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**WALKING MOOD INDUCTORS:
GROUP AND INDIVIDUAL INFLUENCES ON AFFECTIVE LINKAGES WITHIN
TEAMS**

A Thesis in

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ABSTRACT

This study attempted to examine how positive and negative mood linkage between team and member is facilitated by the team context of psychological safety and the influence of individual susceptibility to emotional contagion. Furthermore, an exploratory examination of group anger and anxiety convergence was conducted. Emotional contagion is posited to explain this mood sharing process among members of existing research teams. The results show that mood convergence did not occur within groups. Furthermore, psychological safety and individual susceptibility to emotional contagion moderated the affective linkages present within groups, but not in a manner consistent with predictions of the study. Psychologically safe groups showed a stronger negative relationship between group and individual negative affect and anger, respectively, when compared to less psychologically safe groups. Individuals who are more susceptible to “catch” others emotions demonstrated less convergence with their group anxiety. A three-way interaction is observed between group anxiety, psychological safety, and individual susceptibility to emotional contagion on individual anxiety. Conceptual, contextual and methodological explanations are offered to interpret the findings. The implications and future directions of research in group affect is also discussed.

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Chapter 1

Introduction

He that has eyes to see and ears to hear may convince himself that no mortal can keep a secret. If his lips are silent, he chatters with his finger-tips; betrayal oozes out of him at every pore (Freud, 1905, pp. 77-78).

Affective experiences in the workplace have evolved a long way from its earlier reputation as insignificant and detrimental to productivity and performance. Such implied negative connotations of affect in the workplace could be evidenced by quotes in research articles such as "...power, conflict and emotions are subversive forces which divert groups from work" (Sinclair, 1992 cf. Barsade & Gibson, 1998, p. 86). Research on affect in the workplace has slowly been gaining momentum and receiving positive attention from affect researchers. The realization of the relevance of including affect in workplace considerations were touted by Barsade and Gibson (1998), "Though the traditional approach is to separate socio-emotional from task aspects, we stress the degree to which emotions permeate both aspects" (p. 94). Of particular importance, there has also been a parallel increase in focus on how emotions are played out within the unique context of a team. Given the increasing popularity of teams (Gibson & Tesone, 2001) with organizations replacing traditional work structures consisting primarily of individual actors with team-based organizations (TBOs; Harris & Beyerlein, 2003), studying how emotions are influencing group processes and group outcomes becomes more and more important.

"Emotions are an inherent part of group life" (Barsade & Gibson, 1998, p. 82). This paper has taken on the essence of the preceding phrase in trying to describe the phenomenon of affective influences in a group. Affective linkages have been used to describe the reciprocal affective influences of group and individual member affect leading to affective convergence over

time (Totterdell, 2000; Totterdell, Kellett, & Teuchman, 1998; Ilies, Wagner, & Morgeson, 2007).

Group affect exerting its influence on individual affect can lead to a variety of positive and negative outcomes. Individual negative affect has been linked to several unfavorable workplace outcomes, among others an increase in the relationship between job stressors such as role ambiguity, role conflict, interpersonal conflict and physical strains (e.g. doctor visits, absences; Chen & Spector, (1992), greater reactivity and engagement in more retaliatory behaviors (Skarlicki, Folger, & Tesluk, 1999), and heightened aggression towards coworkers and group members whenever frustrated (Morf & Rhodewalt, 2002; Stucke & Sporer, 2002). On the other hand, positive affect among individuals translate into beneficial outcomes in terms of enhancing performance (Tsai, Chen, & Liu, 2007), work achievement and supportive network of individuals at work (Staw, Sutton, & Pelled, 1994), facilitating higher quality ratings of participation, leadership and mastery of information in group discussions (Staw & Barsade, 1993), increased prosocial behaviors (George, 1991; Ilies & Judge, 2006)) and helping (Salovey, Mayer, & Rosenhan, 1991). Given the relevance of outcomes associated with individual positive and negative affect to the workgroup, increased knowledge about the factors facilitating the sharing of mood among individual team members becomes necessary.

Consistent with previous researchers, this study examines the role of emotional contagion as the underlying mechanism to affective linkages among group members (Barger & Grandey, 2006; Barsade, 2002; Bartel & Saavedra, 2000; Kelly & Barsade, 2001; Grandey (2008); Pugh, 2001; Totterdell, 2000; Totterdell et al., 1998). Nevertheless, previous studies have focused mainly on examining the broad process of emotional contagion without further understanding the potential different mechanisms that might exist for negative and positive emotional contagion (Barger & Grandey, 2006; Bartel & Saavedra, 2000; Pugh, 2001). There is sufficient evidence in social psychology literature to suggest the stronger effects of negative emotional contagion,

especially within the context of a workgroup. Additionally, this paper attempts to further extend the current literature on negative emotional contagion by conducting an exploratory investigation on the contagion of the discrete negative emotions of anger and anxiety.

Individual member characteristics such as being older and more committed to the group (Totterdell et al., 1988) and collectivistic values (Ilies et al., 2007) have been shown to enhance the affective linkages among group members. However, there is still a need for future research to investigate additional factors or processes that facilitate the sharing or lack of sharing of mood within a group (Brief & Weiss, 2002), in particular, the ways in which certain team normative environment and the interaction between team context and individual factors might increase affective sharing among group members. Therefore, this study proposes the role of a team contextual variable – psychological safety – that will likely influence the expression of emotions, an individual level characteristic – individual susceptibility to emotional contagion – that will influence the “catching” of team members’ emotions, and the interaction between the team contextual and individual characteristic variables in facilitating affective sharing among group members. In fact, one of the unique contributions of this study is the consideration of *group*-level contextual element in influencing emotional contagion and by examining simultaneously the facilitating influence of group context (i.e. psychological safety) and individual level predictor.

Moreover, this study focuses on an examination of affective linkages among members of research teams. The ambiguous nature of tasks such as problem-solving, idea generation and knowledge acquisition of the sample of research groups that will be used in this study lends itself well to the influence of emotions. Past research has shown the importance of affect in creative tasks such as product development, new process creation, and complex problem-solving for clients (Amabile, Barsade, Mueller, & Staw, 2005), all of which are very similar to the job description of a researcher. Thus, within the context of research teams, emotions seem likely to play an important role in influencing the dynamics of research teams.

In short, the current study extends existing research on emotions in workgroups by focusing on the unique interplay between team climate of psychological safety and individual sensitive to others' emotions on affective linkages, including anger and anxiety, particularly within the context of research teams. Affect can be shared between team members through a number of mechanisms grouped under the general umbrella of emotional contagion. A more detailed explanation of the mechanism of affective linkages among group members and how psychological safety and individual susceptibility to emotional contagion might enhance the affective connections in a group follows.

Mechanisms of Affective Linkages among Group Members

Interest in group affect was triggered when George (1990) provided evidence for the existence of a collective affective tone of groups of sales people in departmental stores. Drawing from the Attraction-Selection-Attrition model (Schneider, 1987), George (1990) explained the emergence of a consistent affective tone, which she argues was a result of interpersonal attractive forces that binds similarly affective individuals together. Likewise, Bartel and Saavedra (2000) successfully demonstrated that the construct of a collective mood could be reliably measured using both self-reports and observer-ratings of groups. Totterdell et al. (1998), in much the same line of research, showed a positive linkage between individual mood and the teams' mood of both accountants and nurses over time. This effect was stronger among members within the same group than between groups. In sum, the above evidence suggests the existence of affective linkages among group members, unique to each group.

A model of the variables and proposed relationships in this study is illustrated in Figure 1. As shown in the model, the reciprocal linkage between group affect and individual affect is thought to occur through the process of emotional contagion. The two-step process of emotional contagion consists of 1) the perception of others' emotional expressions and 2) the resulting experience of similar emotions. These steps are proposed to be affected by the contextual variable

of psychological safety and the dispositional variable of individual susceptibility to emotional contagion, respectively. The rationalizations and justifications of how these variables are related will be described in further detail below.

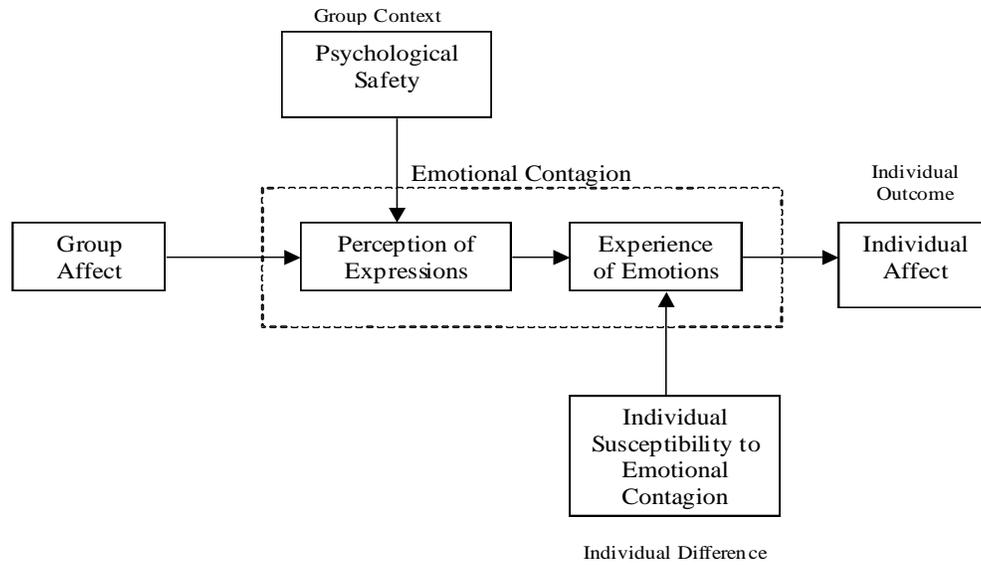


Figure 1-1: A model of the facilitators of affective linkage among team members.

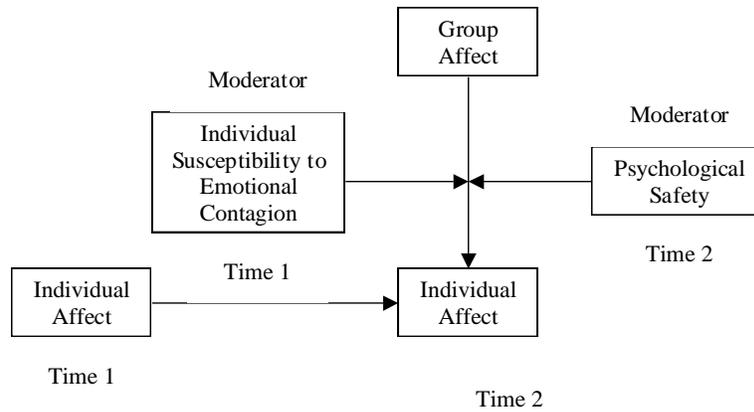


Figure 2-1: An empirical model of the tested relationships between variables.

Overview of Affective Linkage Mechanisms

In enhancing our understanding of affective influences in groups, Kelly and Barsade (2001) offered a conceptual framework that illustrated how group members come to share the same moods. These factors can be divided into internal and external mechanisms of affective sharing processes. External mechanism focuses on the peripheral nonaffective environment of the group that might influence group dynamics, for example, a shared performance outcome. On the other hand, internal mechanisms of affective influences involve the characteristics of members that compose the group. These include the beliefs held by team members as well as their individual affective characteristics.

External affective linkage mechanisms.

Consistent with Affective Events Theory (AET; Weiss & Cropanzano, 1996), nonaffective situational events such as performance outcomes, leadership style and available

resources might create emotional reactions in a workgroup that lead to affective convergence. Teams that experience an event or situation together (i.e. shared performance, shared resources, shared leadership style), through mechanisms of event appraisal and attitude formation, will come to share a similar affect (Weiss & Cropanzano, 1996). Empirical evidence exist that points to the salience of shared experience in explaining the convergence of group affect (Ilies et. al., 2007; Totterdell, 2000; Totterdell et al., 1998). Acknowledging the potential salience of shared experience in interpersonal mood induction among team members, Totterdell and colleagues (1998) measured daily hassles experienced by nurses and accountants such as workload and work regulations and found them to influence the affective reactions within these groups. Shared leadership experience can influence the group mood (Sy, Coté, & Saavedra, 2005) such that leader's positive or negative mood affected team members' positive or negative mood and the group affective tone. This emotional synchronization between leader and members has important group consequences such as increased group coordination and group effort. Additionally, Ilies et al. (2007) found that group performance had a significant effect on the extent of positive affective linkages and a marginal effect for negative affective linkages among team members. This means that groups that perform better experience more affective convergence than did groups who performed worse.

Internal affective linkage mechanism.

The internal mechanisms of affect refer to factors within the group or individual that influence affective sharing. These include implicit processes of emotional contagion such as vicarious observations, behavioral entrainment and primitive mood sharing (Kelly & Barsade, 2001), and explicit processes such as intentional affective influence and impression management. The affective environment surrounding a workgroup, including group norms and emotional history specific to the group can also influence the internal mechanisms of affective sharing. Most of the research looking at these internal mechanisms has focused on the implicit processes of

emotional contagion (Barsade, 2002; Bartel & Saavedra, 2000; Totterdell, 2000; Totterdell et. al., 1998).¹

Taken together, both external factors such as shared experience, and internal mechanisms such as emotional contagion can lead to group affective convergence. However, in all these studies, internal mood sharing processes, particularly emotional contagion was found to still significantly predict group affect, even after shared experience was accounted for (Ilies et al., 2007). Thus, this paper will focus on the implicit mechanism of emotional contagion in explaining the affective linkages between team members, the emotional synchrony among team members that culminates in group affective convergence.

Emotional Contagion as a Mechanism of Group Affective Linkages

Hatfield, et al. (1994) described emotional contagion as a mechanism through which the emotions of others are transferred through facial, postural and vocal cues to observers. This result in emotional and behavioral synchrony among individuals involved, so that similar to the instigator, the observers too might come to feel the same emotions. If you ever attended an amateur ballet performance, through the facial and postural expressions of the ballerina, you feel her anxiety and nervousness and you catch yourself holding your breath, praying that she does not lose her balance and fall. This is an example of the automatic contagion of emotions through behavioral mimicry.

Emotional contagion is said to occur as a reaction to unconscious and conscious mental processing as well as automatic mimicry and feedback (Hatfield, et al., 1994). For example, we may share emotions with others due to empathy and learned associations. Emotional contagion also unfolds through unconscious induction of affect and attitudes by means of automatic mimicry, which triggers corresponding physiological responses that create specific emotions (Barsade, 2002; Kelly & Barsade, 2001; Hatfield et al., 1994). Additionally, researchers have

shown that within a group setting, emotional contagion can also transpire through conscious, social comparison processing of group members where emotional expressions of others are used as information or cues as to what is normative or acceptable (Barsade, 2002; Kelly & Barsade, 2001; Laird & Bresler, 1982; Totterdell et al., 1998). The current study adopts a generalist approach in examining the process of emotional contagion that could unfold through any of these various mechanisms.

For emotional contagion to occur, team members need to first perceive the emotions shown by other members. For example, automatic mimicry of another's facial expressions and awareness of group norms is contingent on perceptions of emotional expression. Second, through facial efference feedback (Adelmann & Zajonc, 1989), social comparison of group norms (Barsade, 2002; Kelly & Barsade, 2001; Laird & Bresler, 1982; Totterdell et al., 1998) and empathy (Hatfield et al., 1994) the individual comes to experience identical emotions. This two-step process of emotional contagion is illustrated in Figure 1, where the perception and experience of emotions explain the affective convergence among team members.

Current empirical studies provide ample support for the existence of a two-step process of emotional contagion, particularly the "primitive" process of contagion. The unconscious induction of affect has been strongly argued by Zajonc (1980), who concluded that emotional experience could be derived independent of cognitive awareness of the perception of affect when presented with stimuli. The lack of conscious cognitions in emotional perceptions is demonstrated by the ability of individuals to "eavesdrop" on the emotions of others through nonverbal channels of body and vocal expressions (Elfenbein & Ambady, 2002). Furthermore, using dyads in the workplace, it was shown that positive emotional displays of customer service employees significantly affected the positive emotions reported by clients (Pugh, 2001). Providing support for the fleeting occurrence of mimicry, Barger and Grandey (2006) found an association between strength of employee smiling and simultaneous customer smiling, which was linked to customer

mood in brief coffee shop encounters. Evidence for the conscious processes toward emotional contagion exists as well, with judgments of team members' emotions predicting affective linkages among team members (Totterdell et al., 1998). This is consistent with reliance on situational cues in the attribution theory of affect where individuals come to experience a certain emotion through the "judgment" of appropriate emotions based on surrounding others' expressions (Laird & Bresler, 1992; Laird & Crosby, 1974). The findings of these studies provide support for the importance of a two-step process of emotional perception and emotional experience.

Previous research has demonstrated the close patterning of individual team members' mood to the group's collective mood (Totterdell et al., 1998; Totterdell, 2000). Specifically, cricket players' moods were found to be linked to the team's mood and that these findings were based on both average team's mood and team members' retrospective judgments of the team's overall mood (Totterdell, 2000). In an earlier study, nurses' and accountants' moods were found to vary with their work unit's moods, beyond affective reactions to work events (Totterdell et al., 1998). Additionally, individual and team mood linkages have been found even at the intra-individual level across several points in time (Ilies, et al., 2007). Thus, based on evidence above, individuals within a team act as "walking mood inductors" (Barsade, 2002,) while at the same time "catching" the mood of team members, leading to the convergence of affect among team members.

Negative Emotional Contagion

Although most affect research in groups has focused on positive mood convergence, there is also evidence of shared negative affect. The contagion of negative emotions leading to an overall negative affective tone of the group has been demonstrated historically through the occurrence of mass hysteria and mob lynching where the intense emotional experience of one person spreads throughout the group, sufficient to arouse collective effort from the group

(Hatfield et. al., 1994). In fact, the negative affect of anxiety was shared more easily through affective linkages among employees, relative to the positive affect of enthusiasm, amidst a large organizational change effort (Totterdell, Wall, Holman, Diamond, & Epitropaki, 2004). There is also evidence from the social psychology literature to suggest the relatively stronger contagion effect of negative emotions. For example, in the process of attitude formation, individuals are more likely to react to negative stimuli and these negative evaluations will have a stronger effect on our physiological, cognitive and emotional responses (Cacioppo, Gardner, & Berntson, 1997). This effect is called the negativity bias. This means that in an evaluation situation with both positive and negative stimuli, the negative events will draw greater attention and have a greater influence on the overall judgment of the event (Rozin & Royzman, 2001). Additionally, empirical evidence exists for the contagion effect of depression in dyadic encounters (Joiner, 1994).

Several theoretical mechanisms were proposed to explain the saliency of negative stimuli. For example, negative events are more informative because of its relative rarity. Besides that, individuals are evolutionarily-trained to devote greater attention to negative events because of the adaptive value of doing so. Moreover, negative events might stimulate our physiological mechanisms to a greater extent than positive events (Cacioppo et al., 1997; Rozin & Royzman, 2001).

Most research on emotional contagion has not differentiated positive and negative emotional contagion effects. One notable exception is Barsade's (2002) laboratory comparison of the relative magnitude of positive and negative emotional contagion. In her study, both positive and negative affect showed contagion effects to a similar degree. On the other hand, Bartel and Saavedra (2000) managed to show the relative ease in detecting unpleasant and activated emotions by observers of real teams, suggesting the relative potency of activated negative affect when compared to positive affect. Before drawing strong conclusions, more research is needed to clarify the relative contagion effects of positive and negative moods,

Combining theoretical and empirical evidence, this study proposes that negative emotions will be more effective in explaining affective linkages among group members than positive emotions. By investigating the relative strength of positive and emotional contagion, this paper can help clarify the inconsistent results common in emotional contagion research. Therefore, based on the evidence and rationale provided for group affective linkages and the role that positive and negative emotional contagion plays in explaining mood sharing among group members, I hypothesize the following:

Hypothesis 1: The average affect of the team (excluding the individual team member) will be related to individual team member's affect in that a) the average positive affect of the team will be positively related to the focal individual's level of positive affect, b) the average negative affect of the team will be positively related to the focal individual's level of negative affect c) the relationship will be greater for negative than positive affect.

Contagion of Anger and Anxiety

Few researchers have attempted to examine the contagion of discrete emotions such as anger and anxiety. This is perhaps due to a lack of strong theoretical and empirical evidence suggesting the relative salience of anger or anxiety to be detected and “caught” by team members. An examination of anger and anxiety contagion allows a comparison of two high arousal emotions, which are likely to occur in a work context. More importantly, anger and anxiety represent the behavioral approach and inhibition systems that might engender different responses from others (Gray, 1990). Thus, the examination of anger and anxiety allows for an exploratory investigation of two discrete emotions that are similar on the arousal dimension, but differ in their behavioral tendencies (Gray, 1990; Russell, 1980). Drawing from what is available in research, certain hypotheses can be made regarding the relative ease to which anger and anxiety is spread and “caught” in a team.

Preliminary support exists to indicate the potential salience of anxiety contagion among individuals interacting together. Drawing from social psychological findings, anxiety may be spread among dyads interacting together in an experimental or naturalistic setting (Gump & Kulik, 1997; Joiner & Katz, 1999) and among individuals about to engage in public-speaking (Benhke, Sawyer, & King, 1994). Individuals suffering from depression can also cause their relationship partners to experience not only depressive symptoms, but also an increase in anxiety levels (Joiner, 1994; Joiner & Katz, 1999). As pointed out earlier too, Bartel and Saavedra (2000) found that observers were more accurate in detecting activated and unpleasant emotions such as anxiety, than unactivated and pleasant emotions in a group discussion.

Borrowing from research on interpersonal behaviors, specifically behaviors and responses that vary along the dominance-submission continuum, anger expressions could engender a complementary reaction from observers. Examinations of dyadic interactions in laboratory experiments and in realistic situations indicate the tendency for individuals to respond in a complementary way to their partners' behaviors. Individuals tend to behave in a submissive manner when interacting with dominant partners or in a dominant manner when interacting with submissive partners (Dryer & Horowitz, 1997; Markey, Funder, & Ozer, 2007). This result has been shown even when examining the nonverbal behaviors between two participants engaging in certain tasks where dominance was coded as expansive gestures and submissiveness was coded as constricted gestures and body movements (Tiedens & Fragale, 2003). As anger is often perceived as a dominant behavioral action, with individuals expressing anger more likely to be perceived as competent and conferred a higher status (Tiedens, 2001), expressions of anger might not be as contagious as anxiety in a team setting because anger might invite a distinct complementary emotional response. On the other hand, anxiety motivates individuals to seek emotional support from others (Gibson, 1995), creating opportunities for affective sharing.

Given the ambiguity in potential responses to anger and existing preliminary evidence for anxiety contagion, this study will conduct an exploratory investigation to compare the relative contagion strength of anger and anxiety. This is particularly important given the dearth of research comparing the contagion of discrete emotions within a single study. Most of the current findings are drawn from separate lab and field studies examining the contagion characteristics of one specific emotion (Benhke et al., 1994; Gump & Kulik, 1997; Joiner, 1994; Joiner & Katz, 1999). In order to extend current research on emotional contagion beyond general positive and negative affect, the relative effects of discrete emotions of anger and anxiety on the emotional behaviors of team members will be examined and compared in this paper.

Boundary Conditions of Emotional Contagion

The empirical studies mentioned above highlights the importance of the boundary condition of team interdependence and frequent face-to-face interactions among team members in the emergence of group affect. Previous researchers have measured team task interdependence (Bartel & Saavedra, 2000), and frequency of interaction in the form of individual commitment to team and individual attachment to group (Totterdell, 2000; Totterdell et al., 1998). These constructs have been shown to influence mood-sharing processes. In interdependent and frequently interacting teams, emotional contagion unfold as the mechanism to explain affective linkages among team members because of the numerous and often intense interactions that take place in the team. In the absence of regular contact among team members, alternative processes such as shared experience would be necessary to explain convergent group affect. Thus, we would expect teams whose members interact frequently and are interdependent on each other will show stronger convergence than can be explained by contagion.

Individual and Group-Level Moderators

Group affective linkages can be influenced by both the normative context of the team and individual level member characteristics (Barsade & Gibson, 1998; Kelly & Barsade, 2001). In

particular, this paper will focus on the contextual norms of expression dictated by psychological safety and the tendency for individuals to “catch” the emotions of others in facilitating the mechanism of emotional contagion and the affective linkages in a group. Furthermore, these factors correspond with the two-step process of emotional contagion posited earlier, and with Kelly and Barsade’s (2001) contention that group affective properties arise out of the dynamic interaction between individual affective characteristics and the affective context. In addition, this underlying assumption of the relevance and distinction of the expression and experience of emotions is echoed by Hatfield et al.’s (1994) contention that emotional contagion is a by product of the expressivity of the emotional contagion carrier and the sensitivity of the perceivers to the emotions of others.

Psychological Safety

The existence of unique unexplored *group* antecedents, in explaining the phenomenon of group affect has been pointed out in Grandey’s (2008) theoretical review of the extant literature on work emotions research. The relevance to which the group’s context regulates its members’ emotional expressions was explicitly recognized by Ashforth and Humphrey’s (1995) work on social emotion regulation strategies. In attempts to suppress emotional expressions in everyday rational exchanges, organizations invented norms or structures that dictate when and where emotional expressions are appropriate. For example, in the service industry, employees are influenced and required by organizational and occupational norms and display rules to portray positive expressions while dealing with customers (Barger & Grandey, 2006; Pugh, 2001; Rafaeli & Sutton, 1987; Grandey, 2003). Previous researchers that examine emotional contagion have often focused only on the individual-level predictors of affective linkage (Bartel & Saavedra, 2000; Ilies et al., 2007; Totterdell, 2000). However, at the group level, one of the contextual elements that is proposed to influence the emotional expressions of group members is the climate of psychological safety.

Psychological safety is often conceptualized as the shared belief that the group is safe for interpersonal risk-taking, leading to a climate of mutual respect, trust and caring for team members (Edmondson, 1999). A team high on psychological safety encourages team members' to voice their opinions, to take chances and to support each other in their tasks. This safe and comfortable environment is accurately described as "a shared sense of family atmosphere" (Edmondson, 1999). Psychological safety is often discussed within the realm of organizational or team learning. It has been explicated as a facilitator of individual engagement in the team (Nembhard & Edmondson, 2006), failure-based learning where individuals and teams learn from their mistakes rather than avoiding them (Carmelli, 2007) and overall performance (Edmondson, 1999).

Given the many advantages of psychological safety mentioned above, it becomes important for teams and organizations to achieve this ideal state. With high psychological safety, team members feel comfortable expressing their thoughts, behave in an authentic manner with one another, willing to take risks, to experiment and more importantly, to learn from mistakes and failures. Most of the research conducted on psychological safety has portrayed it as beneficial to the task performance of teams or organizations, examining it from the effectiveness perspective of performance (i.e. team learning and performance; Campbell, McCloy, Oppler, & Sager, 1993). On the other hand, the underlying emotional experiences and consequences of a team high or low on psychological safety are often assumed but remain unknown. Implicit in many of the research findings is the importance of the interpersonal relationships between team members (Carmelli, 2007; Edmondson, 1999) in the creation of a shared belief of safety.

In particular, a psychologically safe team context may involve different emotion norms than those that exist within the organization or unit. Similar to accepting and caring families, psychologically safe teams encourage members to express their unique thoughts, even if these are negatively valenced. In fact, past research has shown that individuals are more likely to express

anger and are less likely to control angry expressions when interacting with family members than with strangers (Matsumoto, Yoo, Hirayama, & Petrova, 2005). Organizations develop expressive norms to limit or control the irrationality of emotions in the workplace (Ashforth & Humphrey, 1995). Nevertheless, in a team that experiences psychological safety, team members might not feel restricted or constrained by organization emotion norms to suppress potentially disruptive displays of negative emotions (e.g. anger and anxiety). In other words, it may be acceptable to express negative emotions once in a while in the course of carrying out one's tasks. There is no perceived need to contain one's emotional expressions in a "safe" environment because there is less fear of consequences from group members for acting out. Further substantiating this assertion, respondents in a study of psychologically safe teams reported the lack of emotional regulation during team interactions; "We don't wear a mask" or "We don't have a workface" (Edmondson, 1999, p. 372).

High psychological safety within a team may mean more expressive emotion norms than low psychologically safe teams. As a result of the "freedom of expression" norm underlying a psychologically safe team, members might overstep their boundaries and let go of self-control, expressing more negative or positive feelings than they would in a less psychologically safe team. Consistent with our emphasis on the two-part process of expression and experience of emotional contagion, this study proposes that psychological safety climate increases emotional convergence by making negative and positive displays of emotions within a group more likely. To the extent these displays are observed and internalized through emotional contagion, the group, as a whole will come to feel stronger emotions. Based on findings on the unique outcomes of unpleasant or pleasant group affect (Barsade, 2002; George, 1990; Sy et al., 2005; Tee & Ashkanasy, 2007), investigating the role psychological safety play in enhancing group affective linkages is important. Furthermore, the influence of negativity bias (Cacioppo et al., 1997), negative potency and dominance (Rozin & Royzman, 2001) will increase the salience of negative emotional

expressions, intensifying the effect of high team psychological safety on negative affective linkages among group members.

Hypothesis 2: Psychological safety will moderate the strength of the affective linkage between team and individual team member such that teams high in psychological safety will show stronger a) positive and b) negative affective linkages, compared to teams lower in psychological safety, and c) the moderating effect on negative affective linkages will be greater than positive affective linkages.

Individual Susceptibility to Emotional Contagion

As shown in Figure 1, the first step of the two-part process of emotional contagion is the perception of expressed emotions. In the second part of emotional contagion, team members come to experience the expressed emotion. Laird and Bresler (1992) provided evidence for the existence of self-produced emotional cues (Laird & Bresler, 1992) whereby certain individuals reported the relative ease in experiencing emotional ‘sensations’ within the self. In addition, Hatfield et al. (1994) asserted that individual differences arise in the extent to which individuals are aware of their own emotional responses, and are better able to read other’s emotional expressions. The heightened sense of emotional awareness leads to individual susceptibility to emotional contagion, which has been defined as the tendency to experience congruent emotions to that of which is observed (Doherty, 1997). Individuals who are particularly sensitive to others’ emotions have been shown to be more reactive, emotional and attuned to others. These team members are then likely to enhance the affective linkage between their feelings and their team members’.

Recent evidence supports the role of individual susceptibility to emotional contagion as a moderator that enhances individual-team affective linkage (Ilies et al., 2007; Totterdell, 2000). Additionally, Bartel and Saavedra (2000) found susceptibility to emotional contagion as a facilitator of the collective construction of group affect. However, these studies looked at

emotional convergence in short-term groups (e.g. classroom teams; Ilies et al., 2007) that work on a finite task (e.g. class project, sports matches; Totterdell, 2000). Therefore, this study will attempt to replicate Ilies et al.'s, (2007) and Totterdell's (2000) findings by examining individual susceptibility to emotional contagion as a moderator of the link between group and member affect within actual research teams that have ongoing interactions as part of their work towards a common goal.

Given the significance of emotional experience in the progression of emotional contagion, team members who are particularly susceptible to others' emotional expressions as well as their own inner emotions might be more likely to detect, react to and hence, come to feel the same way as the rest of their team. Individuals with greater susceptibility to emotional contagion (as an individual level variable) are proposed to be relatively more affected by positive and negative team's mood. Again, the relative salience of negative emotions increases the extent to which individuals react (Cacioppo et al., 1997) and come to share the experience of similar negative emotions.

Hypothesis 3: Individual team member's susceptibility to emotional contagion will moderate the strength of the affective linkage between team and individual member such that individuals high on susceptibility to emotional contagion will show stronger a) positive affective and b) negative affective linkages, compared to individuals with lower susceptibility to emotional contagion, and c) the moderating effect will be greater for negative affective linkages than for positive affective linkages.

Interaction of Psychological Safety and Susceptibility to Emotional Contagion

In addition to examining the influence of psychological safety and individual susceptibility to emotional contagion separately, it is imperative to look at the effects of individual and group-level factors simultaneously in predicting group affect. In discussing the recent movement towards consideration of levels of analysis issues other than the individual,

Borman, Klimoski, and Ilgen (2003) suggested the need to look at more than one level of analysis at a time to better explain the outcomes of interest. Thus, this paper attempts to reveal the unique interactive effects of the team contextual influence of psychological safety on emotional perceptions and the influence of individual susceptibility to contagion on the experience of similar emotions in the emergence of group affect.

In a group with high psychological safety, members are free to express their emotions without fear of negative reprisals (Edmondson, 1999). This paper has suggested that this may mean more expressions of both positive and negative emotions, such that teams higher in psychological safety might experience higher affective linkages among members. Individual differences also arise in the degree to which someone is susceptible to emotional contagion (Doherty, 1997). An individual particularly susceptible to others' emotions should experience greater affective connections with his or her group members. Combining these two patterns of relationships, a team high in psychological safety might be particularly conducive for an individual who is susceptible to emotional contagion to "hitch" onto team members' affect, leading to greater affective linkages with team members. On the other hand, a team composed of individuals that are relatively immune to others' emotions might be insensitive to negative affective expressions of team members, even if high psychological safety allows that, and might not experience a strong affective link with the team.

Overall then, I expect a three-way interaction of positive and negative team affect, psychological safety, and individual susceptibility to emotional contagion.

Hypothesis 4: The moderating effect of psychological safety on the relationship between a) positive and b) negative team affect and individual member affect will be stronger when individual emotional contagion susceptibility is high, but will be weaker when individual emotional contagion susceptibility is low.

Chapter 2

Methods

Participants

Participants of this study consisted of 374 members of 101 research grant teams, recruited from a large mid-atlantic public university in the United States. These research teams were sampled from a larger population of research teams through the Office of Research Protections that are or will be receiving grants from various sources. These teams come from a wide variety of functional departments and level of education. The current sample was a subset of a larger group of 763 members of 186 teams that met the criterion of having met within the last two weeks and has two or more members in the group (excluding team leader). There were two waves of data collection, with a time gap of approximately two to three months between the first and second wave of survey administration. Overall, team size ranged from 2 to 12 team members, with a mean of 4.74 research members in each group. The sample was composed of 45.19% females and 54.81% males with their ages ranging from 19 to 81 years old with a mean of 31.96. Principal investigators of each research team were contacted through email and then followed up by a telephone call to ask for participation in a 30 minute interview, as well as to gain access to their team members. Data collection was done as part of a larger group of researchers interested in various team composition and team process issues, led by Dr. David Harrison, a professor from the Smeal Business School at the Pennsylvania State University.

Procedures

Principal investigators of graduate research teams were contacted via email first and then followed up by a telephone call to request permission for participation in this study. Team leaders were interviewed briefly to obtain qualitative data on team processes and team interaction

patterns. The team leader recruitment and interviews happened during the first one and a half months of the fall semester in 2007. Once permission was obtained to contact remaining team members, the first set of survey consisting of the informed consent form, the affect (Watson & Clark, 1994) and the individual susceptibility to emotional contagion measures (Bartel & Saavedra, 2000; Doherty, 1997) were sent through campus mail to all team members identified. Some of the team members' office addresses were not available and for this group of individuals, an electronic version of the survey was sent to them using their email addresses. These participants were given the option of completing it on the computer and sending it back as an email attachment or printing it out to send by mail in pre-addressed envelopes to the investigators of this study. The electronic version and paper-and-pencil copy of the survey are identical with respect to the scales and items. The wave 1 survey distribution was followed by an email a few weeks later reminding participants of the study and explaining the importance that all team members within a group complete the surveys. In order to increase participation rates, team members were also contacted through telephone to remind them about the study. Furthermore, participants were offered individual incentives of \$20 gift certificates from an internet retail website to complete both waves of survey. The teams were also entered into a drawing to win a \$100 gift certificate to a variety of local restaurants.

After approximately 8 to 12 weeks of receiving the first wave of survey responses, the second set of survey items including the affect scale (Watson & Clark, 1994) again and the psychological safety measure (Edmondson, 1999) were sent to respondents. Again, the survey was followed by an email approximately one week later to remind respondents to fill it out and to send it back using the pre-addressed envelopes. Participants who have not responded to the reminder emails were contacted through telephone to inform them again about the study. They were also reminded about the \$20 Internet retail website gift certificates and team drawing for the \$100 restaurant gift certificates.

Individual susceptibility to emotional contagion (Doherty, 1997) was measured during wave 1 because it is conceptualized as an individual disposition and is believed to remain stable over time. On the other hand, psychological safety (Edmondson, 1999) was measured during wave 2 of the study in order to obtain the most accurate assessment of the current normative environment of the group. The measures used in this study were a part of a larger survey of research teams within the university.

Measures

Positive and negative affect.

Individual team members' positive and negative affect were assessed using a modified version of the Positive and Negative Affect Schedule X (PANAS X) scale (Watson & Clark, 1994). The original PANAS X (Watson & Clark, 1994) consists of 60 adjectives, describing both general positive and general negative affect. This 60-item list of affect adjectives ask respondents to indicate on a scale of 1=very slightly or not at all to 5=extremely the extent they feel that way while interacting with team members. However, Watson and Clark (1994) also divided these adjectives into four categories of basic negative emotion scales (i.e. fear, hostility, guilt, sadness) and three basic positive emotion scales (i.e. joviality, self-assurance, attentiveness), suggesting the use of these scales instead of the original PANAS X if the main concern is length. Given my concerns about the length of the scale and research interests, I focused on a shortened version of the PANAS X.

Redundant adjectives (e.g. alone and lonely) that had relatively lower factor analytic loadings on their respective factors (Watson & Clark, 1994) were deleted to arrive at a total of 32 adjectives in the final version of the measure. The final items are attached in Appendix A. The internal consistency for positive affect for wave 1 and wave 2 data collection were .90 and .92 respectively. Negative affect at wave 1 had an alpha of .88 and at wave 2, had an alpha of .90. In order to conduct the exploratory analysis, an anger scale was formed, using a combination of

items from the hostility subscale of the PANAS X. The items assessing anger are anger, hostile, scornful, loathing, disgusted, and irritable. The alpha for this scale was .86. Similarly, items tapping the discrete emotion of anxiety were formed using the affect terms of afraid and nervous from the fear subscale of PANAS X. The alpha for this scale was .70.

Positive and negative affect has been construed as both a disposition and a state (Watson & Clark, 1984; Watson, Clark, Tellegen, 1988; Watson & Clark, 1994; Terraciano, McCrae, Hagemann, & Costa, 2003) and it has been measured and shown that both are highly correlated with each other, in that an individual's positive or negative disposition can reliably predict an individual's positive or negative state (Watson et al., 1988). One of the ways in which these manipulations of trait or state can be achieved is by altering the instructions of affect measures such as the PANAS X scale (e.g. "How do you feel today?" as opposed to "How do you feel in general?"; Watson & Clark, 1994). Building on Larsen and Frederickson's (1999) emphasis on clarifying a working definition of affect in any research on emotions, this paper adopted the state, but context specific conceptualization of positive and negative affect (George, 1990), and modified the instructions in the PANAS X (Watson & Clark, 1994) to asking respondents how they felt when they interacted with the whole team the past few times. In other words, this instruction was intended to cue respondents to thinking of the predominant emotions felt over the last few interactions with their team members.

Psychological safety.

Edmondson's (1999) 7-item scale measuring individuals' perceptions of their group's psychological safety climate was adapted to fit into the team context of this study. Participants were given a 7-point response format to indicate the extent to which they endorsed the statement, ranging from 1=strongly disagree to 7=strongly agree. Examples of some of the items are "In our team, some members are rejected for being different (reverse-scored)" or "In our team, everyone is free to take risks". One item from the measure was dropped because it was judged not suitable

for our study (i.e. “No one in our company would deliberately act in a way that undermines others’ efforts”). The internal consistency of this scale was .70. The measure is shown in Appendix B.

Individual susceptibility to emotional contagion.

The extent to which an individual is susceptible to emotional contagion in their team was assessed using Doherty’s (1997) measure. This paper followed Bartel and Saavedra’s (2000) adaptation of it to groups. Example items are “Listening to the agitated voices of worried group members makes me feel nervous” or “Being around happy group members make me feel cheerful and upbeat”. Due to space constraints, I shortened the scale from 18 to 10 items, removing items with affect terms that appear twice in the scale. Respondents were asked to indicate the extent to which they believed the 10 statements were accurate in describing their experiences from 1=very inaccurate to 7=very accurate. This study reported an internal consistency of .79. Items for this measure are attached in Appendix C.

Control variables.

It is equally important to consider the impact of individuals’ preexisting level of affect. By obtaining individuals’ affect twice over a period of time, it is possible to control for the influence of factors such as individual affective predispositions and constraining situations on the affect of the individual. Thus, this paper used the initial PANAS X as a measure of individual baseline affect, prior to extensive group interactions. Some stability is expected due to individual disposition, but some changes are likely due to mood. Additionally, this enables for a more precise test of the change in affect among respondents as a result of the convergence of emotion from wave 1 to wave 2 of the data collection period.

Furthermore, the effect of shared performance was partialled out because such shared experience can spuriously induce similar affective responses among individuals from the same team, rather than contagion processes explaining their affective similarities (Ilies et al., 2007; Sy

et al., 2005; Totterdell, 2000). Group performance is assessed by asking respondents to indicate their perception of how effective their group has been in achieving relevant team goals on a scale ranging from 1=poor to 5=outstanding. Researchers involved in this large research collaboration developed these items and the internal consistency for these items was .92. The items are included in Appendix D.

Similarly, members from an interdependent team interact with each other more frequently, allowing for a greater likelihood that affect will be shared and caught (Bartel & Saavedra, 2000). This might indirectly influence individual member's affect levels. Team task interdependence was measured using 5 items drawn from the scale created by Pearce and Gregersen (1991). An example of these items is "I work closely with teammates in doing my work". Respondents are asked to indicate the extent to which they agree or disagree to these items, on a scale from 1=strongly disagree to 5=strongly agree. The internal consistency of these items was .88. The items are shown in Appendix E.

Team size might also influence the likelihood of interaction between group members and the extent of affective sharing in the group. Teams with a larger number of members might have less opportunity to detect and "catch" the emotions of others. Thus, group size, computed as the number of respondents from the group was included as a control variable in the main and moderated effects models.

Finally, an item on the team member survey that asked whether respondents have met with their team in the last two weeks assessed the extent to which group members interacted with each other. This assures that some form of interaction between team members had occurred to allow affective sharing to unfold. The time period of two weeks was used to allow sufficient time for team members to have interacted with the team. Only teams that indicated a yes to this question were selected for subsequent analyses in this study.

Chapter 3

Results

The correlations, means and standard deviations for the individual-level variables of this study are shown in Table 1 and the means, standard deviations and correlations for group-level variables are shown in Table 2. In order to account for interdependence among individuals from the same research team, multilevel-modeling of the data was conducted using SAS 9.0. A multilevel-modeling approach allows for a more accurate investigation of how unique affective links are formed and transferred from group to individual and to examine the hypothesized cross-level moderating effects of team psychological safety.

Table 1-1: Means, Standard Deviations, and Correlations between Individual-Level Variables.

Variable	<i>N</i>	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Age	308	31.96	10.42	-								
2. Meeting frequency	357	5.19	6.51	-.06	-							
3. Group PA other	371	3.08	0.46	.07	-.05	-						
4. Group NA other	369	1.40	0.34	-.09	.11*	-.25**	-					
5. Group Anger other	367	1.38	0.44	-.11	.12*	-.27**	.88**	-				
6. Group Anxiety other	366	1.43	0.46	-.10	.11*	-.22**	.68**	.48**	-			
7. Ind PA W1	338	3.27	0.63	.10	-.06	.03	-.02	-.07	.05	-		
8. Ind PA W2	371	3.08	0.72	.06	-.04	.06	-.08	-.16	-.05	.52**	-	
9. Ind NA W1	339	1.48	0.49	-.14*	.10	-.01	.14**	.16**	.04	-.15**	-.24**	-
10. Ind NA W2	369	1.40	0.49	-.19**	.11*	-.09	.19**	.20**	.11*	-.11*	-.24**	.61**
11. Ind Anger W1	338	1.39	0.52	-.09	.08	-.09	.17**	.16**	.10	-.03	-.13*	.73**
12. Ind Anger W2	367	1.38	0.61	-.17**	.15**	-.15**	.21**	.22**	.13*	-.10	-.23**	.49**
13. Ind Anxiety W1	338	1.61	0.74	-.19**	.08	-.01	.14*	.14**	.08	-.16**	-.25**	.72**
14. Ind Anxiety W2	366	1.43	0.67	-.17**	.08	-.04	.10	.11*	.11*	-.15**	-.24**	.47**

Variable	10	11	12	13	14
1. Age					
2. Meeting frequency					
3. Group PAother					
4. Group NA other					
5. Group Anger other					
6. Group Anxiety other					
7. Ind PAW1					
8. Ind PAW2					
9. Ind NAW1					
10. Ind NAW2	-				
11. Ind Anger W1	.46**	-			
12. Ind Anger W2	.85**	.54**	-		
13. Ind Anxiety W1	.42**	.37**	.27**	-	
14. Ind Anxiety W2	.67**	.24**	.45**	.54**	-

Notes. Group PA other=average of group positive affect without the focal individual, Group NA other=average of group negative affect without the focal individual, Group Anger other=average of group anger without focal individual, Group Anxiety other=average of group anxiety without focal individual, Ind PA W2=individual positive affect at wave 2, Ind PA W1=individual positive affect at wave 1, Ind NA W2=individual negative affect at wave 2, Ind NA W1=individual negative affect at wave 1, Ind Anger W2=individual anger at wave 2, Ind Anger W1=individual anger at wave 1, Ind Anxiety W2=individual anxiety at wave 2, Ind Anxiety W1=individual anxiety at wave 1
*p<.05, two tailed. **p<.01, two-tailed.

Table 2-1: Means, Standard Deviations, and Correlations between Group-Level Variables.

Variable	<i>N</i>	<i>M</i>	<i>SD</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
1. Group size	101	4.75	2.54	-				
2. Gender ratio	101	0.49	0.19	-.00	-			
3. Psychologicalsafety	101	4.03	0.37	-.01	.13	-		
4. Task interdependence	101	3.67	0.53	.06	.16*	-.03	-	
5. Team performance	101	3.73	0.56	.18**	-.25**	.52**	.15**	-

Notes. *p<.05, two tailed. **p<.01, two-tailed

Testing Assumptions for Multi-Level Modeling

First, the random variation of individual positive and negative affect at wave 2 of data collection was investigated to determine whether there was sufficient fluctuation across research teams. This was to justify the use of multilevel-modeling, as well as the aggregation of positive and negative affect up to the group level. The null models of negative and positive affect were analyzed and the covariance parameters for individual positive and negative affect were .02 (n.s.) and .03 ($p < .05$) respectively. In other words, there was significant random variation in individual negative affect at wave 2 across research teams, but the same was not true for individual positive affect at wave 2. In addition, the null models partitioned the total variance of these variables into between and within group variances, which allowed for the calculation of intrateam-reliability, or ICC values for both positive and negative affect. This step revealed that 3.35% of the variance in positive affect and 11.13% of the variance in negative affect was due to between-research team variation. Together, this provided further evidence to model individual negative affect, but not positive affect, in a multilevel framework to account for the nesting of individuals within research teams. Thus, Hypothesis 1a, 1c, 2a, 2c, 3a, 3c, and 4a were not tested.²

To test the affective connections among team members and the moderating effects proposed, the average team negative affect at wave 2 (without the focal individual) were calculated for each research team member. Consistent with that suggested by previous researchers (Cohen, Doveh, & Nahum-Shani, 2007; James, Wolf, & Demaree, 1984), within-group agreement (r_{wg}) of negative affect was determined to provide reasonable justification for aggregation up to the group level. The average r_{wg} for negative affect at wave 2 was .96 supporting the aggregation of negative affect to the group level. In other words, this confirmed the presence of both positive and negative affect as a stable group construct.

The covariance parameters and ICC values for team psychological safety, task interdependence and team performance were obtained. The covariance parameters for

psychological safety, task interdependence, and team performance were .06 ($p < .01$), .08 ($p < .05$), and .20 ($p < .01$), respectively. Similarly, their ICC values were calculated and 16.00%, 10.00%, and 30.00% of the respective variances were due to between-group differences, in that sequence. This means that each team possesses unique levels of psychological safety, task interdependence, and team performance. Moreover, the within-group agreement indices were also computed for team psychological safety, team task interdependence, and team performance before aggregating them up to the group level. The average r_{wg} for team psychological safety was .87, the average r_{wg} for team task interdependence was .85, and the average r_{wg} for team performance was .70. These constructs successfully demonstrated sufficient consistency within groups to justify aggregation up to the group level (James et al., 1984). Therefore, each team had different values for team psychological safety and team task interdependence that were used in the multilevel analysis.

Hypothesis Testing

In the following multilevel-models, team performance, team interdependence, group size and individual negative affect at wave 1 were included as controls. In addition, I centered the main variables of this study, particularly to compute the interaction terms before testing the moderating effects of psychological safety and individual susceptibility of emotional contagion (Aiken & West, 1991; Hox, 1994).

Affective convergence.

Hypothesis 1b states that group negative affect at wave 2 will be positively related to the focal individual's negative affect at wave 2. On the contrary, the evidence shows that there was a significant relationship between group and individual negative affect, but in the opposite direction as predicted (unstandardized $\beta = -1.13$, $p < .01$, see Table 3). In short, the results showed that there was no convergence, but rather there was divergence of negative affect among group

members, when controlling for team performance, team interdependence, team size and individual negative affect at wave 1. Thus, Hypothesis 1b was not supported.

Table 3-1: Main effects of multilevel analysis of group-individual affective linkages.

Criterion	Negative					
	Affect	t	Anger	t	Anxiety	t
Intercept (γ_{00})	1.41	21.28**	1.39	15.32**	1.44	45.91**
Other team members (γ_{01})	-1.13	-14.82**	-1.18	-15.64**	0.04	0.56
Team performance (γ_{02})	-0.46	-4.45**	-0.56	-3.97**	-0.05	-0.76
Task interdependence (γ_{03})	0.03	0.24	0.11	0.72	-0.05	-0.77
Team size (γ_{04})	0.00	0.1	-0.14	-0.14	0.00	-0.35
Individual affect wave 1 (γ_{10})	0.40	11.22**	7.91	7.91**	0.49	11.31**

Notes. The individual level sample size are as follows: N=334 for negative affect model. N=331 for anger model. N=330 for anxiety model. The main effects model included the controls of team performance, task interdependence, team size, and individual negative affect (anger or anxiety) at wave 1. γ = unstandardized first level regression coefficients. The first subtext number indicates the variable level in the multilevel equation, and the second subtext number indicates the variable number at that equation level.

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

df = 232 for main effects model including negative affect. df = 229 for main effects model including anger. df = 228 for main effects model including anxiety.

Moderation effects.

In addition, it was hypothesized that team psychological safety (Hypothesis 2b), and individual susceptibility to emotional contagion (Hypothesis 3b) will moderate the relationship between group negative (without the focal individual) and individual negative affect. The interaction terms of psychological safety and individual susceptibility to emotional contagion with group negative affect (without the focal individual) were entered into their respective multilevel models to investigate these predictions. The results of the multilevel analysis show that psychological safety was a significant moderator of the association between group negative affect and the focal individual's negative affect at wave 2 (unstandardized $\beta = -.39$, $p < .01$, see Table 4).

Table 4-1: Moderating effects of susceptibility to emotional contagion, psychological safety, and the three-way interaction between susceptibility to emotional contagion, psychological safety on group-individual affective linkages.

Criterion	Negative					
	Affect	t	Anger	t	Anxiety	t
Susceptibility to emotional contagion:						
Intercept (γ_{00})	1.41	23.65**	1.38	18.29**	1.44	15.66**
Other team members (γ_{01})	-1.14	-14.74**	-1.20	-15.80**	-1.16	-15.44**
Team performance (γ_{02})	0.19	-1.79	-0.08	-0.58	-0.34	-2.12*
Task interdependence (γ_{03})	-0.01	-0.15	0.02	0.17	-0.03	-0.19
Team size (γ_{04})	-0.01	-0.48	-0.03	-0.95	-0.01	-0.20
Psychological safety (γ_{05})	-0.76	-4.55**	-1.36	-6.28**	-0.29	-1.19
SEC (γ_{10})	-0.04	-1.85	-0.01	-0.39	0.00	0.13
Other team members * SEC (γ_{11})	-0.11	-1.61	-0.10	-1.64	-0.07	-0.90
Individual affect wave 1 (γ_{20})	0.40	10.86**	0.33	7.43**	0.28	8.07**
Psychological safety:						
Intercept (γ_{00})	1.39	23.15**	1.33	17.11**	1.43	44.78**
Other team members (γ_{01})	-1.22	-14.82**	-1.41	-15.36**	0.03	0.42
Psychological safety (γ_{02})	-0.72	-4.29**	-1.34	-6.12**	-0.06	-0.56
Team performance (γ_{03})	-0.19	-1.74	-0.07	-0.49	-0.02	-0.27
Task interdependence (γ_{04})	-0.02	-0.17	0.02	0.13	-0.06	-1.03
Team size (γ_{05})	-0.01	-0.32	-0.03	-0.76	0.00	-0.29
Other team members * Psychological safety (γ_{06})	-0.39	-2.65**	-0.60	-3.63**	-0.10	-0.64
SEC (γ_{10})	-0.04	-1.87	-0.01	-0.48	0.61	1.57
Individual affect wave 1 (γ_{20})	0.41	11.16**	0.35	8.04**	0.46	10.32**

3-way interaction:

Intercept (γ_{00})	1.38	23.87**	1.33	17.27**	1.42	21.89**
Other team member affect (γ_{01})	-1.19	-14.29**	-1.39	-15.06**	-0.81	-10.52**
Psychological safety (γ_{02})	-0.69	-4.24**	-1.31	-6.03**	-0.19	-1.05
Other team member * Psychological safety (γ_{03})	-0.39	-2.53*	-0.56	-3.33**	-0.33	-2.15*
Team performance (γ_{04})	-0.18	-1.72	-0.07	-0.49	-0.21	-1.85
Task interdependence (γ_{05})	-0.01	-0.12	0.02	0.16	0.01	0.12
Team size (γ_{06})	-0.01	-0.31	-0.03	-0.75	0.01	0.29
SEC (γ_{10})	-0.03	-1.31	0.00	-0.01	0.02	0.39
Other team member * SEC (γ_{11})	-0.04	-0.52	-0.01	-0.16	-0.19	-1.94
Psychological safety * SEC (γ_{12})	0.02	0.46	0.02	0.27	-0.13	-1.29
Other team member * Psychological safety * SEC (γ_{13})	0.14	0.93	0.11	0.84	0.43	2.01*
Individual affect wave 1 (γ_{20})	0.41	11.07**	0.36	8.03**	0.33	8.67**

Notes. N=329 for negative model. N=326 for anger model. N=326 for anxiety model. The moderated effects model included the controls of team performance at wave 2, team interdependence, team size and individual negative affect (or anger and anxiety) at wave 1. γ = unstandardized first level regression coefficients. The first subtext number indicates the variable level in the multilevel equation, and the second subtext number indicates the variable number at that equation level.

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

for moderating effects model including negative affect. df = 222 for moderating effects model including anger. df = 222 for moderating effects model including anxiety. df = 219 for 2-way interaction model including negative affect. df = 219 for 3-way interaction model including anger. df = 219 for 3-way interaction model including anxiety.

In order to further understand this interaction effect, I plotted separate regression equations of the relationship between group negative affect and individual negative affect, for groups that are 1 SD above and below the grand mean of psychological safety. In brief, Hypothesis 2b posited that psychological safety would strengthen the positive association between group and individual negative affect. As shown in Figure 3, the graph revealed that the moderating effect of psychological safety was in the opposite direction as predicted. In groups high on psychological safety, there was a strong *negative* relationship between group negative affect and individual negative affect. This relationship was weaker, but still negative, for groups with lower psychological safety. Thus, there is no support for Hypothesis 2b.

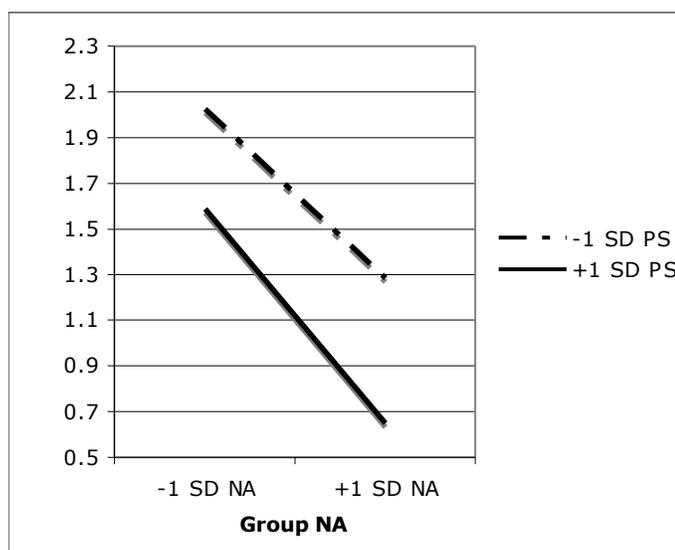


Figure 3-1: The interaction plot of psychological safety as a moderator of negative affective linkages between group and individual.

For individual susceptibility to emotional contagion, results show that individual susceptibility to emotional contagion was not a significant moderator of the relationship between group and individual negative affect (unstandardized $\beta = -.11$, $p > .05$, see Table 4). Thus, Hypothesis 3b failed to be supported.

Finally, Hypothesis 4b proposed a three-way interaction between group negative affect with team psychological safety and individual susceptibility to emotional contagion, on individual negative affect. The results provided no support for this three-way interaction effect (unstandardized $\beta = .15, p > .05$, see Table 4). There are no differences in the relationship between group and individual negative affect among individuals more or less susceptible to emotional contagion, regardless of being in groups with the presence or absence of a psychologically safe norm.

Exploratory Analysis

It is possible that affective convergence occurs for some negative moods but not for others, thus obscuring true patterns of negative affective linkages. Thus, the convergence of anger and anxiety was tested to investigate possible differences in both these affective sharing processes. Before proceeding with this exploratory analysis on the convergence of anger and anxiety among team members, the random variability of individual anger and individual anxiety at wave 2 were investigated. Null models of anger and anxiety were created, and the variance component of anger was found to be significant while that of anxiety was marginally significant (.06 at $p < .01$ and .03 at $p < .10$ respectively). Furthermore, their ICCs were calculated and mirrored the conclusion from their variance components, in that 16.13% of variability in individual anger and 6.94% of variability in individual anxiety occurred between groups. In summary, the results show that individual anger and anxiety at wave 2 demonstrated sufficient variability across teams to set up its analyses with multilevel models in order to account for the nesting of individuals within teams.

Additionally, to justify the aggregation of anger and anxiety up to the group level to test for their contagion effects, their within-group agreement indices (r_{wg}) were obtained. Group anger at wave 2 had an r_{wg} of .87 and group anxiety at wave 2 had an r_{wg} of .96. Both indices exceeded the often used rule-of-thumb of .70 (James et al., 1984) to indicate adequate agreement among

group members to treat a variable as a group-level property. Thus, there is enough evidence to support the existence of a unique group anger and group anxiety. Moreover, these variables were centered and their interaction terms with psychological safety and individual susceptibility to emotional contagion computed before entering them into their respective multilevel models.

Affective convergence.

Similar to the main effects model of group negative affect, the multilevel models of individual anger and individual anxiety included the controls of team performance, team interdependence, and team size in addition to individual anger and individual anxiety at wave 1, respectively. The exploratory hypothesis concerned the ability of anxiety to be shared among group members while the contagion of anger will be less salient, as a result of the greater tendency for anger to elicit complementary submissive responses, such as fear (Dryer & Horowitz, 1997; Markey et al., 2007; Tiedens, 2001; Tiedens & Fragale, 2003). The results show that group anger at wave 2 (without the focal individual) was significantly related to individual anger at wave 2 (unstandardized $\beta = -1.17, p < .01$, see Table 3), but in the opposite direction as predicted. That is, group and individual anger was negatively related, which means that there was no convergence of anger from group to individual. On the other hand, the relationship between group anxiety at wave 2 (without focal individual) and individual anxiety at wave 2 was nonsignificant (unstandardized $\beta = .03, p > .05$, see Table 3). Hence, there is no support for the convergence of anxiety among group members. Given the lack of anxiety convergence, the evidence does not indicate the relative ease for anxiety to be shared among group members compared to anger contagion. Nevertheless, the significant negative relationship between group and individual anger provides preliminary support for a complementary submissive response from team members when anger is expressed.

Moderating effects.

To examine whether psychological safety and individual susceptibility to emotional contagion act as moderators in the association between group anger and individual anger, and between group anxiety and individual anxiety, their interaction terms with their respective group discrete emotion was entered into separate multilevel models.

Team psychological safety was a significant moderator of the relationship between group anger and the focal individual's anger (unstandardized $\beta = -.60$, $p < .01$, see Table 4), although in the opposite direction as expected. The interaction effect was plotted using the regression equations for groups 1 SD above and below the grand mean of team psychological safety. As illustrated in Figure 4, high psychological safety strengthens the negative relationship between group anger and individual anger compared to low psychologically safe groups. Generally, as groups increase in anger, the individual member's anger decreases and this effect is stronger for those working in psychologically safe teams. For the effect of group anxiety on the focal individual's anxiety, psychological safety did not appear to be a significant moderator of this relationship (unstandardized $\beta = -.10$, $p > .05$, see Table 4). Regardless of the psychological safety of the group, the association between group anxiety and individual anxiety was the same.

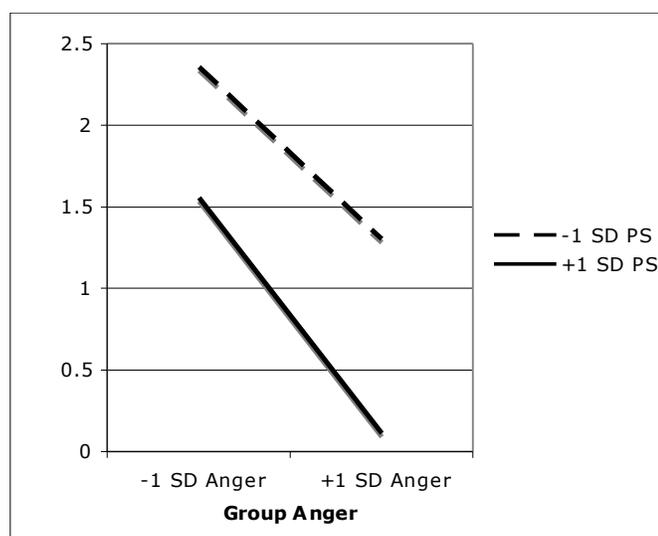


Figure 4-1: The interaction plot of psychological safety as a moderator of anger affective linkages between group and individual.

Next, the moderating effect of individual susceptibility to emotional contagion was examined and the results revealed that it had a nonsignificant influence on the association between group anger and the focal individual's anger (unstandardized $\beta = -.10$, $p > .05$, see Table 4). Similarly, individual susceptibility to emotional contagion did not function as a significant moderator in the relationship between group anxiety and individual anxiety (unstandardized $\beta = -.07$, $p > .05$, see Table 4).

Finally, the three-way interaction between psychological safety and individual susceptibility to emotional contagion with group anger or group anxiety was investigated. The interaction term was not a significant factor in the multilevel model focusing on the relationship between group anger and the focal individual's anger (unstandardized $\beta = .11$, $p > .05$, see Table 4). In other words, the moderating effect of psychological safety on the affective linkage between group and individual anger did not differ among individuals high or low on susceptibility to emotional contagion. On the other hand, there was a significant effect of the three-way interaction term on the relationship between group anxiety and the focal individual's anxiety (unstandardized $\beta = .43$, $p < .05$, see Table 4). To further understand the influence of this three-way interaction, I

plotted the regression lines for each of the four combinations of groups high or low on psychological safety with individuals high or low on susceptibility to emotional contagion. Inferring from Figure 6, among individuals less susceptible to others' emotions, there was a stronger negative relationship with their group's felt anxiety, when working in more, compared to less psychologically safe groups. Among individuals less susceptible to others emotions, being in a psychologically safe group strengthened the negative relationship compared to working in a less psychologically safe group. Again, this is not consistent with prior predictions of the study.

Posthoc Analysis

In addition to testing the hypotheses using multilevel analysis, I also reran all of the models using OLS regression. The same set of controls – team performance, team interdependence, team size, and individual affect at wave 1 were used. The main difference between OLS regression and multilevel analysis is that the latter accounts for the nesting structure of the data, hence, functions as a more sensitive test of the hypotheses. Nevertheless, results stemming from OLS regression is useful to double check the accuracy of multilevel analysis. OLS regression results should not appear to be drastically different from the findings of multilevel analysis (e.g. interactions running in the opposite direction as that of the multilevel analysis). In fact, the regression tests of these hypotheses provided support for the findings of the multilevel analyses. The results were similar to that of the multilevel findings, except that under regression analysis, there were no significant affective linkages among group members, as opposed to the significant negative affective and anger divergence shown above. This reinforces the more precise nature of multilevel tests when compared to OLS regression for nested data.

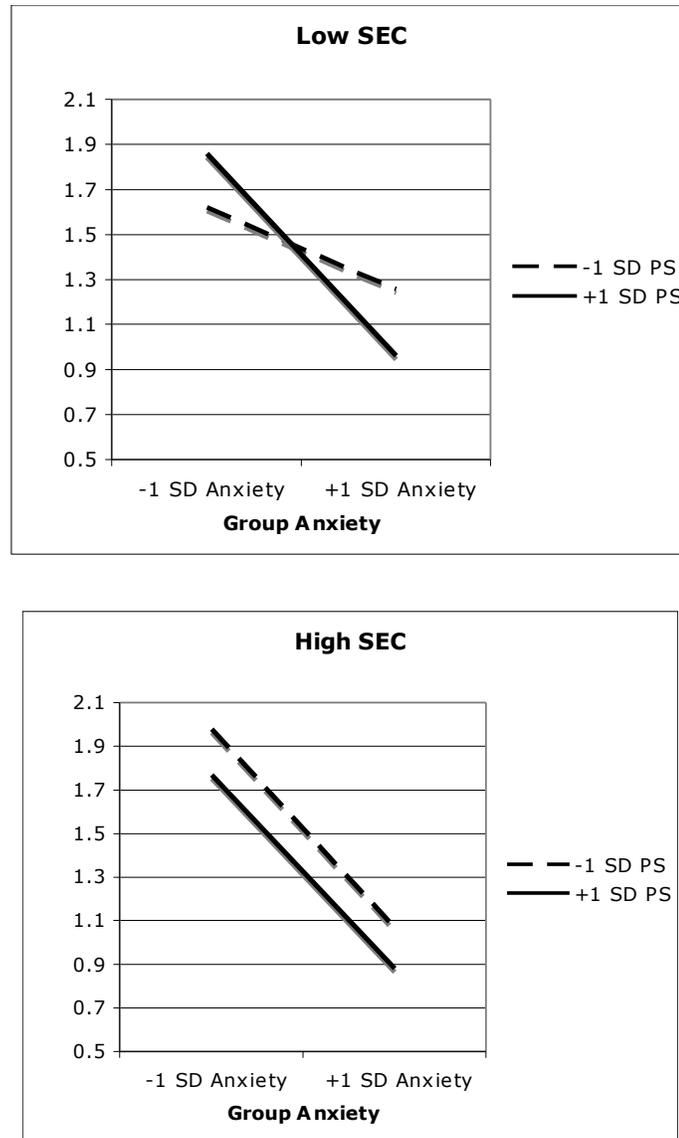


Figure 5-1: The three-way interaction plot of psychological safety and individual susceptibility to emotional contagion on the anxiety affective linkages between group and individual.

Chapter 4

Discussion

The present study examined the nature of positive and negative affective sharing among research team members through the two-step process of emotional contagion, where affective convergence depends on 1) the perception of others' emotions and 2) the experience of similar emotions. Through the implicit mechanisms of emotional contagion such as behavioral entrainment, social comparison of norms, and automatic mimicry, team members come to feel the same positive or negative emotions. Furthermore, this study investigated whether the presence of a particular affective norm – psychological safety and the predisposition to detect and “catch” others' moods – susceptibility to emotional contagion would enhance or attenuate the two steps of emotional contagion, respectively. Psychological safety has often been examined within the context of team creativity and team learning (Baer & Frese, 2002; Edmondson, 1999; 2002; Lee, Edmondson, Thomke, & Worline, 2004), but there is limited work on its affective influence within the group. This is the first known study to adopt an affective angle in studying the impact of psychological safety on group members. Furthermore, the study also focused on examining the contagion of discrete negative emotions, particularly the sharing of anger and anxiety among coworkers in a group. Most published studies have focused mainly on the sharing of broad positive affect, and to a limited extent, general negative affect (Barsade, 2002; Barsade et al., 2000; Pugh, 2001). Therefore, this study addressed the dearth of research in the nature of discrete negative affective linkages (Barsade, Brief & Spataro, 2003).

It is important to point out the inability of this study to model positive affect as a group-level variable, given the many studies available focusing on group positive affect (Barsade, 2002; Barsade et al., 2000; Pugh, 2001). The lack of between-group differences in positive affect may

be attributed to the diffuse and pervasive nature of positive affect. Individuals from these research teams might have experienced a similar, stable level of positive affect over the past two weeks.³ This is in contrast to the experience of negative affect, which might be more salient, and memorable (Cacioppo et al., 1997; Rozin & Royzman, 2001), explaining the existence of unique group negative affect between research teams.

On the whole, the results did not follow the predictions of this study. There was no support for negative affective, anger or anxiety convergence within groups. Instead, the results point to the divergence of negative affect among group members. That is, when group members felt increasing negative affect, the individual member felt decreasing levels of negative affect. Furthermore, this pattern of results might be driven by the significant divergence of anger in groups, which demonstrated preliminary support for the tendency of anger to invite complementary, as opposed to similar affective responses (Dryer & Horowitz, 1997; Markey et al., 2007; Tiedens & Fragale, 2003). On the other hand, the lack of anxiety convergence in groups failed to provide evidence for the relative ease to which anxiety was “caught” and felt, when compared to anger. It is vital to point out that there was a significant positive correlation between group and individual negative affect ($r = .19, p < .01$), as well as group and individual anger ($r = .22, p < .01$), as shown in Table 1, but these relationships became negative when the controls of individual negative affect (or anger) at wave 1, team performance, team size and team interdependence were included in the multilevel analysis. The observed effect between group and individual negative affect and anger might be spurious and thus, difficult to interpret. Future research should attempt to replicate these effects to further ascertain the nature of these relationships.

In addition, when moderating effects were found, both relationships were negative, not positive, as expected. In particular, psychological safety was a significant moderator of negative affective linkages between group and individual, but in the opposite direction as predicted. The

present study found that in teams high on psychological safety, the negative relationship between group negative affect and the focal individual's negative affect was more pronounced, while this negative association was weaker among groups lower on psychological safety. This means that group members were less likely to share negative emotions when they perceived their group to have a psychologically safe climate. When negative affect was broken down into the discrete emotions of anger and anxiety, the results show that this moderating effect was potentially driven by psychological safety's influence on anger linkages in groups.

In contrast to expectations, individual susceptibility to emotional contagion did not emerge as significant moderators of group and individual affective linkages. On the other hand, among individuals less susceptible to others' emotions in psychologically safe teams, there was a stronger negative relationship between group and individual anxiety, as shown in Figure 5, when compared to emotionally less susceptible group members in un-psychologically safe teams.

In sum, this study failed to provide support for either affective convergence or the two-step process of emotional contagion in which first, the expression (permitted by psychological safety) and the experience (driven by individual susceptibility to emotional contagion) of emotions function as the explanatory mechanism for affective linkages in groups. The current findings are surprising given that the majority of prior published studies that examined affective convergence among group members have found clear evidence for the convergence of positive, negative, or both among group members (Barsade, 2002; Barger & Grandey, 2006; Ilies et al., 2007; Pugh, 2001; Totterdell, 2000; Totterdell et al., 1998). Below are some speculative conceptual explanations, followed by several important contextual and methodological differences between the present study and former studies that might help explain these divergent findings.

Conceptual explanations

The divergence of negative affect might represent an overall desire for group members to avoid getting involved in the negative emotions of group members and risking the occurrence of interpersonal conflict. This is particularly important given the performance-driven context of grant-funded research teams in a university setting. Anger divergence in the group, where group members are less likely to experience the same angry emotions as their peers, present preliminary support for the tendency for anger, a discrete negative emotion, to invite complementary responses, as opposed to mimicry. The expressions, experience and contagion of anger in workgroups might be detrimental to harmonious task-focused relationships, hence, motivating group members to distance themselves from “catching” this negative emotion. Moreover, the divergence of negative affect might be driven by the strong effects of group anger, and not group anxiety (given its nonsignificant impact on team members’ anxiety levels), lending support to the argument for the importance of investigating discrete negative emotions (Brief et al., 2003) that might display unique nomological networks with affect-related variables, when compared to the broad construct of negative affect.

Looking at the results of the moderating role of psychological safety on negative affect, particularly anger, it might be inferred that psychological safety provided an affective climate that prevented the overall sharing of negative affect and anger among group members, weakening the process of affective convergence between group and individual. This can occur through two different mechanisms. Psychological safety is the tacit but shared belief that the group is safe for interpersonal risk-taking (Edmondson, 1999). Perhaps, when negative emotions are expressed, psychological safety offers a safe climate that allows team members to feel reassured that the negative emotions expressed are not personal attacks, but rather the free expressions of their coworkers’ in the process of completing their tasks. The presence of this safe climate prevented individuals from becoming “caught” in the negative energy of the group. Alternatively, psychological safety encouraged group members to suppress, rather than express, any negative

emotions, particularly anger, since this can make others feel unsafe. This enables team members to be comfortable in their working environment. Thus, psychological safety acted as a suppressor, rather than facilitator of negative emotional expressions.

The moderating effects of individual susceptibility to emotional contagion were unexpected, especially when compared to the findings of previous research that has found its facilitating influence on negative affective linkages (Barsade, 2002; Ilies et al., 2007). Psychological safety's effect as a "safety net" preventing the spread of negative emotions in the group, or as a suppressor of negative emotional expressions augmented the negative relationship between group and individual anxiety among less emotionally-susceptible team members, who might be more oblivious to emotional signals in the group than emotionally-sensitive members. These individuals might be less able to detect emotions in the context of psychological safety.

Contextual Differences

Emotions in general might be more frequently expressed and felt in newly-formed groups that are only required to work together for a limited amount of time on a specific and well-defined task (Barsade, 2002; Ilies et al., 2007; Totterdell, 2000). The nature of certain tasks that require intense interactions between team members such as working in a classroom team on a semester-long project (Ilies et al., 2007), participating in an assessment center (Barsade, 2002), or competing in a professional sports match (Totterdell, 2000) provide a conducive environment for the frequent sharing of intense positive or negative emotions. Furthermore, these intense tasks provided a collaborative environment that requires group members to work together on a pre-determined goal only for a set period of time (i.e. semester grades, performance evaluations, number of game points). The collaborative climate in such groups and consistent temporal and motivational nature of these tasks may facilitate opportunities to share emotions among individual members, more than this study's research teams.

On the contrary, an alternative explanation to the findings of negative affect and anger divergence is the contextual nature of this sample of research teams. The research teams in this study can best be described as ongoing project teams (Devine, Clayton, Philips, Dunford, & Melner, 1999), with research members that are similar to the extent they share lab resources such as research equipment and work under the same research investigator. Just like many research groups, each research member has his or her own defined role in the group, working on their own research agendas. Furthermore, the research team environment may be described as competitive, in that the success of a research group member (and subsequent lower negative affect) may directly oppose another member's success. The nature of such interactions with research team members might explain the unexpected affective divergence findings in this study. Thus, a team member's affect might not be equally felt by others. Team interdependence can be used as a heuristic for the extent to which group members collaborate together in their work. In fact, in this sample there is an overall lower mean of team interdependence when compared to that of a similar study by Bartel and Saavedra (2000) with a different sample (3.67 and 4.91 respectively).

The importance of team interdependence was acknowledged in this study as a control in the multilevel analyses. This is because team task interdependence has been shown to be positively correlated with group affect (Bartel & Saavedra, 2000). Nevertheless, researchers have not yet explicitly tested its influence as a moderator of the strength of affective linkages in groups. As mentioned earlier, perhaps in highly interdependent teams, affective convergence occurs because of the collaborative and frequent interactions among group members. Therefore, to test the *a posteriori* explanation offered above, I conducted a number of posthoc analyses, including examining the interaction between team task interdependence and group negative affect, anger, and anxiety, respectively. The results were surprising in that team task interdependence moderated the relationship between group and individual anxiety (unstandardized $\beta = -.25$, $p < .05$), such that in highly interdependent groups, there was a negative

relationship between group and individual anxiety. On the other hand, in less interdependent groups, there was a positive relationship between group and individual anxiety.

Furthermore, I also investigated how the predicted moderator models might function among high interdependent groups. Therefore, the cross-level moderating effects of these factors with group negative affect, anger, and anxiety, respectively, were conducted on groups with team task interdependence scores above the median ($n = 50$ teams). This was done to see if the relationships would be closer to predicted for these groups. The moderated effects model for psychological safety mirrored the results found earlier for the full sample. Individual susceptibility to emotional contagion and the hypothesized three-way interaction effect were not significant predictors of individual negative affect, anger, and anxiety among interdependent teams. Thus, team task interdependence did not help explain the unexpected affective divergence and moderating effects in this study.

Affective convergence may also depend on the frequency or opportunities to interact with each other, hence increasing the odds of detecting and “catching” others’ moods. Thus, a posthoc analysis was conducted with frequency of group meetings as a moderator of group and individual negative emotions. This is also a more precise test of the boundary condition of frequency of interaction in enabling affective convergence. Nevertheless, it did not moderate the relationship between group and individual negative affect (unstandardized $\beta = -.01, p > .05$), anger (unstandardized $\beta = .00, p > .05$), or anxiety (unstandardized $\beta = .01, p > .05$), respectively. This result is consistent with the lack of effect on group and individual affective linkages of time spent with group (Totterdell et al., 1998). Thus, affective convergence among group members is not just due to exposure to others. Moreover, these research members have been working together for a period of time now and might not experience significant fluctuations in their emotional experience over the period of wave 1 to wave 2 of data collection, explaining this nonsignificant effect.

The overall negative affective and anger divergence might also be explained by the failure to account for gender ratio and individualistic/collectivistic values of the group. Previous research indicates the influence of gender and individualism-collectivism on affective sharing among group members (Doherty, Orimoto, Singelis, Hatfield, & Hebb, 1995; Ilies et al., 2007), such that individuals share more emotions in groups with a higher number of females and in groups with collectivistic values. However, posthoc analysis on gender ratio in participating groups and the collectivism of the group showed the absence of their moderating effects on negative affect (unstandardized $\beta = .73, p > .05$, unstandardized $\beta = .14, p > .05$, respectively), anger (unstandardized $\beta = 1.24, p > .05$; for gender ratio only) and anxiety (unstandardized $\beta = 1.12, p > .05$, unstandardized $\beta = -.07, p > .05$, respectively) linkages. Individualism-collectivism was a significant moderator of group-individual anger linkages such that more collectivistic groups showed a weaker negative relationship compared to less collectivistic groups (unstandardized $\beta = .36, p < .01$, respectively). Therefore, the number of females and collectivistic tendencies of the group does not enlighten us to the factors driving the pattern of results in this study.

In addition, similar to employees in organizations, the researchers in this sample could have interacted with multiple teams at one time, and have been preoccupied with numerous roles and ongoing events in their non-work lives, in addition to the role they play as research team members. Individuals come in and leave work to go home to their families or friends, exposing them to events and new opportunities to experience different, perhaps more intense emotions. In fact, previous research has found support for the reciprocal influence of work/non-work events on the negative emotional experience of individuals at home/work (Judge, Ilies, & Scott, 2006). Thus, the negative emotions reported in this study could have stemmed from an external source, contributing to affective divergence in the group.

Table 5-1: Posthoc analysis of the moderating effects of meeting frequency, gender ratio, task interdependence, and individualism-collectivism on group-individual affective linkages.

Criterion	Negative Affect	t	Anger	t	Anxiety	t
Meeting frequency:						
Intercept (γ_{00})	1.41	20.45**	1.39	15.21**	1.43	45.44**
Other team members (γ_{01})	-1.18	-15.23**	-1.19	-15.79**	0.02	0.26
Meeting frequency (γ_{02})	0.02	1.71	0.03	1.84	0.00	0.66
Team performance (γ_{03})	-0.47	-4.27**	-0.53	-3.75**	-0.05	-0.78
Task interdependence (γ_{04})	0.03	0.29	0.12	0.80	-0.04	-0.71
Team size (γ_{05})	0.00	0.04	0.00	-0.17	-0.04	-0.71
Other team members * Meeting frequency (γ_{06})	-0.01	-0.66	0.00	-0.31	0.01	1.02
Individual affect wave 1 (γ_{10})	0.38	10.96**	0.34	7.83**	0.48	11.08**
Gender ratio:						
Intercept (γ_{00})	1.45	15.19**	1.44	10.15**	1.60	13.06**
Other team members (γ_{01})	-1.71	-15.67**	-1.89	-17.86**	-1.38	-13.10**
Gender ratio (γ_{02})	-1.21	-2.19*	-1.53	-1.87	-1.44	-2.05*
Team performance (γ_{03})	-0.63	-3.36**	-0.75	-2.72**	-0.64	-2.66*
Task interdependence (γ_{04})	0.05	0.23	0.04	0.14	0.14	0.50
Team size (γ_{05})	0.00	-0.08	-0.01	-0.19	-0.05	-0.91
Other team members * Gender ratio (γ_{06})	0.73	0.91	1.24	1.49	1.12	1.37
Individual affect wave 1 (γ_{10})	0.35	9.25**	0.35	8.05**	0.29	6.89**

Task interdependence:						
Intercept (γ_{00})	1.41	21.52**	1.39	14.61**	1.43	45.80**
Other team members (γ_{01})	-1.11	-14.20**	-1.24	-16.48**	0.05	0.78
Task interdependence (γ_{02})	0.03	0.26	0.12	0.76	-0.05	-0.74
Team performance (γ_{03})	-0.46	-4.45**	-0.57	-3.91**	-0.06	-0.98
Team size (γ_{04})	0.00	0.09	-0.01	-0.16	-0.01	-0.51
Other team members * Task interdependence (γ_{05})	-0.04	-0.40	-0.20	-1.96	-0.25	-1.98*
Individual affect wave 1 (γ_{10})	0.40	11.25	0.34	7.85**	0.47	10.98**
Individualism-collectivism:						
Intercept (γ_{00})	1.41	20.81**	1.38	14.25**	1.44	45.76**
Other team members (γ_{01})	-1.17	-14.79**	-1.28	-16.99**	0.05	0.69
Individualism-collectivism (γ_{02})	0.08	0.65	-0.07	-0.42	-0.03	-0.47
Team performance (γ_{03})	-0.46	-4.25**	-0.61	-3.97**	-0.05	-0.87
Task interdependence (γ_{04})	0.05	0.43	0.10	0.63	-0.05	-0.80
Team size (γ_{05})	0.01	0.26	-0.01	-0.21	-0.01	-0.46
Other team members * Individualism-collectivism (γ_{06})	0.14	1.26	0.36	2.80**	-0.07	-0.62
Individual affect wave 1 (γ_{10})	0.39	10.94**	0.32	7.60**	0.49	11.29**

Notes. For meeting frequency moderating models, N=334 for negative affect model, N=331 for anger model, N=330 for anxiety model. For gender ratio moderating models, N=213 for negative affect model, N=210 for anger model, N=211 for anxiety model. For task interdependence moderating models, N=334 for negative affect model, N=331 for anger model, N=330 for anxiety model. For individualism-collectivism moderating models, N=334 for negative affect model, N=331 for anger model, N=330 for anxiety model. The moderated effects model included the controls of team performance at wave 2, team interdependence, team size and individual negative affect (or anger and anxiety) at wave 1. γ = unstandardized first level regression coefficients. The first subtext number indicates the variable level in the multilevel equation, and the second subtext number indicates the variable number at that equation level.

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

For meeting frequency moderating models, df = 231 for moderating effects model including negative affect. df = 228 for moderating effects model including anger. df = 227 for moderating effects model including anxiety. For gender ratio moderating models, df = 160 for moderating effects model including negative affect. df = 157 for moderating effects model including anger. df = 158 for moderating effects model including anxiety. For task interdependence moderating models, df = 231 for moderating effects model including negative affect. df = 228 for moderating effects model including anger. df = 227 for moderating effects model including anxiety. For individualism-collectivism moderating models, df = 231 for moderating effects model including negative affect. df = 228 for moderating effects model including anger. df = 227 for moderating effects model including anxiety.

Methodological Differences

A salient difference between the present and past studies of a similar nature is the timing of affect measurement. Previous studies assessed individuals' momentary affect, immediately following the tasks required of them (Barsade, 2002; Ilies et al., 2007; Totterdell et al., 1998; Totterdell, 2000). On the other hand, the present study captured the retrospective emotional experience of research team members in their daily interaction with colleagues. When emotional events do occur, the retrospective method may not capture such acute contagion processes, given that individuals tend to report more diffuse and general affective states when asked to recall their emotional experience over an extended period of time (Larsen & Fredericksen, 1999). This is consistent with the difficulty to track emotional spillovers across time periods longer than a day (Larson & Almeida, 1999). More importantly, the retrospective emotional method is vulnerable to interference from external events, such that individuals might report their emotions stemming from events unrelated to the group. Future studies should replicate this study using momentary affect measurements such as experience sampling methodology (ESM; Beal & Weiss, 2003) in order to more precisely detect the affective dynamic of the group across time.

Limitations and Future Research

Readers should be cautious when interpreting the negative relationships between group negative affect and individual negative affect, as well as group anger and individual anger. Looking at the correlations in Table 1, the significant associations between group and individual negative affect ($r = .19, p < .01$) and group and individual anger ($r = .22, p < .01$) indicate the presence of some sort of affective sharing among group members. Nevertheless, once the control variables of individual negative affect, team performance, team interdependence and team size were included, these relationships became negative. These relationships might represent suppressor effects and hence their meaning is difficult to interpret and make inferences.

The self-report nature of this study increased the threat of multicollinearity and common method variance between variables of interest, particularly between group psychological safety and group and individual affective variables. I attempted to reduce the threat of these issues by using variables measured at different points in time (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003) and by computing group affect by removing the focal individual's affect score from the sum. For example, individual susceptibility to emotional contagion measured at wave 1 was used to predict individual affect assessed at wave 2. Nevertheless, future studies should address multicollinearity problems and common method variance by using different types of data such as observational data (Bartel & Saavedra, 2000; Barsade, 2002), physiological measures or a combination of both to get at affect. Some of my predictions and assumptions in this study were based on ideas about emotional expression. Such methods of measurement allow researchers to directly assess the presence or lack of emotional expressions in groups, specifically, whether there are more or less emotional expressions in psychologically safe groups. Therefore, such research designs might even allow for a more accurate and precise measurement of affective linkages in groups, though clearly challenging to do.

In addition to the limitations previously mentioned, it is important to note that the affective linkages that are examined in this study are those of group members, and exclude the affect of the team leaders. Leaders' moods may act as a potent influence on their followers' emotional experience (Sy et al., 2005). Therefore, future studies should investigate how status differentials play a role in the formation and unfolding of affective connection among group members, especially in the presence of a climate of psychological safety.

Moreover, this study did not control for group members' level of involvement in the research team. As mentioned earlier, team members occupy multiple roles in addition to their role as a researcher. These additional roles might provide opportunities for them to experience different and divergent affective dynamics, in addition to the affective nature of their focal team,

attenuating the potential affective connection between the individual and his or her research group members. This is in line with earlier speculations about emotional interference from involvement with external projects or teams. Previous studies have found that individual commitment to the group strengthened the affective linkages between group and individual (Totterdell, 2000; Totterdell et al., 1998). An interesting future route is to examine the extent to which involvement in the focal team might moderate the affective linkages between group and individual. The more involved an individual is to the research team, the more likely he or she is to experience strong emotions with the group in response to goal performance and challenges. This in turn might increase the chances of affective sharing among group and that individual.

Similarly, based on the limitations of this study, future studies should extend the current findings by replicating the study on different types of real-life teams to fully examine the boundary conditions of affective convergence. This allows future research to examine the distinction and unique outcomes of affective sharing (or lack thereof) in groups working on collaborative versus competitive tasks.

Contributions to Theory and Practice

The failure to find affective convergence in this study should not be taken as lack of support for the theory of emotional contagion. Previous studies have mainly focused on newly formed lab or classroom teams that worked on a pre-assigned task (Barsade, 2002; Ilies et al., 2007). On the other hand, the pattern of results of this study suggest that real-life research teams might present unique contextual factors that limit affective sharing, thus, illuminating potential boundary conditions for this internal mechanism of affective convergence. The minimal collaborative nature of research work coupled with emotional spillovers from external sources can contribute to affective divergence in these groups. This highlights the importance of recognizing boundary conditions of the process of affective convergence. Furthermore, previous studies have not distinguished broad negative affect into its discrete emotion components.

Examining specific emotions reveal unique patterns of negative affective divergence in groups, which might be driven by divergent anger emotions of group members.

Moreover, this study introduced the possible influence of psychological safety on the affective dynamics in groups. Psychological safety acts as a group affective climate to influence the internal mechanism of emotional contagion. Additional research is needed to clarify the exact role of psychological safety, either as a suppressor of negative emotions, as a safety blanket preventing the “catching” of others’ negative moods, or both.

Although not the focus of this study, looking at the large negative correlations between psychological safety and individual negative affect, and the positive correlations between psychological safety and individual positive affect in Table 1, practitioners and managers in organizations can tentatively conclude that cultivating a psychologically safe environment is important in order to encourage greater positive moods and to reduce the experience of negative affect, including anger and anxiety, in groups. Given what we know about the consequences of negative affect on individuals and groups and the benefits of positive affect and psychological safety in and teams and organizations (Edmondson, 1999; Baer & Frese, 2003), this provides support for developing psychological safety as a core component of team building in research teams.

Conclusion

Previous studies have shown that individuals function as “walking mood inductors” for positive and negative affect (Barsade, 2002; Ilies et al., 2007; Totterdell, 2000; Totterdell et al., 1998). Despite the contextual and methodological limitations, this study suggests that for negative emotions, individuals particularly those in psychologically-safe research teams actually behaved like “walking mood insulators”, shielding themselves from “catching” the negative emotions of the group, including anger. Alternatively, psychological safety acted to prevent internalization of

negative emotions or reduced the expressions of negative emotions to avoid conflict escalation in the group.

Appendix A

Affect Scale

This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Think back to the past few times you interacted with your team and indicate to what extent you feel this way, while working with others on your team.

1	2	3	4	5
Very slightly	a little	moderately	quite a bit	extremely
or not at all				
Afraid _____	Happy _____	Angry at self _____	Joyful _____	
Nervous _____	Irritable _____	Disgusted with self _____	Excited _____	
Angry _____	Scornful _____	Dissatisfied with self _____	Enthusiastic _____	
Hostile _____	Disgusted _____	Sad _____	Energetic _____	
Bold _____	Loathing _____	Downhearted _____	Proud _____	
Attentive _____	Guilty _____	Lonely _____	Strong _____	
Thrilled _____	Ashamed _____	Concentrating _____	Fearless _____	
Delighted _____	Confident _____	Determined _____	Alert _____	

Appendix B

Psychological Safety Scale

- 1) In our team, some members are rejected for being different
- 2) When someone in our team makes a mistake, it is often held against them
- 3) It is difficult to ask others for help in our team
- 4) In our team, everyone is free to take risks
- 5) The people in our team value others' unique skills and talents
- 6) Members of our team are able to bring up problems and tough issues

Appendix C

Individual Susceptibility to Emotional Contagion Scale

- 1) When I'm around angry group members, I get angry myself
- 2) I notice myself getting tense when I'm around members who are stressed out
- 3) Listening to the agitated voices of worried group members makes me feel nervous
- 4) Being around happy group members makes me feel cheerful and upbeat
- 5) I find it hard to remain calm when other group members are excited
- 6) When someone laughs hard, I laugh too
- 7) I feel sluggish when talking to a depressed group member
- 8) I become unhappy when I'm around group members who are depressed
- 9) I pay attention to what others are feeling
- 10) I'm very sensitive in picking up other members' feelings

Appendix D

Team Performance Scale

Please assess your team's performance with respect to the following aspects. Please also specify any additional goals of your research team not listed below and indicate your assessment. How effective has your team been in...

- 1) Extending your research field
- 2) Meeting the requirements of an external funding agency
- 3) Producing publishable work in a respected journal
- 4) Solving a practical problem that the field is currently confronting
- 5) Getting a grant to support further research
- 6) Developing new methodologies
- 7) Creating new software/hardware
- 8) Forming collaborations with different researchers
- 9) Meeting intermediate deadlines
- 10) Other (please specify) _____

Appendix E

Task Interdependence Scale

Please circle the number that indicates how much you agree or disagree with each statement about your experience in working in your research team.

- 1) I work closely with teammates in doing my work
- 2) I frequently must coordinate my efforts with teammates
- 3) My own performance is dependent on receiving accurate information from teammates
- 4) The way I perform my job has a significant impact on teammates
- 5) My work requires me to consult with teammates fairly frequently

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Footnote

1. Little attention has been focused on investigating the unique effects of the more overt processes of affective impression management and intentional affective influence within the realm of emotion research. Nevertheless, drawing from research in the social psychology field, impression management efforts has been shown to induce affective liking among supervisors (Bolino, Varela, Bande, & Turnley, 2006; Judge & Ferris, 1993; Wayne & Ferris, 1990; Wayne & Liden, 1995).

2. The r_{wg} value for positive affect was .94, exceeding the commonly used standard of .70 (James et al., 1984) for acceptable within-group consistency. Nevertheless, taking into consideration its low ICC value and nonsignificant between-group variability, this just means that individual members feel the same, on average, regardless of group membership.

3. The main effects model for positive affect was conducted posthoc, with team performance, team task interdependence and individual positive affect at wave 1 included as control variables. Mirroring the conclusion from its low ICC value and nonsignificant random component, the results looking at individual positive affect at wave 2 were unstable and varied widely, depending on whether centered or uncentered variables were used.