeable teammate to poor team performance and to find ways to limit this negative effect. In this study, a reduction in interdependence did moderate the impact of

disagreeableness on teammate cortisol increases, although the effect on processes and performance was actually detrimental. Thus, a search for other ways to reduce the damage is warranted. For example, team leadership may help reduce the damage. A highly directive team leader may be better equipped to subdue the disagreeable teammate and help members feel more protected from the problem member. On the other hand, a more democratic leader may not adequately confront the disagreeable teammate thereby allowing the negativity to spread. Thus, leadership style represents an intriguing avenue of future research in discovering how to inoculate the team from the disagreeable teammate while still protecting the team.

Another possible solution to the disagreeable teammate worthy of future research is the personal coping skills of teammates. A team leader could focus on supporting teammates through providing coping resources and social support. It may be that many teammates can adequately manage the negativity of the disagreeable teammate if they perceive the leader and the rest of the team as supportive and empathetic. A wise team leader could use this obstacle to rally the rest of the team together in the face of the challenge. In fact, by strengthening the bonds and interaction patterns of the rest of the team, they may actually become a stronger team because of the presence of an adversarial member. Thus, in addition to strategies that focus on subduing the disagreeable teammate in order to protect the team, future research should also consider strategies that focus directly on strengthening of the team, in the face of the internal challenge. As was found in this study, it may be that a direct positive effect on the team is stronger than the indirect benefit from subduing the disagreeable person.

Third, any solution to the disagreeable teammate must take into account the possible side effects of the strategy. For example, unexpected consequences could emerge if a team leader focuses on directive behaviors in order to limit the impact of a disagreeable teammate. Other teammates may feel less inclined to share inputs and may have less opportunity to do so. On the other hand, more conflict will arise by directly confronting the disagreeable teammate. A team leader should be aware of the delicate balance between productive and counterproductive conflict because the confrontation may do more harm than good. In addition, if a team focuses solely on building team support amongst the rest of the members, to the exclusion of the disagreeable teammate, this member may react with even more negativity than before. He or she may retaliate at the team for their exclusion and may try to directly sabotage the team's dynamics and performance. Thus, implications of a strategy incorporated to protect a team from a difficult member should be carefully and thoroughly considered.

Fourth, the use of physiological indicators of affective reactions should be expanded. One challenge is the cost of using physiological measures. The major costs for salivary cortisol first include the enzymeimmuno assay or EIA kits which can cost around \$150 each and analyze about 35 samples in duplicate. Second, analyses fees can easily run another \$200 to \$400 per kit depending on the lab. Also, because more than two samples should be taken per person the cost becomes prohibitive especially in large samples. However, other measures such as heart rate, blood pressure, and skin conductance are also reliable measures of an affective or emotional reaction and are much less expensive. Another challenge is the fact that physiological indicators have their own issues that make them difficult to use. In this study the between individual

variation in cortisol levels at each time made the use of straight magnitudes, or a difference between time 1 and time 2 magnitudes, difficult to use. Despite mean differences across the conditions the high standard deviations prevented significant correlations. This issue was dealt with by using counts of participants who had meaningfully higher levels at time 2. Thus, although a superficial perspective might hold that physiological indicators are somehow perfect and free from measurement issues, they are not. The answer is to understand their nature and address the challenges through guidance in the literature.

Theoretical Implications

This study marks the first test of the team bad apple model (Felps, et al, 2006). Although their model mixes levels of analysis, the model in this study is completely at the team-level of analysis. I found evidence in this study that a disagreeable teammate damaged team performance. I also found evidence that the disagreeable teammate impacted the affective states of team members, these affective states related to team defensive behaviors, team defensive behaviors related to processes, and processes related to performance. I also found that interdependence moderated the impact of disagreeableness on team affective states (cortisol). Thus, initial support for their model exists. However, the complete mediation and mediated moderation models predicting performance were not supported, possibly due to an insufficient sample size of teams. On the other hand, less interdependence related to less negative affective reactions (cortisol) but it also related to less team process and even performance. Thus, the nature of interdependence as a moderator in this model may be more complex than originally conceived. Yes, less interdependence might reduce some indicators of negative affective

reactions but the direct effects of interdependence on process and performance appear to be understated in the theory.

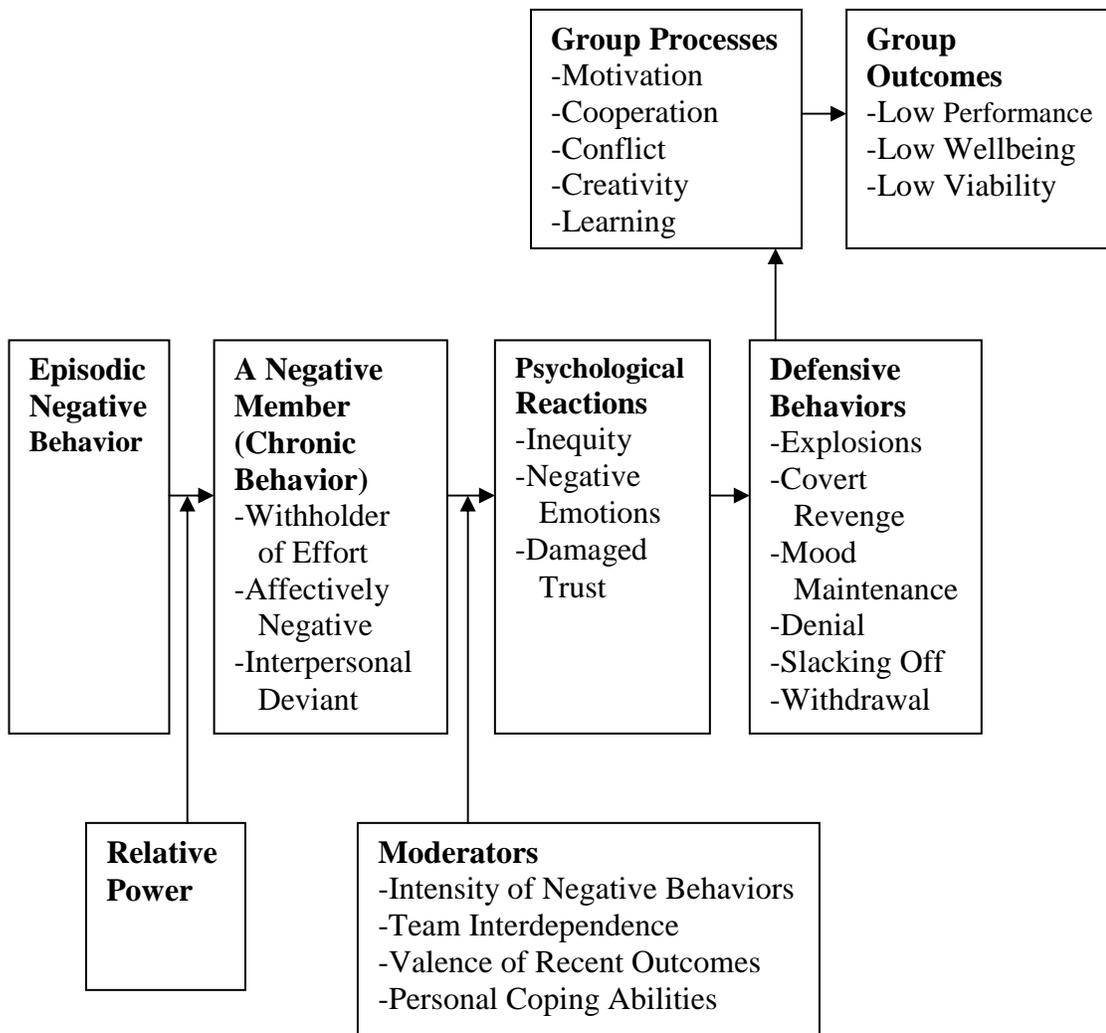
This study also contributes to the literature on affective events theory (Weiss & Cropanzano, 1996) by incorporating elements of the theory in a team-level study. A surprisingly few studies use the theory at the team-level of analysis despite its usefulness in predicting that affective reactions are the primary mediators between negative events and affective driven behaviors. This study indeed found that affective reactions were the proximal outcomes of a negative event for teams, namely interacting with a disagreeable teammate. Thus, this study demonstrates that the theory can be useful in describing how and why a disagreeable teammate damages the interactional processes and ultimately the performance of a team.

Conclusion

Despite evidence that a highly disagreeable teammate damages team performance the path through which the damage occurs is not clear. The purpose of this study was to first illuminate the mediating mechanisms that connect a disagreeable teammate with team performance and then offer a way teams can limit this negative impact. Various theories support the mechanisms of team affective reactions, defensive behaviors, and process along with interdependence as a moderator in the model. This study found initial support for the mechanisms although findings of overall models predicting performance were limited. Thus, initial support suggests these three mechanisms may be the key connectors of disagreeableness to performance. In addition, the moderator of interdependence was supported although the impact on team processes and performance was in the opposite direction. Less interdependence meant less negative affective

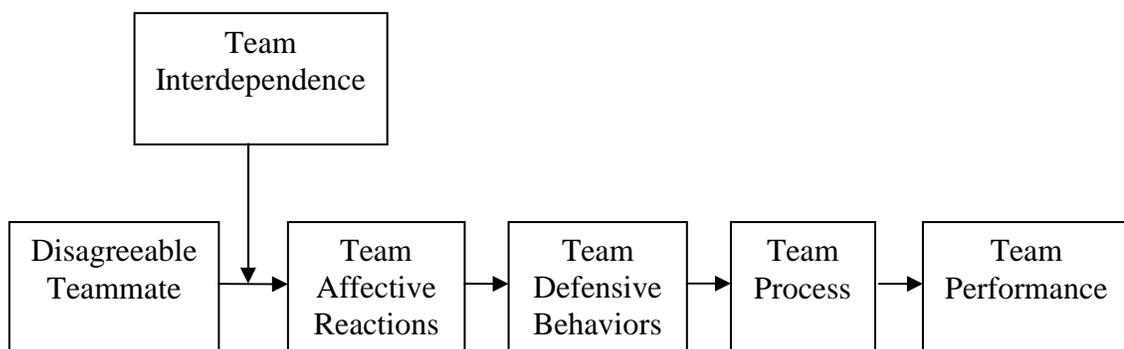
reactions but also lower processes and performance. Increasing a team's interdependence may be a better way to protect a team than reducing the interdependence because the unexpected damage to a team's processes and performance appear to be more than the benefit of protecting team's affective states. Future research is needed to explore alternative solutions to the disagreeable teammate like a directive style of team leadership or enhancing the coping skills of teammates.

APPENDIX A. BAD APPLE PHENOMENON.



NOTE: Model proposed by Felps, W., Mitchell, T. R., & Byington, E. (2006). How, when, and why bad apples spoil the barrel: Negative group members and dysfunctional groups. *Research in Organizational Behavior*, 27, 175-222.

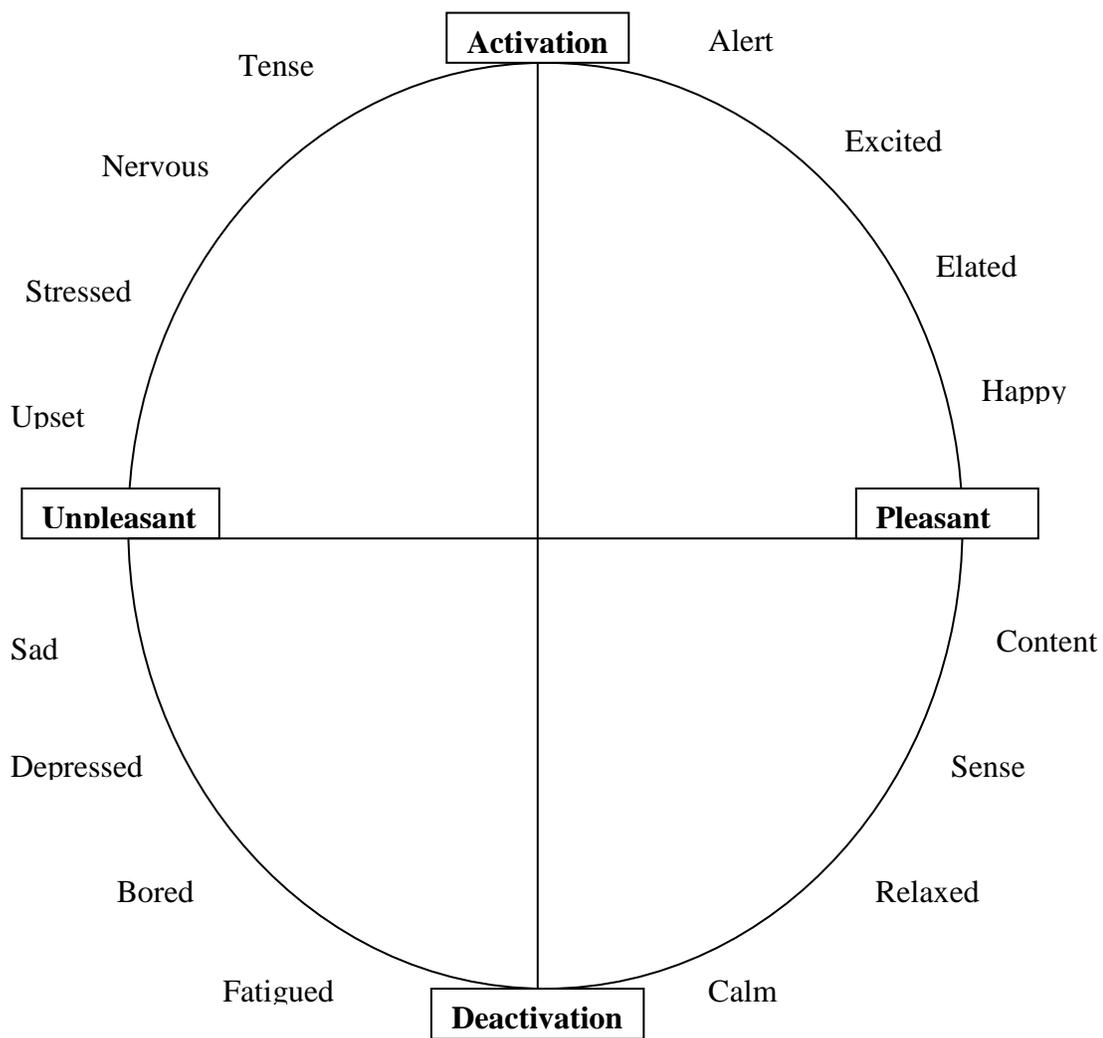
APPENDIX B. PROPOSED MODEL FOR THE STUDY.



APPENDIX C. DISAGREEABLENESS PROFILE.

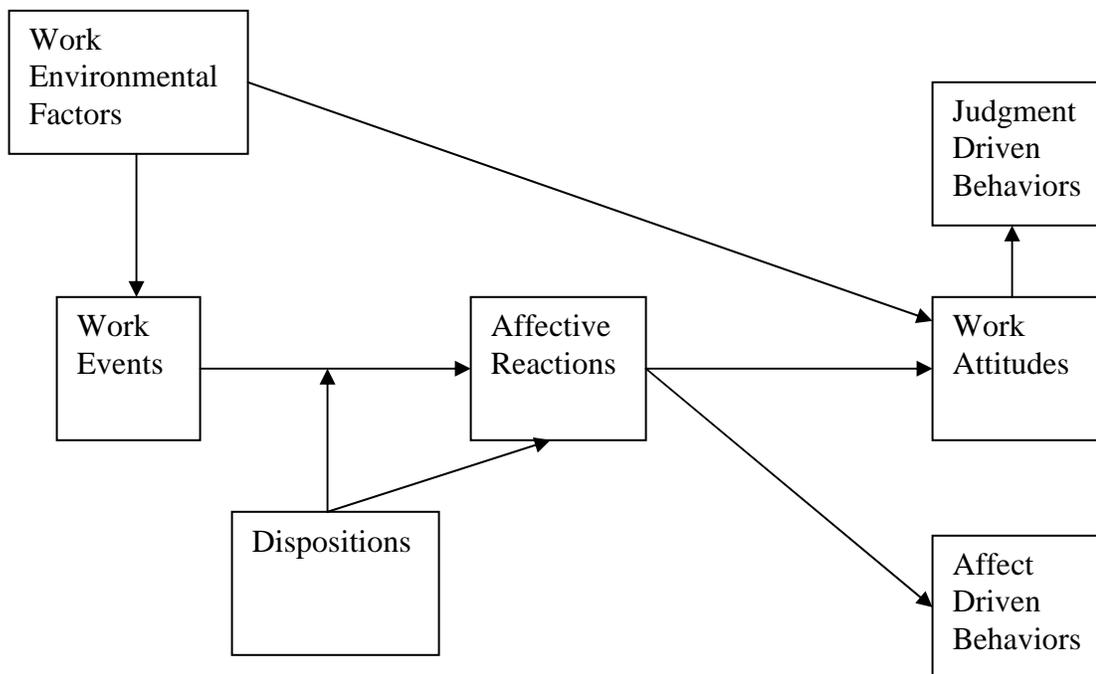
<u>Hard-Hearted</u>	<u>Hard-Minded</u>	<u>Mean</u>	<u>Insecure</u>	<u>Selfish</u>
Indifferent	Inflexible	Hostile	Paranoid disposition	Unforgiving
Uncaring	Stubborn	Spiteful	Suspicious	Ungrateful
Thoughtless	Uncooperative	Quarrelsome	Jealous	Pessimistic
Inconsiderate	Noncompliant	Hurtful	Distrustful	Tightfisted
Unkind	Harsh	Aggressive	Complicated	Self-centered
Cold	Rough	Rude	Emotionally-unstable	Selfish
Unsociable	Dominance	Vengeful	Insecure	
Unfriendly	Arrogance	Relationship conflict		
Unlikable	Narrow-minded			
Hard-hearted	Impatient			
Unpleasant				
Ill-natured				

APPENDIX D. CORE AFFECT CIRCUMPLEX.



NOTE: From Barrett, L., & Russell, J. A. (1998). Independence and bipolarity in the structure of current affect. *Journal of Personality and Social Psychology*, 74 (4): 967-984.

APPENDIX E. AFFECTIVE EVENTS THEORY.



NOTE: From 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.

APPENDIX F. RECRUITING ADVERTISEMENT SCRIPT.

Recruiting Advertisement

Hi. My name is Bret Bradley and I am a graduate student here at the University of Iowa in the Management and Organizations department. I am conducting a research study for my dissertation which looks at how teams make decisions when ethical issues are involved. I am here to invite people who are interested to participate in this study.

There is an announcement on ICON with more details about participation. The announcement has a link where you can sign up for a time slot. Location: Basement of Seashore Hall. Study takes about an hour. Please remember your time and if you need to change or cancel you can do so anytime, up to 24 hours before your scheduled time slot. More times will be added every week – check back if it's full. Should end by November 1st – Sign up early. If you decide to participate you will receive 4 points of extra credit in this class. Compensation is also available.

So, if you think you might be interested please sign up. Thanks!

APPENDIX G. WEB-PAGE SIGN-UP DIRECTIONS.

Please sign in with your Hawk ID and Password to view the current available times for the experiment and to sign up for a time. If you have any problems, contact the researcher Bret Bradley by email (bret-bradley@uiowa.edu), office (W349), or office telephone (335-1814).

For information on the research requirement for 6J:048 Introduction to Management, please refer to your syllabus.

<<(LOGIN)>>

Please observe the following guidelines for the study:

- 1.) Avoid alcohol consumption within 24 hours before the experiment.
- 2.) Avoid dental work within 24 hours before the experiment.
- 3.) Do not brush your teeth within 2 hours before the experiment.
- 4.) Do not eat a major meal within 1 hour before the experiment.
- 5.) Do not eat dairy products within 1 hour before the experiment.
- 6.) Do not eat acidic or high sugar foods within 1 hour before the experiment.

Thanks.

A research participant has the right (1) to receive a description of the study before participating (2) to leave an experiment any time they wish, and (3) to receive a debriefing form at the end of the study which explains why the data is being collected.

APPENDIX H. REMINDER EMAIL SCRIPT.

SUBJECT: Experiment Time Reminder

Hi (name),

Just a reminder that you are scheduled to participate in an experiment tomorrow.

Time: (Fill in with time)

Date: (Fill in with date)

Location: Basement of Seashore Hall (APLHA waiting room – W12)

Please remember to observe the following guidelines for the study:

- 1.) Avoid alcohol consumption within 24 hours before the experiment.
- 2.) Avoid dental work within 24 hours before the experiment.
- 3.) Do not brush your teeth within 2 hours before the experiment.
- 4.) Do not eat a major meal within 1 hour before the experiment.
- 5.) Do not eat dairy products within 1 hour before the experiment.
- 6.) Do not eat acidic or high sugar foods within 1 hour before the experiment.

Let me know if you have any questions.

Thank you,

Bret Bradley
Management & Organizations Department
bret-bradley@uiowa.edu
W349 PBB
335-1814

APPENDIX I. INFORMED CONSENT DOCUMENT.

Project Title: **Team Decision Making**
Researcher: **Bret Bradley, MA**
University of Iowa
Management & Organizations Department
Tippie School of Business
W349 Pappajohn Business Building

Dear Student:

This consent form describes the research study to help you decide if you want to participate. This form provides important information about what you will be asked to do during the study, about the risks and benefits of the study, and about your rights as a research subject.

- If you have any questions about or do not understand something in this form, you should ask the research team for more information.
- You should discuss your participation with anyone you choose such as family or friends.
- Do not sign this form unless the study research team has answered your questions and you decide that you want to be part of this study.

WHAT IS THE PURPOSE OF THIS STUDY?

This is a research study. We are inviting you to participate in a one and a half hour long research study because you are an undergraduate at the University of Iowa. We obtained your name and email address from the web site you used to sign-up for the study.

The purpose of the study is to better understand how teams make decisions where ethical issues are important.

HOW MANY PEOPLE WILL PARTICIPATE?

Approximately 200 people will take part in this study at the University of Iowa.

HOW LONG WILL I BE IN THIS STUDY?

If you agree to participate, your involvement will last for about one and a half hours.

WHAT WILL HAPPEN DURING THIS STUDY?

If you agree to participate in this study, you will be asked to answer some questions about yourself which will take about 10 minutes. You will be asked to provide your age, sex, race, year in school, ACT or SAT score, current GPA. You be asked to tell us when you had your last major meal, when you last ate or drank dairy products, when you last brushed your teeth and last had dental work, whether or not you are taking medications (prescription or over-the-counter) and what those medications are, and if you have taken any illegal drugs or drunk alcohol in the last 24 hours. If you are female you will be asked questions about your menstruation cycle. You will be asked questions about your behaviors, feelings, and emotions. You may skip any questions that you do not wish to answer, but, we ask that you be as complete as possible for research purposes.

Next we will ask you to interact in a team of four randomly assigned people for exactly 20 minutes to complete a team task. We will ask that, as a team, you provide a recommendation from the information given on the case. Before you meet your teammates you will be given a case to read to prepare you for the team task.

Finally, you will return to your individual room and be asked to give an individual recommendation, separate from the team's recommendation. You will also be asked to fill out some more questions about your teammates, your experience interacting with the team, and how things went. These questions will take about 15 minutes. You are free to not answer any questions that you don't want to answer, but, we ask that you be as complete as possible for research purposes.

At three different intervals throughout the study, you will be asked to give saliva samples for testing. The research assistant will leave the room while you obtain the samples and there will be an instruction card on your table. The research assistant will give you a plastic tube with a lid. First, we ask that you allow saliva to pool in your mouth for a minute or two. Then, please spit in the tube until the saliva level reaches the line marked on the tube. After you obtain each saliva sample please place the lid back on the tube.

All procedures will occur in the Center for the Study of Group Processes, located in Seashore Hall.

WHAT ARE THE RISKS OF THIS STUDY?

You may experience one or more of the risks indicated below from being in this study. In addition to these, there may be other unknown risks, or risks that we did not anticipate, associated with being in this study.

You will be asked to work with others in a team situation. You may be uncomfortable doing this.

There are no foreseeable risks to the collection of the saliva samples.

The questionnaires ask for information about alcohol and illegal drug use. Answering these questions may disclose illegal activities. You may skip any questions you do not wish to answer or end your participation at any time. We will protect your confidentiality as described in the confidentiality section below.

WHAT ARE THE BENEFITS OF THIS STUDY?

You will not benefit from being in this study.

However, we hope that, in the future, other people might benefit from this study because we will learn more about how people interact to make decisions in teams.

WHAT OTHER OPTIONS ARE THERE?

Instead of being in this research study, you have other options for receiving extra credit as described in the course syllabus. Options may include attending public lectures endorsed by the instructor, or evaluate a case specified by the instructor. Review the course syllabus or discuss extra credit options with the course instructor.

WILL IT COST ME ANYTHING TO BE IN THIS STUDY?

You will not have any costs for being in this research study.

WILL I BE PAID FOR PARTICIPATING?

You will be given 6 (or 3) points of extra credit for participation in this study, depending on the class.

You will also be paid for being in this research study. You will be informed during the study of the amount of payment. At the end of the study you will need to provide your name, citizenship, and mailing address so a check can be mailed to you.

WHO IS FUNDING THIS STUDY?

Grants from the National Science Foundation (NSF) and the Society for Industrial and Organizational Psychology (SIOP) are funding this study. This means that the University of Iowa is receiving payments from the NSF and SIOP to support the activities that are required to conduct the study. No one on the research team will receive a direct payment or increase in salary from NSF and SIOP for conducting this study.

WHAT ABOUT CONFIDENTIALITY?

We will keep your participation in this research study confidential to the extent permitted by law. However, it is possible that other people such as those indicated below may become aware of your participation in this study and may inspect and copy records pertaining to this research. Some of these records could contain information that personally identifies you.

- federal government regulatory agencies,
- auditing departments of the University of Iowa, and
- the University of Iowa Institutional Review Board (a committee that reviews and approves research studies).

To help protect your confidentiality, we will use an identification number to identify your study information; neither your name nor any other information that could be used to personally identify you will be retained in the record of your participation. There will be no link between the study data identification number and your name.

If we write a report or article about this study or share the study data set with others, we will do so in such a way that you cannot be directly identified.

IS BEING IN THIS STUDY VOLUNTARY?

Taking part in this research study is completely voluntary. You may choose not to take part at all. If you decide to be in this study, you may stop participating at any time. If you decide not to be in this study, or if you stop participating at any time, you won't be penalized or lose any benefits for which you otherwise qualify.

After you have completed participation in the study today, we won't contact you again.

WHAT IF I HAVE QUESTIONS?

We encourage you to ask questions. If you have any questions about the research study itself, please contact: Bret Bradley (319) 335-1814, or Professor Michael Lovaglia (319) 335-2494. If you experience a research-related injury please contact Bret Bradley, W349 Pappajohn Business Building, 319-335-1814, bret-bradley@uiowa.edu.

If you have questions about the rights of research subjects, please contact the Human Subjects Office, 300 College of Medicine Administration Building, The University of Iowa, Iowa City, IA 52242, (319) 335-6564, or e-mail irb@uiowa.edu. To offer input about your experiences as a research subject or to speak to someone other than the research staff, call the Human Subjects Office at the number above.

This Informed Consent Document is not a contract. It is a written explanation of what will happen during the study if you decide to participate. You are not waiving any legal rights by signing this Informed Consent Document. Your signature indicates that this research study has been explained to you, that your questions have been answered, and that you agree to take part in this study. You will receive a copy of this form.

Subject's Name (printed): _____

Do not sign this form if today's date is on or after 09/01/08.

(Signature of Subject)

(Date)

Statement of Person Who Obtained Consent

I have discussed the above points with the subject or, where appropriate, with the subject's legally authorized representative. It is my opinion that the subject understands the risks, benefits, and procedures involved with participation in this research study.

(Signature of Person who Obtained Consent)

(Date)

APPENDIX J. EXPERIMENTAL PROTOCOL.

Experimental Protocol – Team Decision Making Task

Experimenter enters the waiting room at the scheduled start time. He holds a clipboard with names of participants.

(from memory)

Hi,

Is everyone here for the study about team decision making? (If anyone isn't refer them to the right person or place.)

Can I have everyone's names to verify that you're on the list? (Verify the name with the list on the clipboard.)

Great.

(Experimenter hands the participants the Informed Consent document.)

This is an Informed Consent document. It details what you can expect in this study including interacting in a group with three other randomly selected participants and giving three saliva samples. If everything looks OK, we ask that you sign and date on the last page.

(Experimenter leaves the waiting room. After 2-3 minutes, experimenter returns to the room with the box of random numbers.)

Did everything on the forms sound OK? (If not, address any concerns they may have.)

Did everyone sign the form? (Check the signatures.)

Great, then I will collect that from you. (Collect the Informed Consent form and sign and date it too.)

Again, my name is Bret Bradley and I will be helping you with today's study. To begin, please take a number from the box which will help us begin the study. Please tell me your numbers. OK, we'll start with the lowest two numbers – you two please follow me to your rooms.

(Experimenter takes two participants to the first two rooms and instructs them to fill out the packet of questions.)

Here is a packet of questions for you to answer about yourself. All answers are kept strictly confidential and you can choose not to answer any question if you wish. The questions take about 10 minutes to answer and I will come back then to collect it. Also, please write your name on the name tag. Finally, when you're done please slide the red "Attention" card under the door and I'll know you're done.

(Experimenter gives the participant the pre-task packet of questions and leaves the room. Make sure to file the Informed Consent form in the File. Repeat with the next two participants including the confederate.)

(When all participants are finished the experimenter returns to each participant's room with their task description and a pre-marked saliva collection tube with lid and 2-inch straw section.)

All finished? Great. We can go ahead and get started. (Collect the pre-task packet and mark with session ID number.)

For the purpose of this study, we are randomly assigning you to a group of four people who you will meet in a few minutes. This study investigates how teams make decisions when ethical issues are present. The results will help us better prepare teams in these types of situations in the future.

Each person will have about 5 minutes to read the case which has been given to numerous students and managers in the past so a good answer is well known. Then four people will come together as a group to discuss the case and make one group recommendation. (Experimenter hands the participant a copy of the task.) **After you return to your room you will then make an individual recommendation. Remember, you are paid based on the quality of the team's recommendation.**

**** (NOTE: IN THE LOW INTERDEPENDENCE CONDITION THIS PARAGRAPH READS AS FOLLOWS: Each person will have about 5 minutes to read the case which has been given to numerous students and managers in the past so a good answer is well known. Then four people will come together as a group to discuss the case and make one group recommendation.** (Experimenter hands the participant a copy of the case.) **After you return to your room you will then make an individual recommendation. Remember, you are paid based on the quality of your own individual recommendation.**

Also, to collect saliva we ask that you allow your spit to collect in your mouth for a minute or so. When you are ready, place the straw in your mouth and allow the spit to drip into the container. We ask that you fill it to the marked line. Close the tube when you are done.

(Experimenter hands participant the collection tube, straw section, and sheet with saliva sample instructions.)

Are there any questions? (Experimenter will answer any questions participants may have.) **Let me know when you're done by sliding the red "Attention" card under the door.**

(Experimenter leaves the room and files the Pre-task packet in the file folder. Experimenter returns to each participants' room when they are finished.)

OK, all finished? (Experimenter collects the sheet of paper with the task information and the saliva sample. Place the first saliva samples in the fridge. Return to each participant's room and take them to the team room.)

We can now begin the group discussion part of the study. Are there any questions at this point? (Experimenter will answer any questions participants may have.)

(Experimenter will lead each participant into a room where the group will interact. Make sure one task sheet and a pen are on the desk in the room. Make sure to turn the VIDEO CAMERA on.)

In this part of the study you will discuss the case and come to a joint decision about what your recommendation will be and why. Pick one team member to read the instructions and when you're ready, write your recommendation on the answer sheet provided. You have 20 minutes and after 15 minutes I will return and remind you that you should start writing your answer if you haven't started already.

Are there any question? (Experimenter will answer any questions participants may have.) **Is there anything else? Great. I will return in 15 minutes.** (Experimenter leaves the room.)

(Upon leaving the room experimenter starts the stop watch. If teams finish before 15 minutes, stop the timer and record this time. After 15 minutes, re-enter the room.)

You only have 5 minutes left so start writing your answer if you haven't started already. (Experimenter leaves the room and returns in 5 minutes.)

OK, time is up! You must stop working on the task. (Experimenter walks over to the table and picks up the case with the group's recommendation. Turn CAMARA off.)

We will now return to our individual rooms. (Experimenter leads each participant to their individual room. Be sure to file the team recommendation in the file.)

You will now have a chance to make an individual recommendation, separate from the recommendation of your team. (Experimenter hands subject the individual recommendation instructions sheet and another answer sheet and a pen.) **You have exactly 5 minutes and you may begin now.** (Experimenter starts the stop watch and gives the next two participants these items 30 seconds apart.)

(At the end of 5 minutes enter each participants room.)

Times up. I'll take the recommendation and give you the last packet of questions and the second saliva sample. (Experimenter will give participant a the post-task packet of questions and the pre-marked saliva collection tube with lid and 2-inch straw section.)

For the last part of the study you will answer questions about your teammates, the task, and your personal experience interacting with the other people. These questions take about 15 minutes to answer, I will come back when you're done to collect it. (Experimenter hands the participant the post-task packet of questions.) **Also, when you're done with the saliva let me know by using your red card. Any questions?** (Experimenter will answer any questions participants may have.)

(Experimenter will leave the room and place the individual recommendation in the file. Experiment collects each participant's saliva sample when participant is done.)

All done? Great. (Experimenter collects the second saliva sample. Place second saliva sample in the fridge. Collect the post-task packet of questions when each participant is done.)

All done? Great. The last thing to do is fill out the payment form and do the last saliva sample. (Experimenter will collect the post-task packet of questions and hand participant the payment form and the last saliva tube and straw.) **Just like before, let me know when you're done.**

(Experimenter leaves the room, files the post-task packet of questions, and returns when each participant is finished.)

All done? Great. (Experimenter collects the third saliva sample.)

We will now go back into the room where you interacted as a team and I will tell you about the study. (Experimenter takes the payment form and also places the third saliva sample in the fridge and escorts all participants into the team room.)

Now that we are all together I would like to tell you more about the study.

First, Brian is actually a knowing research participant, or confederate, trained to behave in a certain way - either disagreeable or non-disagreeable depending on the condition! The experiment was designed to see how a disagreeable teammate impacts other teammates, the team itself, and the performance of the team. Also, a purpose of the experiment was to see if less interdependence among team members would reduce the negative impact of the disagreeable person. In order to study these questions we had to mislead you about the nature of the experiment and the use of a confederate. Did anyone think that the Brian was actually a confederate or knowing research participant? Are there any other questions? (Experimenter will thoroughly address all the participants' questions.)

The best performance on the recommendations entailed giving a thorough justification for the recommendation. So, the recommended percentage to spend on the PR campaign didn't matter because performance is based on giving all the important information, the quality of the reasoning, and the quantity of the recommendation by way of a word count. Are there any questions? (Experimenter will thoroughly address all the participants' questions.)

Also, we collected saliva samples because a hormone found within saliva, called cortisol, is known to be an indicator of stress reaction. The purpose of taking these samples is to better measure the individual reaction to having to work with a disagreeable teammate. Are there any questions about this or any other part of the study? (Experimenter will thoroughly address all the participants' questions.)

If you have any questions later you may contact me, Bret Bradley, or anyone associated with the study or the lab. (Experimenter will hand each participant a business card.)

Your participation in today's study has been extremely helpful. To make the study successful, though, we need for people to be naïve concerning the true nature of our study. So, we ask, as a further way to help us with our research, that you not discuss the details of this study with anyone until the end of Fall semester, 2007. This gives us an opportunity to conduct our research using naïve participants and it also helps out others who would not be able to participate if they knew the details of the study. Are there any questions about this or any other part of the study? (Experimenter will thoroughly address all the participants' questions.)

OK, we're done with the study. Checks will be mailed in the next week or so.

(Experimenter will show participants to the hallway and indicate which direction to go to either Jefferson St. or Iowa Ave.)

APPENDIX K. PRE-TASK PACKET OF QUESTIONS.

Pre-Task Questions

Study conducted by:
Bret Bradley

Person: **A B C D**

Date: _____

Time: _____

The first set of questions is about you and some pertain to the saliva that we are collecting today. Answer each to the best of your ability.

REMEMBER: All answers will be kept strictly confidential!

<u>Questions</u>	<u>Answers</u>
1.) How old are you?	
2.) What is your sex?	
3.) What is your race?	
4.) What year in school are you?	
5.) What is your ACT or SAT score?	
6.) What is your current college GPA (4.0 scale)?	
7.) What are the average times you woke up and went to bed in the last week?	Woke up: _____ am/pm. To bed: _____ am/pm.
8.) On a scale from 1 to 10 (where 10 is the highest), how stressed do you feel right now?	
9.) How many hours ago was your last major meal?	
10.) How many hours ago did you last eat or drink dairy products like milk, cheese, etc?	
11.) How many hours ago did you last brush your teeth?	
12.) How long ago did you last have dental work done?	
13.) Are you currently taking prescription or over-the-counter medications?	
14.) If so, what medications are you taking?	
15.) If you are female, are you taking any oral contraceptives?	
16.) If you are female, are you currently menstruating?	
17.) If you are female, when did your last period start?	
18.) Have you taken any illegal drugs in the last 24 hours?	
19.) Did you drink alcohol in the last 24 hours?	

The next set of questions consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you have felt this way today. Use the following scale to record your answers.

1	2	3	4	5
Very slightly or not at all	A little	Moderately	Quite a bit	Extremely

- | | |
|---------------------|--------------------|
| 1.) ___Interested | 11.) ___Irritable |
| 2.) ___Distressed | 12.) ___Alert |
| 3.) ___Excited | 13.) ___Ashamed |
| 4.) ___Upset | 14.) ___Inspired |
| 5.) ___Strong | 15.) ___Nervous |
| 6.) ___Guilty | 16.) ___Determined |
| 7.) ___Scared | 17.) ___Attentive |
| 8.) ___Hostile | 18.) ___Jittery |
| 9.) ___Enthusiastic | 19.) ___Active |
| 10.) ___Proud | 20.) ___Afraid |

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement.

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

I See Myself as Someone Who:

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1.) ___ Is talkative.</p> <p>2.) ___ Tends to find fault with others.</p> <p>3.) ___ Does a thorough job.</p> <p>4.) ___ Is depressed, blue.</p> <p>5.) ___ Is original, comes up with new ideas.</p> <p>6.) ___ Is reserved.</p> <p>7.) ___ Is helpful and unselfish with others.</p> <p>8.) ___ Can be somewhat careless.</p> <p>9.) ___ Is relaxed, handles stress well.</p> <p>10.) ___ Is curious about many different things.</p> <p>11.) ___ Is full of energy.</p> <p>12.) ___ Starts quarrels with others.</p> <p>13.) ___ Is a reliable worker.</p> <p>14.) ___ Can be tense.</p> <p>15.) ___ Is ingenious, a deep thinker.</p> <p>16.) ___ Generates a lot of enthusiasm.</p> <p>17.) ___ Has a forgiving nature.</p> <p>18.) ___ Tends to be disorganized.</p> <p>19.) ___ Worries a lot.</p> <p>20.) ___ Has an active imagination.</p> <p>21.) ___ Tends to be quiet.</p> <p>22.) ___ Is generally trusting.</p> <p>23.) ___ Tends to be lazy.</p> <p>24.) ___ Is emotionally stable, not easily upset.</p> | <p>25.) ___ Is inventive.</p> <p>26.) ___ Has an assertive personality.</p> <p>27.) ___ Can be cold and aloof.</p> <p>28.) ___ Perseveres until the task is finished.</p> <p>29.) ___ Can be moody.</p> <p>30.) ___ Values artistic, aesthetic experiences.</p> <p>31.) ___ Is sometimes shy, inhibited.</p> <p>32.) ___ Is considerate and kind to almost everyone.</p> <p>33.) ___ Does things efficiently.</p> <p>34.) ___ Remains clam in tense situations.</p> <p>35.) ___ Prefers work that is routine.</p> <p>36.) ___ Is outgoing, sociable.</p> <p>37.) ___ Is sometimes rude to others.</p> <p>38.) ___ Makes plans and follows through with them.</p> <p>39.) ___ Gets nervous easily.</p> <p>40.) ___ Likes to reflect, play with ideas.</p> <p>41.) ___ Has few artistic interests.</p> <p>42.) ___ Likes to cooperate with others.</p> <p>43.) ___ Is easily distracted.</p> <p>44.) ___ Is sophisticated in art, music, or literature.</p> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Below are several statements about you which you may agree or disagree. Using the response scale below, indicate your agreement or disagreement with each item by placing the appropriate number on the line preceding that item.

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

- 1.) ____ I am confident I get the success I deserve in life.
- 2.) ____ Sometimes I feel depressed.
- 3.) ____ When I try, I generally succeed.
- 4.) ____ Sometimes when I fail I feel worthless.
- 5.) ____ I complete tasks successfully.
- 6.) ____ Sometimes, I do not feel in control of my school work.
- 7.) ____ Overall, I am satisfied with myself.
- 8.) ____ I am filled with doubts about my competence.
- 9.) ____ I determine what will happen in my life.
- 10.) ____ I do not feel in control of my success at school.
- 11.) ____ I am capable of coping with most of my problems.
- 12.) ____ There are times when things look pretty bleak and hopeless to me.

Please check: Did you write a number in front of each statement?

APPENDIX L. SALIVA COLLECTION PROTOCOL.

Saliva Collection Protocol **Lab Experiment (Dissertation) – “Bad Apple”** **Bret H. Bradley, MA, PhD Candidate**

- Participants will be recruited to participate in a 1.5 hour research experiment where they will interact in teams. In oral and written recruitment I will advise interested participants that if they wish to participate they must follow a few simple procedures as follows:
 - 1.) Do not eat a major meal within 60 minutes prior to arriving at the lab.
 - 2.) Avoid alcohol consumption 24 hours prior to arriving.
 - 3.) Avoid eating dairy products during the 30 minutes prior to arriving.
 - 4.) Avoid acidic or high sugar foods 30 minutes prior to arriving.
 - 5.) Do not brush your teeth within 2 hours prior to arriving.
- I will collect three samples from 291 participants making 873 total saliva samples.
- I will collect and store the samples in the ‘SPIT Lab’ located in the Center for the Study of Group Processes in the Sociology department. This lab is located in the basement of Seashore Hall (<http://www.uiowa.edu/~grpproc/>) behind two layers of locked doors which will ensure safety of the saliva samples.
- All tubes will be pre-marked with team #, person #, and sample # for tracking purposes.
- During the pre-task phase I will introduce the participants to the experiment and what will be asked of them including interacting in a team environment for 20 minutes and giving three saliva samples. Participants will be told the saliva will help us in the study. I will assure each participant that ALL responses will be kept strictly confidential. I will answer any questions they have and obtain written informed Consent before proceeding.
- I will then ask each participant to fill out the pre-task series of questions in a packet. In addition to various scales important in the study I will ask the following questions related to cortisol measuring through saliva samples:
 - 1.) How long ago was your last major meal?
 - 2.) When did you last eat or drink dairy products like milk, cheese, etc?
 - 3.) When did you last brush your teeth?
 - 4.) When did you last have dental work done?
 - 5.) If you are female, are you taking any oral contraceptives?
 - 6.) If you are female, are you currently menstruating?
 - 7.) If you are female, when did your past period start?
 - 8.) What prescription and over-the-counter medications, if any, are you taking?
 - 9.) What, if any, illegal drugs have you taken in the last 24 hours?

10.) Did you drink alcohol in the last 24 hours?

- After these questions are answered the participant will be asked to provide the first of three saliva samples.
 - I will use the passive drool technique of saliva collection where participants allow saliva to pool in the mouth and then secrete the saliva down a 2-inch piece of straw into a collection container (5 ml cryovial).
 - I will then escort the three naïve participants and the one knowing research participant (confederate) into one room for the team task. The participants will see the other participants and confederate for the first time.
 - After the 20 minute team task interaction I will escort each participant back to their individual room for the post-task phase of the experiment.
 - I will then ask each participant to provide the second of three saliva samples following the exact same protocol for saliva collection described above.
 - I will then ask each participant to fill out the pre-task series of questions in a packet. This packet will include scales important to the study.
 - After 20 minutes have passed since the second saliva collection, and right before the participants leave I will ask each participant to provide the third of three saliva samples. I will follow the exact same protocol for saliva collection described above.
-
- I will store the samples in a freezer in the 'SPIT Lab' because it will take about 2.5 months to collect all the samples.
 - When all samples are collected I will transport them via automobile, on dry ice, to a lab at the University of Tennessee where they will be analyzed in the lab of Dr. Postlethwaite.
-
- Arnold Postlethwaite, MD
 Professor of Medicine
 Director, Division of Connective Tissue Diseases
 (Rheumatology), Department of Medicine
 UT Health Science Center
-
- After analysis is complete I will return the samples to the freezer location in the SPIT Lab at the Center for long-term storage of no more than a year.
 - I plan to dispose of these saliva samples in 2012 after completion of this research including journal publication.

APPENDIX M. POST-TASK PACKET OF QUESTIONS.

Post-Task Questions

Study conducted by:
Bret Bradley

Person: **A B C D**

Date: _____

Time: _____

Stop for a moment and think about how you are feeling. Use the words that follow to describe that feeling. Don't rate how your mood changes as you move from question to question, but rather rate how you felt while interacting with the other teammates.

REMEMBER: All answers will be kept strictly confidential!

1	2	3	4	5
Very slightly or not at all	A little	Moderately	Quite a bit	Extremely

- | | |
|---------------------|--------------------------|
| 1.) ___ Happy. | 22.) ___ Aroused. |
| 2.) ___ Pleased. | 23.) ___ Alert. |
| 3.) ___ Content. | 24.) ___ Hyperactivated. |
| 4.) ___ Distressed. | 25.) ___ Interested. |
| 5.) ___ Upset. | 26.) ___ Excited. |
| 6.) ___ Guilty. | 27.) ___ Strong. |
| 7.) ___ Scared. | 28.) ___ Enthusiastic. |
| 8.) ___ Hostile. | 29.) ___ Proud. |
| 9.) ___ Irritable. | 30.) ___ Inspired. |
| 10.) ___ Ashamed. | 31.) ___ Determined. |
| 11.) ___ Nervous. | 32.) ___ Attentive |
| 12.) ___ Jittery. | 33.) ___ Active. |
| 13.) ___ Afraid. | 34.) ___ Sleepy. |
| 14.) ___ Miserable. | 35.) ___ Still. |
| 15.) ___ Troubled. | 36.) ___ Quiet. |
| 16.) ___ Unhappy. | 37.) ___ Tired. |
| 17.) ___ Relaxed. | 38.) ___ Sluggish. |
| 18.) ___ At rest. | 39.) ___ Droopy. |
| 19.) ___ Serene. | 40.) ___ Dull. |
| 20.) ___ Calm. | 41.) ___ Drowsy. |
| 21.) ___ At ease. | 42.) ___ Bored. |

Please use the rating scale below to describe how accurately each of the following statements describes some of your teammates. To reduce the burden on participants, each teammate is randomly assigned TWO teammates to rate on these questions (use the map on the last page to remember who to rate). So, you are being rated by other teammates as well.

These phrases describe people's behavior. Describe these TWO teammates how you think they generally are now, not as you wish they would be in the future. Please read each statement carefully, and then fill in the number that corresponds to the scale. (All answers are kept strictly confidential.)

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

RATE PERSON: _____.

I See This Teammate as Someone Who:

- 1.) ____ Is talkative.
- 2.) ____ Tends to find fault with others.
- 3.) ____ Does a thorough job.
- 4.) ____ Is helpful and unselfish with others.
- 5.) ____ Is relaxed, handles stress well.
- 6.) ____ Starts quarrels with others.
- 7.) ____ Is ingenious, a deep thinker.
- 8.) ____ Has a forgiving nature.
- 9.) ____ Can be cold and aloof.
- 10.) ____ Is generally trusting.
- 11.) ____ Tends to be lazy.
- 12.) ____ Is considerate of almost everyone.
- 13.) ____ Remains calm in tense situations.
- 14.) ____ Is sometimes rude to others.
- 15.) ____ Likes to cooperate with others.
- 16.) ____ Is sophisticated in art, music, or literature.

RATE PERSON: _____.

I See This Teammate as Someone Who:

- 1.) ____ Is talkative.
- 2.) ____ Tends to find fault with others.
- 3.) ____ Does a thorough job.
- 4.) ____ Is helpful and unselfish with others.
- 5.) ____ Is relaxed, handles stress well.
- 6.) ____ Starts quarrels with others.
- 7.) ____ Is ingenious, a deep thinker.
- 8.) ____ Has a forgiving nature.
- 9.) ____ Can be cold and aloof.
- 10.) ____ Is generally trusting.
- 11.) ____ Tends to be lazy.
- 12.) ____ Is considerate of almost everyone.
- 13.) ____ Remains calm in tense situations.
- 14.) ____ Is sometimes rude to others.
- 15.) ____ Likes to cooperate with others.
- 16.) ____ Is sophisticated in art, music, or literature.

The next set of questions consists of a number of phrases that may or may not describe your team. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you think the phrases describe your team. Use the following scale to record your answers.

1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
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- 1.) ____ Members of my team discussed our performance vision.
- 2.) ____ Members of my team discussed what we could do to make our performance vision a reality.
- 3.) ____ Members of my team discussed our goals.
- 4.) ____ Members of my team took the time we needed to share task-related information.
- 5.) ____ Members of my team actively learned from one another.
- 6.) ____ Members of my team effectively communicated with each other throughout the task.
- 7.) ____ Members of my team created an environment of openness and trust.
- 8.) ____ Members of my team really trusted each other.
- 9.) ____ Members of my team thought in terms of what was best for the team.
- 10.) ____ The emotional culture of our team was enthusiastic and cheerful.
- 11.) ____ The emotional culture of our team was depressed, sluggish, and gloomy.
- 12.) ____ The emotional culture of our team was pleasant as opposed to unpleasant.
- 13.) ____ The emotional culture of our team was nervous, irritable, and distressed.
- 14.) ____ The emotional culture of our team was calm and serene.

The next set of questions consists of a number of phrases that may or may not describe your team. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you think the phrases describe your team. Use the following scale to record your answers.

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

- 1.) ____ I could not accomplish my task without information from other members of my team.
- 2.) ____ Other members of my team depended on me for information needed to perform their tasks.
- 3.) ____ Within my team, work performed by other team members was dependent on other's work.
- 4.) ____ My work goals come directly from the goals of the team.
- 5.) ____ My work activities were determined by the objectives my team thought were critical.
- 6.) ____ I did very few activities that were not related to the goals of the team.
- 7.) ____ Feedback about how well I did my part comes primarily from information about how well the entire team did.
- 8.) ____ My performance evaluation is strongly influenced by how well my team performed.
- 9.) ____ Rewards from participation on the task were determined in large part by my contributions as a member of the team.

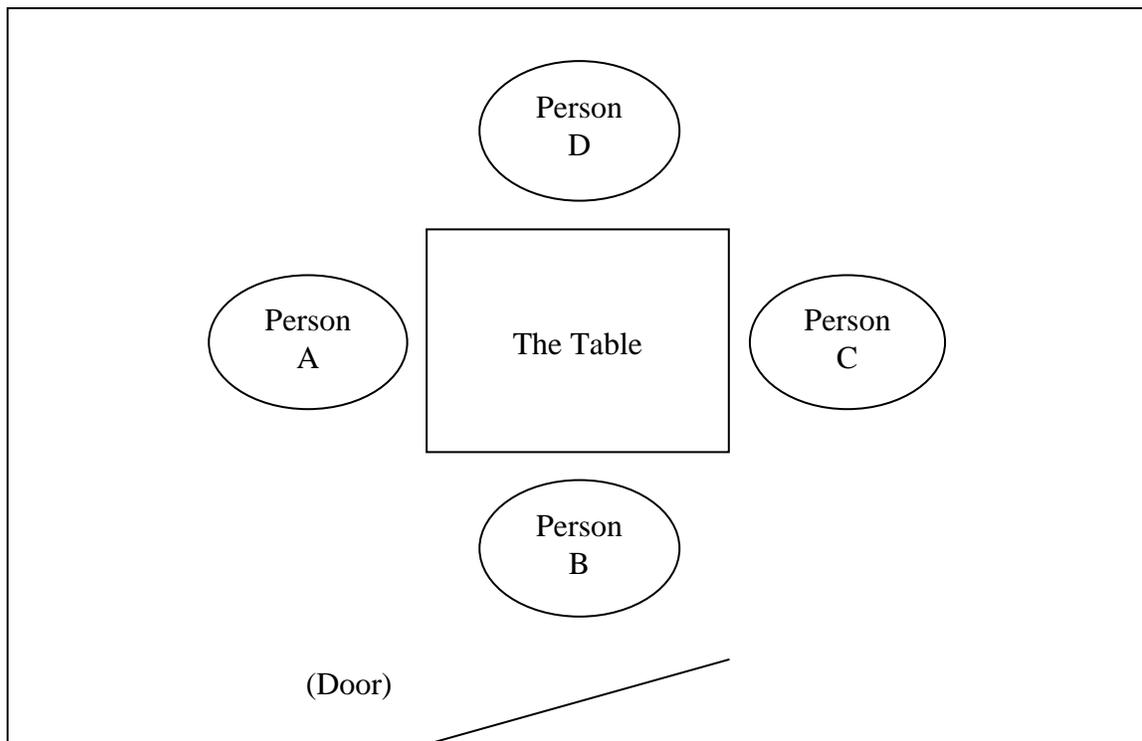
Please rate each teammate (NOT yourself) on the questions below. Use the rating scale and map on next page. Write the most correct number in the box.

1	2	3	4	5
Very slightly or not at all	A little	Moderately	Quite a bit	Extremely

(REMEMBER: Don't rate yourself – Just your teammates)

How much did each teammate:	A	B	C	D
1.) Help others?				
2.) Show anger?				
3.) Behave friendly?				
4.) Retaliate against others?				
5.) Seem enthusiastic about the task?				
6.) Distance him- or herself from others?				
7.) Work closely with others?				
8.) Withdraw from the task?				
9.) Cooperate with others in the team?				
10.) Offer to help other team members accomplish their work?				
11.) voluntarily do more than the task required to help others or contribute to team effectiveness?				
12.) Talk to other team members before taking actions that might affect them?				
13.) go out of the way to help team members with task-related problems?				
14.) go out of the way to make other members feel welcome in the team?				
15.) Show genuine concern and courtesy toward team members, even under the most trying situations?				
16.) Encourage team members to try new and more effective ways of doing the task?				
17.) Encourage hesitant or quiet team members to voice their opinions when they otherwise might not speak up?				

Use this map of the room to remember who each person was in order to rate them on the previous items.



Finally, note in the box below any comments or observations you would like to share about this task:

APPENDIX N. CONFEDERATE SCRIPTS.

<u>Disagreeable</u>	<u>Non-Disagreeable</u>
“I’m Brian and I think this is pretty stupid”	“I’m Brian and I’m ready to get to work”
“So let me get this straight, the only way we get \$60, not just \$20 to split is to have the best team recommendation? That’s garbage.”	“So, the way for our team to get \$60, not just \$20 to split is to have the best team recommendation right?”
“I don’t think we have enough information to make the best decision.”	
“I think this is full of crap.”	“I think this is interesting.”
“What the hell’s up with the spitting?”	“I wonder why we have to spit?”
“I doubt we’ll be able to do well on this.”	“I think we’ll be able to do well on this.”
“I heard a company we’ve used in the past will give us a good rate for this damn PR thing.”	“I heard a company we’ve used in the past will give us a good rate for this PR thing.”
“This is like Enron Stadium.”	“This is like Enron Stadium.”
“I think this William Bradford guy is a jerk.”	“I wonder why William Bradford spied on board members?”
“I don’t care how we do on this thing. I just came for the extra credit.”	“I hope we do well on this.”
“Let’s hurry the hell up and make a decision.”	“Let’s make a decision.”
“I’m glad I’m done working on this stupid thing.”	“I’m glad I could work on this with you guys.”
<p style="text-align: center;">FLEXIBLE:</p> <p>“I think this experiment is a joke.”</p> <p>“There’s no way in hell I’m going to be the writer.”</p> <p>“Bradford can go to hell where he belongs.”</p> <p>“Changing the name would be lame. Why the hell should we let Parkers Inc. slap their name on the arena?”</p>	<p style="text-align: center;">FLEXIBLE:</p> <p>“I like the way this experiment was set up.”</p> <p>“I don’t want to be the writer.”</p> <p>“What do you guys think?”</p> <p>“Maybe we should use the PR company and not change the name? What do you guys think? ”</p>

NOTE: The low interdependence conditions change one statement by the confederate to help make the interdependence more salient for the participants. The second scripted statement changes to the following:

LOW INTERDEPENDENCE CONDITIONS (Individual Oriented)

<p>“So let me get this straight, the only way I get \$15, not just \$5 is to <u>have the best individual recommendation. So the team recommendation seems like a waste of time.</u>”</p>	<p>“So, the way we can each get \$15, not just \$5 is to have <u>the best individual recommendation right?</u>”</p>
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APPENDIX O. PERFORMANCE CODING INSTRUCTIONS.

Performance Coding Sheet

Code each recommendation for two general criteria: (1) their use of specific information and (2) their reasons, decisions, organization, and detail. For each point you give, underline the key words to mark its precise location. Write the number for the category (1 or 2) and then the letter for the sub-category (a – e). This strategy will allow us to look back on the codings and understand where the final score comes from. Write two numbers at the bottom right of every recommendation to indicate the two scores (e.g., 1/4).

GENERAL DIRECTIONS

- 1.) Grade each recommendation sentence by sentence. Take each sentence and ask yourself if it qualifies for a point(s) from one or both of the two major categories. If so, underline the key words and write “1-A” or “2-B”, for example, to indicate Category and Sub-category.
- 2.) Every sub-category (the letters) can ONLY earn one point per recommendation – Except for 2-A (Reasons) which can have many points. So, if they mention multiple things that could count for “Parkers, Inc.” they will only receive 1 point for 1-C.
- 3.) Because the AC/heating system and the PR campaign are mentioned in the general information the scoring for 1-B and 1-D is more difficult. DON’T GIVE ANY points when a recommendation only mentions AC/heating or PR. Thus, AC/heating and PR don’t receive any points unless they state or hint at the unique information given in “1-B” or “1-D”.
- 4.) ONLY give a point for “1-B” or “1-D” if they state or hint at the unique information in that particular section. Here is what you can give a point for:
 - a. 1-B. (The AC/heating system is out of date).
 - i. AC/heating system is outdated.
 - ii. The system was suppose to only last for 10 years but it’s now 15 years old.
 - iii. The system is 5 years overdue.
 - iv. Maintenance inspected the system and advised that it be replaced ASAP.
 - b. 1-D. (A Public Relations firms offers a lower rate).
 - i. A PR firm who worked for the arena in the past recently contacted us.
 - ii. A PR firm has offered help.
 - iii. A PR firm will charge us a lower rate.

GIVING POINTS – CATEGORIES AND SUB-CATEGORIES

- 1.) The use of information given to the team members (score this 1 – 4). Give one point for each of the following areas of information that is used or in any way referred to in the recommendation. Each area of information and what qualifies for points for each is outlined here. This information was given to the participants.
 - a. News report says Bradford hired a Private Investigator (PI) firm to spy on members of the board.
 - i. Bradford hired a PI firm to spy on members of the board of directors.
 - ii. PI firm used illegal surveillance like wire tapping and identity theft.
 - iii. According to state law, Bradford would be responsible for any illegal activities of the PI firm.
 - b. The AC/heating system is outdated.
 - i. The AC/heating system is outdated.
 - ii. The AC/heating system was suppose to only last for 10 years but it's now 15 years old.
 - iii. The AC/heating is 5 years overdue.
 - iv. Maintenance inspected the system and advised that it be replaced ASAP.
 - c. Parkers, Inc. is willing to give money in exchange for naming rights.
 - i. Parkers Inc., a large packaging company in the state, has offered a lot of money to rename the arena after them.
 - ii. Changing the name would mean returning some money to Bradford, Inc.
 - d. A PR firm we've used in the past will charge a lower rate.
 - i. A PR firm who worked for the arena in the past recently contacted us.
 - ii. A PR firm has offered to help us.
 - iii. A PR firm will charge us a lower rate.

- 2.) The reasons, decisions, organization, and detail (score this 1 - ?, no limit) that they give in the recommendation.
 - a. Reason(s). Each reason why their recommendation is best earns a point.
 - i. A reason will always answer the question "why is this the best decision?"
 - ii. A reason might be noted by the word "because," "so," or "since," etc.
 - iii. A sentence counting for #1-info could also be a reason if it's stated as a reason.
 - b. Detailed Reason. If one reason is more than one sentence (or one very detailed sentence) give another point.
 - c. Decision(s). If they state their decision(s) at any time (in addition to writing the percentage in the box) give a point.
 - d. Detailed Decision(s). If they have more than one sentence that discusses their decision(s) give another point.
 - e. Bullets or List. If they use bullet points to organize their recommendation or have a minimum of three separate paragraphs in the recommendation give a point.

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