DISSERTATION

SITUATIONAL AND DISPOSITIONAL UNCERTAINTY AS MODERATORS OF JUSTICE-TO-OUTCOME RELATIONSHIPS: TESTING UNCERTAINTY MANAGEMENT THEORY IN VIRTUAL TEAMS

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WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY TASHA L. EURICH ENTITLED SITUATIONAL AND DISPOSITIONAL UNCERTAINTY AS MODERATORS OF JUSTICE-TO-OUTCOME RELATIONSHIPS: TESTING UNCERTAINTY MANAGEMENT THEORY IN VIRTUAL TEAMS BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

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ABSTRACT OF DISSERTATION

SITUATIONAL AND DISPOSITIONAL UNCERTAINTY

AS MODERATORS OF JUSTICE-TO-OUTCOME RELATIONSHIPS:

TESTING UNCERTAINTY MANAGEMENT THEORY IN VIRTUAL TEAMS

This investigation applied uncertainty management theory (van den Bos & Lind, 2002) to generate a model predicting that situational and dispositional uncertainty would moderate justice-to-outcome relationships. First, the model hypothesized that members of virtual teams would experience increased situational uncertainty relative to members of co-located teams, and situational uncertainty was predicted to intensify reactions to fairness and unfairness. Specifically, it was hypothesized that uncertainty would strengthen (a) the positive relationship between procedural justice and both performance and supervisory trust and (b) the negative relationship between procedural justice and both emotions and counterproductive behavior. Second, because individuals high in risk aversion and uncertainty intolerance experience increased dispositional uncertainty, the model predicted that those high on both traits would exhibit more polarized reactions to fair and unfair procedures than those low on both traits. Specifically, when perceptions of unfairness were present, relative to individuals low on both traits, those high on both traits were proposed to demonstrate increased negative emotions and counterproductive behavior, while demonstrating increased performance and supervisory trust under fair conditions. Third, relative contributions to the outcomes of procedural justice and both situational and dispositional uncertainty interaction terms were tested.

Results revealed that (a) as predicted, media richness was lowest in virtual teams relative to co-located ones, (b) counter to predictions, social presence was higher, and team uncertainty was lower, in virtual teams relative to co-located ones (c) interactive effects of procedural justice and dispositional uncertainty were present for both trust and state anger, and (d) interactive effects of procedural justice and situational uncertainty due to virtual teams did not emerge. Analyses for the relative contributions of each type of predictor indicated that main effects for procedural justice explained the majority of variance in outcomes, such as trust. Procedural justice by dispositional uncertainty interactions explained a small but important amount of variance in outcomes, and procedural justice by situational uncertainty interactions explained effectively no variance. Theoretical and practical contributions are discussed.

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DEDICATION

I dedicate this work to my mother, Teresa Wanger. You are my role-model as a business women and entrepreneur, and are the single reason I was able to discover my passion for business. On a personal level, you have been my source of unwavering inspiration and support, convincing me I could do things that I never thought were possible. I hope that this accomplishment makes you even half as proud of me as I am proud to have you as my mother.

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Introduction

Perceptions of fairness matter. As such, research in the area of organizational justice is considered an important contribution to organizational policy (Cohen-Charash & Spector, 2001; Colquitt, Conlon, Wesson, Porter, & Ng, 2001). Both organizations and employees experience positive outcomes if fairness perceptions are high and experience negative consequences if fairness perceptions are low. For example, high perceptions of fairness are positively related to organizational citizenship behaviors (Moorman, 1991), organizational commitment (Folger & Konovsky, 1989), positive emotions (Fox, Spector, & Miles, 2001; Weiss, Suckow, & Cropanzano, 1999), job satisfaction (Masterson, Lewis, Goldman, & Taylor, 2000; McFarlin & Sweeney, 1992), performance (Colquitt et al., 2001; Cohen-Charash & Spector, 2001), and evaluation of authority (Colquitt, 2001; Lind & Tyler, 1988). Low perceptions of fairness (i.e., perceived injustice) are associated with withdrawal (Dailey & Kirk, 1992; Hom, Griffeth, & Sellaro, 1984), counterproductive behaviors (Colquitt et al., 2001; Fox et al., 2001; Skarlicki & Folger, 1997), negative emotions (Weiss et al., 1999), and workplace sabotage (Ambrose, Seabright, & Schminke, 2002). To ensure a positive work experience and to maximize productivity, organizations should strive for high levels of fairness and minimize injustice as much as possible.

Typically, fairness perceptions can be subdivided into three types of evaluations: (a) fairness of outcomes, distributive justice (DJ: Adams, 1965), (b) fairness of

procedures, procedural justice (PJ: Thibaut & Walker, 1975), and (c) fairness of interpersonal treatment one receives from decision makers, interactional justice (IJ: sometimes conceptualized as a component of PJ; Bies & Moag, 1986). Main effects between all types of fairness perceptions and outcomes have been frequently documented (Colquitt et al., 2001; Holbrook, 1999; Moorman & Byrne, 2005); however, researchers have recently begun to underscore the importance of investigating moderators of relationships between fairness perceptions and outcomes (Colquitt et al., 2001; Nowakowski & Conlon, 2005).

The current study draws on uncertainty management theory (van den Bos & Lind, 2002) to investigate moderators of the relationship between PJ and outcomes (i.e., performance, trust, emotions, counterproductive behaviors). Uncertainty management theory states that when individuals experience uncertainty regarding their environment, relationships between justice and outcomes are strengthened. In the current study, uncertainty will be conceptualized both dispositionally and situationally. Dispositional uncertainty refers to individual differences in the extent to which individuals are uncomfortable with uncertainty in general, and will be operationalized in the current study as dispositional uncertainty intolerance and risk aversion. Situational uncertainty refers to psychological uncertainty regarding one's environment, and will be manipulated by assigning participants to team types of varying levels of virtual communication, followed by the collection of three measures of situational uncertainty: media richness, social presence and team uncertainty. Teams interacting virtually are proposed to experience greater situational uncertainty than face-to-face teams, for reasons outlined in the following sections. The study's proposed theoretical model (i.e., situational and

dispositional moderators of the relationship between PJ and outcomes) is presented in Figure 1.

Teams in Organizations

The use of teams in organizations is increasing (Devine, Clayton, Philips, Dunford, & Melner, 1999; Koslowski & Bell, 2003), perhaps because of the changing nature of work and the plethora of associated benefits (Levine & Moreland, 1990). The Department of Transportation recently reported that more than eight million Americans work in virtual teams (i.e., teams in which members collaborate regardless of physical location; see Ahuja & Galvin, 2003), indicating that organizational use of virtual teams, in particular, is substantial (Ahuja & Galvin, 2003; Cascio, 2000; Martins, Gilson & Maynard, 2004; McKenna, & Green, 2002; Townsend, DeMarie, & Hendrickson, 1998).

Despite many potential advantages of virtual teams, they often pose unique challenges for team members, supervisors, and organizations (Hinds & Bailey, 2003). Extended to virtual teams, uncertainty management theory (van den Bos & Lind, 2002), predicts that when members are not collaborating in a face-to-face manner, additional uncertainty is introduced, leading to increased interest in fairness. As such, different consequences may arise when face-to-face and virtual teams encounter the same situations.

The following sections review the existing literature on virtual teams, uncertainty management theory, and justice. I then describe the study's proposed model of uncertainty management in teams, in which both situational uncertainty resulting from virtual teams and the dispositional experience of uncertainty moderate the relationship between justice and cognitive, behavioral and affective outcomes.

Virtual Teams in Organizations

For the purposes of this study, virtual teams[1] are defined as "teams whose members use technology of varying degrees in working across locations, temporal, and relational boundaries to accomplish an independent task" (Martins et al., 2004, p. 808). Conversely, co-located teams are defined as teams whose members work in the same physical location (see Ahuja & Galvin, 2003). Past researchers have suggested that the widespread use of virtual teams is due to increased globalization (Hinds & Bailey, 2003; Townsend et al., 1998), mergers and acquisitions (Grinter, Herbsleb, & Perry, 1999), reductions in costs of communicating (Fulk & DeSanctis, 1995), increases in the speed of electronic communication (Fulk & DeSanctis, 1995), opportunities for quick and effortless linkages between team members (Ahuja & Galvin, 2003; Townsend et al., 1998), and more efficient exchange of documents and messages (Baltes, Dickson, Sherman, Bauer, & LaGanke, 2001).

Both practitioners and researchers have hailed the benefits of virtual teams. First, to maintain a sustained competitive advantage in the global marketplace (Cascio, 1995; Ramon & Cohen, 2005), it is extremely valuable for organizations to have the ability to assemble teams of qualified individuals regardless of location (Martins et al., 2004). Second, the introduction of virtual teams is cost-effective for organizations and employees alike. Organizations can reduce real estate costs if physical offices are not required, and employees can save money by eliminating commuting to the same location (Cascio, 2000). Third, virtual communication methods may reduce negative social

[1] Although the words "team" and "group" are sometimes distinguished in the literature, for the purposes of this study, and consistent with past writing (Kozlowski & Bell, 2003), the two terms will be used interchangeably in the current investigation.

politics involved with co-located teams, resulting in increased participation and decreased discomfort with voicing one's opinions (Majchrzak, Malhotra, Stamps, & Lipnack, 2004). Fourth, increased efficiency and productivity are possible because it is no longer necessary to physically gather all team members before accomplishing task-related activities (Majchrzak et al., 2004). For example, team members can commence working without having to schedule a conference room or commute to the same location.

Despite their advantages, virtual teams do not come without disadvantages (Maruping & Aqarwal, 2004). First, managers of virtual teams may have difficulty managing subordinates with whom they do not regularly meet, and may have equal difficulty gaining their trust (Handy, 1995). For team members, negative consequences include feelings of isolation (Cascio, 2000; Handy, 1995), difficulty building trust with other team members and supervisors (Cascio, 2000; Fulk & DeSanctis, 1995; Handy, 1995; Harvey, Novicevic, & Garrison, 2004; Majchrzak et al. 2004), difficulty expressing thoughts and ideas via non-traditional communication media (Ramon & Cohen, 2005; Townsend et al., 1998), conflict (Hinds & Bailey, 2003; Sproull & Kiesler, 1986), lack of team identification and shared culture (Handy, 1995; Harvey et al., 2004), lower commitment (Workman, Kahnweiler, & Bommer, 2003), increased misunderstandings (Harvey et al., 2004), lack of overlapping business hours (Grinter et al., 1999; Handy, 1995), and uncertainty regarding tasks (Townsend et al., 1998; Walther & Bunz, 2005), communication (Langan-Fox, 2002; Sproull & Kiesler, 1986; Walther, Slovacek, & Tidwell, 2001), environmental characteristics (Cramton, 2001; Walther & Bunz, 2005), and relationships between team members (Cramton, 2001; Sarbaugh-Thompson & Feldman, 2000; Walther & Bunz, 2005). Finally, for organizations, it is likely that the

process of staffing virtual teams may be complicated by factors not usually important in co-located teams (e.g., different social structures; Harvey et al., 2004).

Accordingly, it is clear that if implemented correctly, virtual teams stand to add value to organizations in terms of profitability and functioning (Harvey et al., 2004). However, if virtual teams are not implemented with care and thoughtfulness, they can have detrimental effects for team members, supervisors, and organizations (Harvey et al., 2004). One primary goal of this study is therefore to increase understanding of virtual team functioning under various conditions (see Hinds & Bailey, 2003, Walther et al., 2001).

How Do Virtual Teams Communicate?

Because virtual teams are human systems, to understand team functioning, it is necessary to examine communication among team members. In lieu of face-to-face communication, recent technological advances provide virtual teams with a variety of communication options (Martins et al., 2004), which researchers often categorize as either asynchronous or synchronous. Asynchronous communication involves team members composing messages at independent times (e.g., paper mail, e-mail), whereas synchronous communication involves message composition allowing immediate responses or feedback (e.g., instant messaging, telephone, videoconferencing; Baltes et al., 2001; Walther, 1994). A primary distinction between the two is that synchronous communication allows immediate feedback, and asynchronous does not (see Daft & Lengel, 1986, Ramon & Cohen, 2005).

In this investigation, I focus on synchronous text-based conferencing (i.e., instant messaging; see Yao & Flanagin, 2006). Instant messaging shares many features of face-

to-face communication such as instant feedback; however, the two possess differences, such as, for example, the inability to communicate vocal tone or facial expressions (Walther, 1994). I chose instant messaging because of its popularity in organizations. Researchers have recently suggested that instant messaging is one of the most widespread forms of virtual team communication (Baltes et al., 2001; Bell & Kozlowski, 2002; Majchrzak et al., 2004; Martins et al., 2004; Tangirala & Alge, 2006), and that "the common suggestion a few years ago that relatively few people use synchronous, text-based messaging systems is demonstrably false" (Baltes et al., 2001, p. 174). Instant messaging is widespread in many virtual teams such that it may be even more common than telephone or paper mail communication (Baltes et al., 2001). Moreover, a recent benchmarking study of virtual team members reported that over half of virtual teams believe that instant messaging is a highly useful form of communication (Majchrzak et al., 2004). In contrast, e-mail and videoconferencing methods were reported to be less useful (see also Sproull & Kiesler, 1986). Therefore, the current study examines instant messaging because it closely reflects popular and current organizational practices.

Uncertainty in Virtual Teams

As discussed in forthcoming sections, the implementation of virtual teams is proposed to introduce uncertainty into group communication processes. Uncertainty is defined as "the state of belief when...one is unsure" (Reber, 1995, p. 822), and arises when one cannot predict the future, "especially if the doubt centers on the experience of potentially unpleasant events like punishment, physical harm, failure or rejection" (Kagan, 1972, p. 55). Workers consistently face uncertainty on the job due to "continuous, unremitting, almost unrelenting...transmutation" (Davidow & Malone,

1992, p. 7; see also Achrol, 1988; Buhko, 1994; Gifford, Bobbit, & Slocum, 1979; Milliken, 1987). Because "work is gradually changing from the need to use tools to a need to respond to the unexpected" (Ramon & Cohen, 2005, p. 261), it is becoming more important for workers to be able to operate effectively in the face of uncertainty.

Uncertainty is generally conceptualized as either an objective characteristic (i.e., environmental uncertainty) or a subjective experience (i.e., psychological uncertainty; see Bordia, Hunt, Paulsen, Tourish, & DiFonzo, 2004). Environmental uncertainty is defined as objective uncertainty present in the organizational environment or how "environmental factors...affect the success or failure of the decision unit in performing its function" (Duncan, 1972, p. 318). Examples of sources of environmental uncertainty include uncertainty regarding a firm's customer base, the capabilities of its suppliers, or the accuracy of its financial projections (see Buhko, 1994).

Psychological uncertainty occurs at the individual level, and refers to an individual's perception of an absence of information (Achrol, 1988). Researchers have noted that psychological uncertainty functions as a poignant self-threat (McGregor, Zanna, Holmes, & Spencer, 2001; see also Fiske & Taylor, 1991; Jost, Glaser, Kruganski, & Sulloway, 2003; Lopes, 1987; Sorrentino & Roney, 1986; van den Bos & Lind, 2002) and can mount and result in distress if not resolved (Kagan, 1972). Similar to prior work, because the current study investigates perceptual phenomena at the individual level, it focuses on psychological uncertainty rather than environmental uncertainty (see Gifford et al., 1979; Huber, O'Connell, & Cummings, 1975; Lipshitz & Strauss, 1997; McGregor et al., 2001).

Because virtual team members do not exhibit the same interactions as co-located teams, virtual teams can be a breeding ground for uncertainty (Baruch & Nicholson, 1997; Fiol & O'Connor, 2005; Griffith & Neale, 2001; Sarbaugh-Thompson & Feldman, 2000; Stanworth, 1998; Workman et al., 2003). Virtual team members experience uncertainty for a variety of reasons, including ambiguity of messages (Langan-Fox, 2002), uneven information distribution (Cramton, 2001; Hinds & Bailey, 2003), fewer shared perceptions and meaning of work (Hinds & Bailey, 2003; Walther & Bunz, 2005), reduced understanding of other team members (Langan-Fox, 2002; Sarbaugh-Thompson & Feldman, 2000; Walther et al., 2001), lack of information about the context within which other team members function (Cramton, 2001), and poor understanding of silence (Cramton, 2001). The application of two psychological theories, social presence theory and media richness theory, provide a framework to understand why virtual team members should experience heightened uncertainty.

Social Presence Theory

Social presence theory (Short, Williams, & Christie, 1976) states that different methods of communication carry different levels of social presence (i.e., salience of interaction partners). According to this theory, communication methods that convey more information lead to greater mutual liking and reduced uncertainty between team members. Applying social presence theory to virtual teams suggests that virtual team members do not have the same amount of social information as co-located teams.

Specifically, researchers have found that all forms of virtual team communication "attenuate to at least some degree the social context cues available in face-to-face conversations" (Sproull & Kielser, 1986, p. 1496; see also Ramon & Cohen, 2005),

because key social presence indicators such as facial expressions, body language, gestures, and intonation are missing (Sarbaugh-Thompson & Feldman, 2000). Sproull and Kiesler (1986) found a positive relationship between social context cues and social context information (e.g., organizational position of others, relationships with others), such that the fewer social context cues team members possessed, the less social context information they experienced (i.e., increased uncertainty). Social presence theory therefore indicates that communicating using a medium lacking in social presence such as instant messaging will lead to greater uncertainty (see also Tangirala & Alge, 2006). Indeed, team members communicating via instant messaging tend to have reduced understanding of the sender compared with co-located teams (Fulk & DeSanctis, 1995).

Media Richness Theory

Media richness theory (Daft & Lengel, 1986) states that the natural consequence of complex social systems is reduced information exchange, resulting in both increased uncertainty and equivocality. Uncertainty refers to an absence of information, whereas equivocality is best defined as ambiguity. Both uncertainty and equivocality are related; for example, equivocality may cause new data to seem even more uncertain (Becker & Knudsen, 2005). Daft and Lengel (1986) state that to minimize uncertainty and equivocality, effective communication must occur. One of the main tenets of media richness theory is that different communication media contain different levels of richness, or "ability of information to change understanding within a time interval" (Daft & Lengel, 1986, p. 560).

Applying media richness theory to virtual teams suggests that virtual team members do not possess the same amount of information exchange as co-located teams,

resulting in uncertainty. Daft and Lengel (1986) classify the following media in descending order of richness: face-to-face, phone, written communication, and numeric communication. Though the authors did not incorporate electronic media into their original typology, it is now possible to place different types of electronic media on this continuum. Because virtual teams exchange less information than co-located teams (Martins et al., 2004), virtual communication methods such as e-mail and instant messaging likely fall in the mid-point of the richness continuum. Virtual media may be further sub-divided based on synchronicity and asynchronicity, the former being richer than the latter because of the ability to give immediate feedback. Therefore, according to media richness theory, messages of virtual teams will not possess the richness of co-located team communication.

The Role of Organizational Justice in Virtual Teams

Because of the inherent uncertainty in virtual teams, team members should actively search for information to reduce it (see Lipshitz & Strauss, 1997). Recent research suggests that fairness may play a key informational role under conditions of uncertainty. In particular, virtual team members may be acutely aware of, and more likely to react to, fairness judgments (van den Bos & Lind, 2002; for justice in teams research, see Roberson, 2006).

Though researchers frequently frame studies on organizational justice from a justice perspective only (i.e., examining the consequences of fairness: Ambrose & Schminke, 2003; Holbrook, 1999) or an injustice perspective only (i.e., examining the consequences of unfairness; Ambrose et al., 2003; Baron, Neuman, & Geddes, 1999; Cropanzano & Baron, 1991), this study will examine both justice and injustice to help

organizations determine which practices to strive for and which to avoid. Specifically, it will examine positive consequences of high justice perceptions (i.e., performance, supervisory trust) as well as negative consequences of low justice perceptions (i.e., negative emotions, counterproductive behavior).

In the current study, virtual team members engaging in synchronous text-based communication are predicted to experience increased psychological uncertainty because of limited social information (Sproull & Kielser, 1986) and reduced media richness (Daft & Lengel, 1986). The following sections will apply uncertainty management theory (van den Bos & Lind, 2002) to virtual teams, suggesting that increased concerns for fairness information result from (a) uncertainty due to working in virtual teams, and (b) dispositional propensities to react to uncertainty, with predicted consequences for individual reactions.

Moderators of Justice Effects

As previously discussed, it is beneficial to examine main effects in justice-to-outcome relationships (e.g., Colquitt et al., 2001; Holbrook, 1999). Main effects clearly inform organizational policy, showing, for example, that organizations can increase acceptance of a workplace smoking ban by increasing fairness perceptions of communications regarding the ban (Greenberg, 1994). However, most relationships among attitudes, behaviors, and cognitions are inherently complex (Ajzen, 1985), and may not always be easily captured by simple cause-effect chains. In support, a recent meta-analysis (Colquitt et al., 2001; see also Nowakowski & Conlon, 2005) reported a considerable amount of variation in justice-to-outcome relationships due to moderators.

Including theoretically-compelling moderators in justice research will help identify factors that strengthen or lessen observed relationships between justice and outcomes (Colquitt, Scott, Judge, & Shaw; 2006; Gililand & Steiner, 2001; Kausto, Elo, Lipponen, & Elovainio, 2005; Nowakowski & Conlon, 2005; van den Bos, Maas, Waldring, & Semin, 2003). Specifically, "this knowledge would provide greater insight into the contexts and considerations facing organizations when making decisions with fairness implications to ensure that individuals do indeed perceive the decision, procedure, or treatment as fair" (Nowakowski & Conlon, 2005, p. 8). Because justice has often been shown to have different effects under different conditions, scholars have stated that investigating moderators of justice is essential to advancing the field (Ambrose &

Schminke, 2003; Gililand & Steiner, 2001; Nowakowski & Conlon, 2005). The following sections will briefly review existing literature on the situational and dispositional moderators of justice-to-outcome relationships, and will follow with a discussion of each type of moderator investigated in this study.

Situational Moderators of Justice Effects

Research on situational moderators of justice is common, perhaps because organizations can have more control over them than they do over dispositional moderators (i.e., individual differences). Past justice research on situational moderators has investigated organizational structure (Ambrose & Schminke, 2003), role definition (Tepper & Taylor, 2003), blameworthiness of the source of injustice (Horvath, 2002), leader prototypicality (Platow & van Knippenberg, 2001), and job insecurity (Kausto et al., 2005). First, organizational structure has been found to moderate the relationship between PJ and IJ and perceived organizational and supervisory support, such that relationships were stronger in mechanistic structures than in organic ones (Ambrose & Schminke, 2003). Second, role definition has been found to moderate the relationship between PJ and organizational citizenship behaviors, such that the relationship was stronger when employees believed that organizational citizenship behaviors were not part of their formal job requirements (Tepper & Taylor, 2003).

Third, the source of injustice has been found to moderate the negative relationship between justice perceptions and organizational citizenship behaviors, such that the relationship was stronger if the source (e.g., supervisor, organization) was seen as blameworthy (Horvath, 2002). Fourth, leader prototypicality (i.e., whether the leader represents typical characteristics of the team) has been found to moderate the relationship

between organizational justice and pride in group membership, such that the relationship was stronger when the leader was more, as opposed to less, prototypical (Platow & van Knippenberg, 2001). Finally, job insecurity has been found to moderate the relationship between both PJ and IJ and the outcome of health, such that relationships were strongest when insecurity was high and weakest when it was low.

Despite contributing to the literature, many of the above studies did not use theory to frame their work (e.g., Ambrose & Schminke, 2003). Prior work has noted the importance of applying theory to empirical research, as it often leads to more robust effects and an increased ability to generalize beyond one's immediate sample (Klein & Zedeck, 2004). Therefore, the current study uses the predictions of uncertainty management theory (van den Bos & Lind, 2002) to generate its situational moderator. Specifically, I will explore the effects of uncertainty resulting from working in virtual teams to determine whether virtual team members experience heightened amounts of uncertainty relative to co-located team members.

Situational Uncertainty: Applying Uncertainty Management Theory to Virtual Teams

Uncertainty management theory (van den Bos & Lind, 2002) was proposed to clarify why fairness matters to individuals. Specifically, "fairness is important...because it gives [people] a means of managing uncertainty" (van den Bos & Lind, 2002, p. 216). The following section will briefly review uncertainty management theory and its precursor, fairness heuristic theory, and will follow with a discussion of its applicability to virtual teams.

Fairness heuristic theory. Fairness heuristic theory (Lind, 2000; van den Bos, Wilke, & Lind, 1998) is rooted in the assumption that interest in fairness stems largely

from relational concerns (Lind & Tyler, 1988), and states that individuals care about fairness because it serves as a proxy for judgments regarding an authority's trustworthiness. If individuals are treated fairly, they deduce that their supervisor is trustworthy and respond cooperatively to requests; however, when individuals believe they are treated unfairly, they experience low trust for supervisors and demonstrate uncooperative behavior (Lind, 2000).

Fairness heuristic theory posits that even when relevant information is lacking (i.e., uncertainty is present), justice judgments are made quickly based on initial fairness information (often called the primacy effect; Lind, Kray, & Thompson, 2001). There are two types of primacy effects: the fair process and the fair outcome effect. The fair process effect emerges when individuals are uncertain regarding DJ, and therefore use PJ to judge their outcome (van den Bos et al., 1998; van den Bos, Lind, Vermunt, & Wilke, 1997). In support of fairness heuristic theory, the fair process effect disappears when individuals have information regarding the trustworthiness of authorities (van den Bos et al., 1998). The fair outcome effect emerges when individuals are uncertain regarding PJ, and therefore use DJ to help judge procedures (van den Bos, Vermunt & Wilke, 1996; van den Bos, 1999). In summary, fairness heuristic theory argues that individuals can be uncertain regarding the trustworthiness of authorities. To cope with this uncertainty, they rely on fairness information.

Uncertainty management theory. As previously stated, uncertainty management theory is an extension of fairness heuristic theory (van den Bos & Lind, 2002). Because fairness heuristic theory deals with substituting fairness information for trustworthiness information (van den Bos, 2001), it makes a fundamental assumption about uncertainty;

specifically, uncertainty present in supervisor-subordinate dyads leads to the increased importance of fairness. Uncertainty management theory subsumes predictions of fairness heuristic theory regarding trust, but takes a more general approach to how uncertainty affects interest in fairness. Specifically, uncertainty management theory states that uncertain environments cause individuals to become particularly attuned to fairness and that "solid, firmly constructed fairness judgments either remove uncertainty or alleviate much of the discomfort that uncertainty would otherwise generate" (Elvainio et al., 2005, p. 2502). Uncertainty management theory differs from its predecessor insofar as it deals with all uncertainty, rather than one specific type (i.e., trustworthiness of authorities).

The general predictions of uncertainty management theory are twofold. First, uncertainty intensifies justice perceptions; when individuals experience uncertainty, unfair events will be perceived as more unfair, and fair events will be perceived as more fair (van den Bos & Lind, 2002). Despite the fact that uncertainty management theory was only recently proposed, research is already lending support, finding that uncertainty indeed leads to polarized fairness perceptions (Tangirala & Alge, 2006; van den Bos & Lind, 2002; van Prooijen, van den Bos, & Wilke, 2005).

Second, uncertainty management theory predicts that uncertainty leads to pronounced effects of fairness perceptions (i.e., uncertainty moderates the relationship between justice and outcomes). This prediction has also amassed support (see Kausto et al., 2005). For example, van den Bos (2001) found that uncertainty moderated the relationship between PJ and affective reactions, such that individuals demonstrated stronger negative reactions to unfair procedures when they were uncertain. In another study, Diekmann, Barsness, and Sondak (2004) found that when uncertainty was high,

the effects of PJ and IJ on job satisfaction were stronger than when uncertainty was low. Finally, Elvainio et al. (2005) revealed that uncertainty strengthened the positive relationship between injustice and poor health.

To maximize practical applicability, the current study focuses on the second theoretical proposition, where uncertainty moderates the relationship between fairness perceptions and outcomes. In addition to being concerned with justice as an end in and of itself, organizations may wish to influence variables traditionally considered outcomes of justice. In response to fair treatment, employees "reward" organizations with job satisfaction, organizational commitment, and high performance (Colquitt et al., 2001). Conversely, employees who feel they have been the victim of injustice are more likely to "punish" organizations, for instance by engaging in counterproductive behaviors (Skarlicki & Folger, 1997). Therefore, organizations may be more interested in outcomes of justice rather than justice perceptions in isolation (see Byrne & Cropanzano, 2001).

Why Focus on Procedural Justice?

Procedural justice (PJ) was first proposed by Thibaut and Walker (1975), and refers to the fairness of procedures used to arrive at decisions. Researchers have found that PJ predicts job satisfaction, organizational commitment (Colquitt et al., 2001), work performance (Cohen-Charash & Spector, 2001; Masterson et al., 2000), trust (Konovsky & Pugh, 1994), evaluation of authority (McFarlin & Sweeney, 1992), organizational citizenship behaviors (Colquitt et al., 2001; Moorman, 1991), counterproductive behaviors (Fox et al., 2001; Skarlicki & Folger, 1997), and emotions (Krehbiel & Cropanzano, 2000; Weiss et al., 1999). More specifically, Leventhal's rules (1980) outline that fair procedures are consistent, free of bias, ethical, determined based on

accurate information, amendable, take opinions into account, and give participants a voice in the decision process. Unfair procedures are inconsistent, biased, unethical, based on faulty information, unchangeable, independent of opinions, and lacking in voice. Following Thibaut and Walker (1975) and Leventhal's (1980) seminal research, the capacity to have a say in decision making (i.e., voice), has arguably been the most common PJ operationalization relative to other operationalizations (e.g., consistency, accuracy; Lind & Tyler, 1988).

Though uncertainty management theory was originally proposed to apply to all forms of justice, the current study focuses on PJ, which is consistent with much research on fairness heuristic theory and uncertainty management theory (see Elvainio et al., 2005; Tangirala & Alge, 2006; van den Bos et al., 1998; van den Bos, 1999; van den Bos, 2001; van den Bos, van Schie, & Colenger, 2002; van den Bos et al., 1996; van den Bos et al., 1997; van Prooijen et al., 2005). This trend is likely due to the construct space PJ occupies. Specifically, PJ provides information about an individual's status in a group (Lind & Tyler, 1988; see also DeCremer & Blader, 2006; Greenberg, 1990; Lind, 2000; van Prooijen et al, 2005), or how "one is valued as a team member" (van den Bos et al., 1998, p. 96). Because group status information minimizes uncertainty regarding one's functioning within a social team, PJ information is likely particularly important under uncertain conditions. In contrast, research rarely reports strong effects for DJ under uncertain conditions, suggesting that instrumental concerns (i.e., seeking fairness to maximize material outcomes) are not as salient under uncertainty as group status ones (i.e., knowing one is valued as a team member; Lind & Tyler, 1988; see also Colquitt et al., 2006; Diekmann et al., 2004; Lipponen, Koivisto, & Olkkonen, 2005).

Following the above arguments, this study focuses exclusively on PJ perceptions, while manipulating objective PJ regarding whether or not participants have a voice in decision making processes. Especially because of reduced social presence in virtual teams (Short et al., 1976), concern with PJ may be particularly strong for virtual team members. Though IJ may also be of some relevance, forming perceptions of interpersonal treatment may be more idiosyncratic in virtual teams than co-located ones (see Tangirala & Alge, 2006). Therefore, consistent with past research, PJ will be the focus of this initial investigation.

Before proceeding, two important points regarding the measurement of justice in the current study are worth nothing. First, because it is unlikely that a laboratory experiment will generate feelings of the presence of an "organization" per se, PJ items for the current study will be tailored towards participants' supervisor. That is, while the literature examines PJ in reaction to treatment by both organizations and supervisors, the current study is more likely to create a meaningful experience for participants by manipulating perceptions of the supervisor.

Second, past research has distinguished between two types of organizational justice: objective and perceptual (see Cropanzano & Greenberg, 1997). Objective justice refers to the innate fairness of a decision or procedure, whereas perceptual justice refers to individuals' subjective justice judgments regarding the fairness of a decision or procedure. There is not a one-to-one correspondence between the objective fairness of a procedure and individuals' perceptions of it (Greenberg, 1983). Therefore, consistent with past research and theorizing (Cropanzano & Greenberg, 1997), the current study will manipulate objective procedural justice and measure perceptual procedural justice (see

Lind et al., 2001; van den Bos et al., 1998; van den Bos, 1999; van Prooijen et al., 2005) to determine how individuals react to their unique perceptions of fairness.

Uncertainty Management Theory and Virtual Teams

Although uncertainty management theory was originally conceptualized within the context of general uncertainty, van den Bos and Lind (2002) recommended that researchers investigate the effects of specific types of uncertainty (e.g., uncertainty regarding performance appraisals, uncertainty regarding work in virtual teams, etc.). Their suggestion is based on the possibility that uncertainty management theory may not apply equally to all types of uncertainty (van den Bos & Lind, 2002). Some researchers have followed suit, investigating the effects of uncertainty regarding performance standards (Diekmann et al., 2004) and control perceptions over work (Elvainio et al., 2005). To contribute to this growing body of literature, the current study investigates uncertainty management theory in the context of virtual teams. As previously stated, although uncertainty manifests itself on many levels (e.g., structural uncertainty, market uncertainty, team uncertainty, individual uncertainty; Bordia et al., 2004), the current study focuses the experience of uncertainty at the individual employee level. Two lines of research—socialization and teams—suggest that as teams form, considerable uncertainty will be present, particularly for virtual teams (see Ahuja & Galvin, 2003; Fiol & O'Connor, 2005), who will will look for any answer that reduces confusion and ambiguity (Fiol & O'Connor, 2005).

Socialization research. Socialization is defined as the process of acquiring social and task based knowledge to assume an organizational role (Van Maanen & Schein, 1979) and encompasses information search regarding tasks, roles, and team processes

(Ostroff & Kozlowski, 1992). When individuals enter a new role (e.g., team member), they actively seek information, which serves to reduce uncertainty and control their environment (Morrison, 1993; Van Maanen & Schein, 1979). Research suggests that new employees spend a considerable amount of time gathering information, often by observing those around them (Ostroff & Kozlowski, 1992). Specific to virtual teams, because individuals frequently require direct observation of team processes to become successfully socialized, introducing electronic communication media may make observation and building team identity difficult (see Daft & Lengel, 1986; Furst, Blackburn, & Rosen, 1999) compared with co-located groups. Virtual team research has investigated virtual teams over both short (e.g., one meeting: Rico & Cohen, 2005) and lengthy (e.g., 21 months; Maznevski & Chudoba, 2000) timespans; regardless, based on such research, it can be argued that uncertainty is highest when virtual team members begin to work together.

Teams research. As teams form, the considerable uncertainty present fundamentally affects the way they function. As evident by Tuckman's famous (1965) "Forming, Storming, Norming, Performing Model," the dynamics of teams are rarely static (Arrow & McGrath, 1995). Specifically, Tuckman's model states that after a group is assembled (i.e., forming), team members reduce uncertainty by establishing roles and determining how they will work together (i.e., storming, and norming) before engaging in task functions (i.e., performing). More recent research supports the argument that information seeking behavior is highest when teams first form (Ostroff & Kozlowski, 1992).

Uncertainty in virtual teams. Recognizing that virtual team members experience heightened uncertainty relative to co-located team members, particularly in newly formed teams, a recent study conducted a preliminary test of uncertainty management theory. Tangirala and Alge (2006) determined whether virtual and co-located teams differentially judged fairness. Findings indicated that virtual team members reported lower fairness than co-located team members, which the researchers attributed to their manipulation of virtualness.

Tangirala and Alge's (2006) study was an important, initial study of uncertainty management theory in virtual teams; however, for my purposes, their study exhibits several weaknesses. First, though the authors tested the effects of uncertainty on fairness perceptions, they did not incorporate outcomes typically studied in justice research (e.g., counterproductive behaviors, Skarlicki & Folger, 1997). Second, they measured general fairness perceptions rather than PJ. Though it is beneficial to understand reactions to overall fairness judgments, most researchers agree that to maximize prediction, it is superior to measure specific types of fairness (e.g., PJ; Colquitt et al., 2001; Greenberg, 1994). Therefore, the current study used a validated PJ scale to measure fairness perceptions. Third, Tangirala and Alge's (2006) investigation focused exclusively on the effects of situational uncertainty on fairness, ignoring the effects of individual differences in the experience of uncertainty. The current investigation will build on prior work suggesting that dispositional uncertainty also plays a role in the relationship between justice and outcomes (Colquitt et al., 2006), and will test the relative contribution of both types of uncertainty.

Fourth, Tangirala and Alge's operationalization of virtual and co-located teams (i.e., 100% virtual vs. 100% face-to-face) may have unrealistically maximized variance between conditions (Walther, 1994; Walther & Burgoon, 1992). To more realistically capture the experience of organizational team members, the current study includes both virtual and co-located teams, and will also add a hybrid condition (50% co-located, 50% virtual). In summary, this investigation will build on the work of Tangirala and Alge (2006), but will provide additional contributions by exploring the relationship between PJ and outcomes in realistically conceptualized virtual teams, as well as examine the effects of individual differences in the experience of uncertainty.

Hypotheses for Situational Uncertainty and Virtual Teams

The following section presents hypotheses regarding the relationship between situational uncertainty, virtualness, justice, and outcomes (Figure 1). First, I discuss the nature of the relationship between virtualness (i.e., "the extent to which technology is used for team interaction," Niederman & Beise, 1999, p. 16; see also Martins et al., 2004) and situational uncertainty. Second, I present hypotheses arguing that situational uncertainty resulting from working in virtual teams moderates the relationship between PJ and four outcomes: performance, supervisory trust, negative emotions, and counterproductive behavior.

The Relationship Between Virtual Teams and Uncertainty

First, I predict that as the virtualness of a team increases (i.e., from co-located to hybrid to virtual), uncertainty will increase:

H1: Virtual team members will experience the greatest uncertainty, followed by hybrid team members, and then co-located team members, with uncertainty being

indicated by high team uncertainty (H1a), low media richness (H1b) and low social presence (H1c).

Situational Uncertainty as Moderator of Justice Effects

As previously discussed, the current study will test the moderating effects of situational and dispositional uncertainty on justice-to-outcome relationships. Thus far, I argued that situational uncertainty will be stronger when teams function virtually; however, it is important to acknowledge that there is likely not a one-to-one correspondence between the virtualness of a team and individuals' level of situational uncertainty. That is, other factors likely influence the presence or absence of uncertainty besides the virtualness of one's team. Similarly, the virtualness of one's team undoubtedly has other consequences besides uncertainty. As such, the current study investigates the role of uncertainty resulting from working in virtual teams, rather than using the degree of virtualness as a proxy for uncertainty. Therefore, it is anticipated that for Hypotheses 2 – 6, variance in situational uncertainty due to virtualness should moderate the relationship between PJ and each outcome.

The four outcomes I will investigate are variables that have demonstrated significant relationships with PJ and have a sufficient amount of variance to suggest the presence of moderators (see Colquitt et al., 2006). I have already provided evidence that situational uncertainty due to virtualness will moderate justice-to-outcome relationships, therefore this section will outline theoretical and empirical evidence for each justice-to-outcome relationship, followed by each hypothesis.

Performance. Past research (Cohen-Charash & Spector, 2001; Konovsky & Cropanzano, 1991) has found PJ to positively relate to task performance (see

Viswesvaran, 2001). Researchers have often explained the relationship between PJ and performance using social exchange theory (Masterson et al., 2000), where individuals and organizations engage in transactions over time. Here, when organizations provide justice as an "input," the resulting "output" from employees is increased task performance (Cohen-Charash & Spector, 2001). Specific to PJ, if employees feel supervisors or organizations have fair decision making processes, they will reward them with performance. Indeed, a prior meta-analysis found a strong relationship between PJ and performance (weighted mean for lab studies r = .45), whereas the relationship between DJ and IJ and performance was weak or non-existent (Cohen-Charash & Spector, 2001). Building on work demonstrating a main effect between PJ and performance and uncertainty management theory's postulates, the current study predicts that:

> H2: Situational uncertainty due to virtualness (H2a: team uncertainty, H2b: media richness, H2c: social presence) will moderate the positive relationship between procedural justice and individual performance. Specifically, the relationship between procedural justice and individual performance will be stronger when uncertainty is high rather than low.

Supervisory trust. Past research indicates that PJ is positively related to trust in one's supervisor (Colquitt et al., 2001; Folger & Konovsky, 1989; Pillai, Schriesheim, & Williams, 1999). Specifically, when treated fairly, employees believe that they are not being deceived by organizational decision makers (Saunders & Thornhill, 2004). Fairness heuristic theory (Lind, 2000) elegantly explains the positive relationship between organizational justice and trust, such that fairness serves as a proxy for an authority's trustworthiness (see also Brockner & Siegel, 1995). Moreover, supervisory

trust has been found to be more strongly related to PJ than DJ (Cohen-Charash & Spector, 2001; Konovsky & Pugh, 1994). Therefore, building on work demonstrating main effects between PJ and supervisory trust, as well as the postulates of uncertainty management theory, the current study proposes:

> H3: Situational uncertainty due to virtualness (H3a: team uncertainty, H3b: media richness, H3c: social presence) will moderate the positive relationship between procedural justice and supervisory trust. Specifically, the relationship between procedural justice and trust will be stronger when uncertainty is high rather than low.

Negative emotions. In the past two decades, emotions have received increasing attention from organizational researchers (Brief & Weiss, 2002). Past researchers have noted the importance of examining affective reactions to justice (Cohen-Charash & Spector, 2001; Folger & Cropanzano, 1998; Folger, Rosenfield, Grove, & Corkam, 1979; Martin, 1999; Mikula, Scherer, & Athenstaedt, 1998; van den Bos et al., 2003; Weiss et al., 1999). Specific to PJ, prior work has demonstrated a negative relationship with emotions (Krehbiel & Cropanzano, 2000; van den Bos, 2001; Weiss et al., 1999). Researchers have applied cognitive appraisal theory (Scherer, 1984, 1986) to understand affective reactions to justice. Cognitive appraisal theory states that individuals engage in a two-stage process of evaluating events, first, determining whether an event is relevant to their well-being, and second, assigning meaning to the event. Weiss et al. (1999) suggest that characteristics of PJ judgments "map nicely" (p. 787) onto the second phase, where one uses procedural information to react emotionally. Building on work demonstrating main effects between justice and anger (Barclay, Skarlicki, & Pugh, 2005;

Krehbiel & Cropanzano, 2000; Mikula et al., 1998; Weiss et al., 1999), and justice and negative affectivity (Hubley, 1999; VanYperen, Hagedoom, Zweers, & Postma, 2000), the current study applies uncertainty management theory to predict that:

H4: Situational uncertainty due to virtualness (H4a: team uncertainty, H4b: media richness, H4c: social presence) will moderate the negative relationship between procedural justice and state anger. Specifically, the relationship between procedural justice and state anger will be stronger when uncertainty is high rather than low.

H5: Situational uncertainty due to virtualness (H5a: team uncertainty, H5b: media richness, H5c: social presence) will moderate the negative relationship between procedural justice and state negative affectivity. Specifically, the relationship between procedural justice and state negative affectivity will be stronger when uncertainty is high rather than low.

Counterproductive behavior. Counterproductive behavior is defined as any behavior intentionally aimed at harming one's organization or its members, and can include acts such as theft, property destruction, absenteeism, and relational or physical aggression (see Sackett & DeVore, 2001). Past research has shown a strong negative relationship between PJ and counterproductive behavior (Cohen-Charash & Spector, 2001; Colquitt et al., 2006). Similar to social exchange and social identity explanations for organizational citizenship behaviors (see Moorman & Byrne, 2005), individuals who are treated unfairly are likely to reciprocate by harming the organization (Dailey & Kirk, 1992; Cohen-Charash & Spector, 2001). As such, the current study builds on work

demonstrating a main effect between PJ and counterproductive behavior, as well as uncertainty management theory, to propose that:

> H6: Situational uncertainty due to virtualness (H6a: team uncertainty, H6b: media richness, H6c: social presence) will moderate the negative relationship between procedural justice and counterproductive behaviors, such that the relationship will be stronger when uncertainty is high rather than low.

Dispositional Moderators of Justice Effects

As previously stated, in addition to examining situational moderators of justice-to-outcome relationships, the current study also examines dispositional moderators. Although research investigating situational moderators of attitudes, behaviors, and cognitions is important, an exclusively situational focus unduly neglects dispositional forces (Bowers, 1973; Ekehammar, 1974; Endler & Magnusson, 1976; Mandler, 1996; Schneider, 1985; Sedikides & Skowronski, 1990; Snyder & Ickes, 1985; Tett & Burnett, 2003). For example, the social cognitive perspective (Shoda & Mischel, 1993) argues that both personality and the environment influence thoughts and behaviors. Indeed, many argue that researchers should simultaneously investigate both types of antecedents (Buss, 1987; Cronbach, 1957; Epstein & O'Brien, 1985; Gough, 1957).

Specific to fairness, prior research has pointed out that there is a "risk of under-specification in framing behavioral models...that have only situational or dispositional variables and do not include the interaction between the two" (Skarlicki, Folger, & Tesluk, 1999, p. 105). Therefore, the current study also explores factors at the individual level that moderate justice-to-outcome relationships. For example, for selection purposes (e.g., for example, virtual teams; Harvey et al., 2004), it is valuable to know which types

of workers have particularly strong reactions to injustice and those who are more resilient against it (see Gilliland & Stiener, 2001).

Past research on dispositional moderators of justice effects has focused on gender (Lee & Farh, 1999; Lee, Pillutla, & Law, 2000), trait emotion (Fox et al., 2001; Irving, Coleman & Bobocel, 2005; Skarlicki et al., 1999; van den Bos et al., 2003), and personality (Brockner, 1988; O'Leary-Kelly, Griffin, & Glew, 1996; Skarlicki et al., 1999; van den Bos et al., 2003). For gender, one study found that the relationship between DJ and supervisor trust was stronger for women than men (Lee & Farh, 1999). Moreover, emotions have been found to moderate the relationship between justice and outcomes. Van den Bos et al. (2003) found that affective intensity (i.e., a propensity to react to events with emotional intensity) moderated the relationship between DJ and PJ and subsequent affective reactions, such that when affect intensity was low, relationships were not significant.

Despite occasional support for the above non-personality based moderators of justice effects, these relationships are not always consistent (Cohen-Charash & Spector, 2001) or based on theory (Colquitt et al., 2006). As such, the current study focuses on personality moderators, which are generated more easily based on theory, and may show more compelling moderating functions between justice and outcomes than studies that do not generate personality moderators from theory (Colquitt et al., 2006). Personality refers to "any distinguishing, relatively enduring way in which one individual differs from others," Guilford, 1959, p. 6). Counter to early work questioning the value of personality in the workplace (Guion & Gottier, 1965), more recent research underscores its usefulness (see Barrick & Mount, 1991; Hogan, Hogan & Roberts, 1996; Tett &

Burnett, 2003; Tett, Jackson, & Rothstein, 1991). Personality has been applied to many organizational issues, including selection, development, and team building (Hogan et al., 1996; Tett & Burnett, 2003; Tett & Murphy, 2002).

The re-emergence of personality in the workplace is likely due to the predictive utility of the Five Factor Model (see Barrick & Mount, 1991). The traits comprising the Five Factor Model (extraversion, neuroticism, agreeableness, conscientiousness, openness; Costa & McCrae, 1992) have recently been investigated as moderators of justice effects. Skarlicki et al. (1999) found that when individuals were low in agreeableness (i.e., uncooperative, uncompassionate, cruel; Costa & McCrae, 1992), they were more likely to react to low DJ and IJ with aggression than those high in agreeableness. Beyond Skarlicki et al.'s study (1999) however, research examining the Five Factor Model as a moderator of justice effects has not been abundant (Colquitt et al., 2006), which may be due to observations that such broad traits may not be particularly effective in predicting specific effects (Ashton, Jackson, Paunonen, Helmes, & Rothstein, 1995) such as justice (Hogan & Roberts, 1996).

In addition to the Five Factor Model, other narrower personality traits have been investigated. First, exchange ideology (i.e., believing one will be rewarded for hard work; Eisenberger, Huntington, Hutchison, & Sowa, 1986) has been found to moderate the relationship between justice and organizational commitment, such that the relationship was strong when individuals were high in exchange ideology, but weak when they were low in exchange ideology (Witt, Kacmar, & Andrews, 2001). Second, Lee et al. (2000) found that for low power distance (i.e., low willingness to tolerate power differentials, see Hofstede, 1980), the relationship between justice and outcomes such as

organizational citizenship behaviors was stronger than for those high in power distance (see also Begley, Lee, Fang, & Li, 2002; Blader, Chang, & Tyler, 2001). Third, the justice-related traits of sensitivity to befallen injustice (Schmitt, 1996) and equity sensitivity (Huseman, Hatfield, & Miles, 1987; King, Miles, & Day, 1993) have been found to play a moderating role in justice effects. For example, individuals high in sensitivity to befallen injustice (i.e. feeling that one is a victim of unfairness) exhibit stronger relationships between PJ and job satisfaction and absenteeism than those low in the construct (Schmitt, 1996). For equity sensitivity (i.e., preferring equitable outcomes for oneself and others; see Huseman et al., 1987), individuals low in equity sensitivity exhibit a weaker negative relationship between unfairness and satisfaction than those high in equity sensitivity do (King et al., 1993).

In a recent study, Colquitt et al. (2006) examined the strength of moderating effects of the Five Factor Model and more specific justice-related traits (i.e., sensitivity to befallen injustice and equity sensitivity). They found that both trait categories had weaker effects than specific individual differences deduced from theory (Colquitt et al., 2006). Particularly, the trait of risk aversion, based on the propositions of uncertainty management theory (van den Bos & Lind, 2002), provided the most robust moderating effects (Colquitt et al., 2006). Therefore, following work investigating specific, theory-based dispositional moderators of justice-to-outcome effects, the current study focuses on two moderators of justice-to-outcome relationships suggested by uncertainty management theory: risk aversion and uncertainty intolerance.

Dispositional Uncertainty: The Role of Individual Differences in Uncertainty Management Theory

As previously stated, justice researchers argue that subjective fairness perceptions, rather than the objective, inherent properties of decisions or processes, are the driving force behind individuals' reactions to justice (see Colquitt, Greenberg, & Zapata-Phelan, 2005). Consequently, it is likely that individual differences are relevant to the investigation of justice (Colquitt et al., 2006). In support, some writing on uncertainty management theory advocates the addition of individual differences (van den Bos, 2001; van den Bos & Lind, 2002); however little research has empirically tested these types of predictors (see Colquitt et al., 2006, for an exception), and no known research has examined their contribution relative to situational moderators. An interactionist approach to uncertainty management theory is valuable because few psychological processes are simply due to dispositional or situational variables alone (Endler & Magnusson, 1976; Mandler, 1996; Sedikides & Skowronski, 1990; Tett & Burnett, 2003); investigating both should (a) more effectively capture the construct of uncertainty and (b) explain more co-variance in justice-to-outcome models.

Therefore, building on the original theory of uncertainty management (van den Bos & Lind, 2002), the current study incorporates individual differences in the experience of uncertainty. Although one prior study used uncertainty management theory to generate and test individual difference constructs (Colquitt et al., 2006), it took a rather limited view of dispositional uncertainty, and did not compare its effects with the effects of situational uncertainty. To maximize prediction of outcomes and to increase theoretical understanding of uncertainty and fairness, the current study will use both

situational and dispositional uncertainty as moderators of justice effects on outcomes. The following section presents hypotheses for the dispositional uncertainty variables investigated in this study (the reader is again referred to Figure 1).

Hypotheses for Dispositional Uncertainty

Uncertainty Intolerance

Although research on individual differences in virtual teams has been virtually nonexistent (see Fiol & O'Connor, 2005; Workman et al., 2003 for exceptions), prior research has isolated individual differences in the experience of uncertainty (Duncan, 1972; Fay & Frese, 2000; Kagan, 1972; Roney & Sorrentino, 1995; van den Bos & Lind, 2002). For example, individuals high on uncertainty intolerance (i.e., highly intolerant of uncertain situations; Dugas, Buhr, & Ladouceur, 2004) are more concerned with maintaining clarity about what they know and are less comfortable with situational uncertainty than those low in uncertainty intolerance (Roney & Sorrentino, 1995).

In a recent theoretical paper, Fiol and O'Connor (2005) proposed that virtual team members who are low on uncertainty intolerance may have less uncertainty reduction needs than those high on uncertainty intolerance. Those high on uncertainty intolerance find uncertainty upsetting, and may therefore have particular difficulty with uncertainty presented by working in virtual teams. To date, these propositions have not been empirically tested; therefore, the current study provides the first known test of uncertainty intolerance in virtual teams.

H7: Uncertainty intolerance will moderate the relationship between all justice-to-outcome relationships (H7a: performance, H7b: supervisory trust, H7c: state anger, H7d: state negative affectivity, H7e: counterproductive behaviors), such

that relationships will be stronger for individuals high in uncertainty intolerance than for individuals low in uncertainty intolerance.

Risk Aversion

Another individual difference variable relevant to the experience of uncertainty is risk aversion (Maehr & Videbeck, 1968). Risk aversion is the tendency to pay particular attention to risk and react to it with anxiety. Colquitt et al. (2006) found that risk aversion amplified the relationships between PJ and IJ and performance and counterproductive work behaviors. Similarly, the current study proposes that:

H8: Risk aversion will moderate all justice-to-outcome relationships (H7a: performance, H8b: supervisory trust, H8c: state anger, H8d: state negative affectivity, H8e: counterproductive behaviors), such that relationships will be stronger for individuals high in risk aversion than for individuals low in risk aversion.

Situational and Dispositional Uncertainty: Relative Contributions

As previously discussed, attitudes, cognitions, and behaviors are rarely solely the result of situations or dispositions only (Ekehammar, 1974; Endler & Magnusson, 1976; Mandler, 1996; Sedikides & Skowronski, 1990). Accordingly, thus far, this study has incorporated both situational and dispositional uncertainty as moderators of justice-to-outcome relationships. Additionally, to determine the relative contributions of PJ and each moderator, it may be beneficial to test the relative importance of each. Whereas situational predictions of uncertainty management theory (van den Bos & Lind, 2002) have been supported in other areas (Elvainio et al., 2005), predictions regarding dispositional uncertainty are relatively novel (see Colquitt et al., 2006, for an exception).

As such, the current study will test the relative contributions of PJ, PJ by dispositional uncertainty interactions, and PJ by situational uncertainty interactions. Based on a lack of prior work upon which to build, the relative contributions of situational and dispositional uncertainty as moderators were addressed as a research question:

> *Research Question:* In predicting each outcome (performance, supervisory trust, state anger, state negative affectivity, counterproductive behaviors), what are the relative contributions of procedural justice, procedural justice by situational uncertainty interactions, and procedural justice by dispositional uncertainty interactions?

Summary of Hypotheses

In summary, Hypothesis 1 predicts that virtual teams will experience the greatest situational uncertainty, and co-located teams will experience least, with hybrid teams falling somewhere in between. Hypotheses 2 through 6 predict that situational uncertainty due to virtualness will moderate relationships between PJ and outcomes (performance, supervisory trust, state anger, state negative affectivity, counterproductive behaviors). Hypotheses 7 and 8 predict that dispositional uncertainty (uncertainty intolerance and risk aversion) will moderate the relationship between PJ and outcomes (performance, supervisory trust, state anger, state negative affectivity, counterproductive behaviors). Finally, for each outcome, I will examine relative contributions of PJ and each type of interaction. For a graphical summary of the relationships investigated in the current study, see Figure 2.

Method

The following sections describe the study's sample, measures, design, and procedure. The study's design was a 2 (voice / no voice) by 3 (virtual / hybrid / co-located) between-subjects experimental design, where introductory psychology students were randomly assigned into one of six conditions. Study supervisors first explained their role in the study, then asked participants to complete dispositional uncertainty measures. A group task was presented, followed by a discussion with varying degrees of virtualness. Next, study supervisors delivered the fairness manipulation, and outcome data were collected. Finally, participants completed situational uncertainty measures, were debriefed and then dismissed.

Participants

The sample consisted of introductory psychology students from a large public western university participating for course credit (N = 302). The mean age was 19.35 (SD = 1.64); 30.1% of students were male and 68.9% were female (for complete demographics, see Table 1).

Power analysis calculations (Lenth, 2006) suggested a desired sample size of, at minimum, 50 per cell, for a total of 300 participants. To obtain as many participants as possible and to maximize power to detect effects, 396 subjects were subsequently recruited and were to be assigned to 11 teams of five to six participants for each of six conditions. Unfortunately, because of recruitment issues, it was not possible to obtain the

desired number of participants per cell. As a result, I reduced the number of participants in hybrid cells (N_{voice} = 23; $N_{no\ voice}$ = 22) so virtual and co-located cells would have sufficient power to detect effects (virtual N_{voice} = 61; $N_{no\ voice}$ = 68; co-located N_{voice} = 66; $N_{no\ voice}$ = 62). In other words, hybrid cells were reduced as opposed to virtual or co-located ones to maximize variance between conditions, thereby increasing power to detect relationships.

Measures

Following previous fairness studies that use computers to present stimuli and collect data (e.g., Tangirala & Alge, 2006; van den Bos, 2001; van den Bos & Miedema, 2000; van den Bos et al., 1998; van Prooijen et al., 2006), the majority of data in the current investigation was collected via web-based surveys.

Procedural Justice

As previously mentioned, it is unlikely that participants could perceive the existence of an "organization" from the brief meeting involved in this study. Because of prior work indicating that the source of justice (e.g., supervisor, organization) relates to the source of outcomes (e.g., supervisory trust, organizational trust; Byrne & Cropanzano, 2000), PJ items were tailored to deal specifically with the study supervisor. Supervisory PJ judgments were measured using a popular seven-item justice measure (Colquitt, 2001), which has demonstrated adequate construct and criterion validity (Colquitt, 2001) and has been found to be psychometrically sound in other studies (Ambrose & Schminke, 2003; Colquitt, Noe, & Jackson, 2002; De Cremer, Van Knippenberg, Van Didjke, & Arjan, 2004; Judge & Colquitt, 2004; Wenzel, 2006). Participants rated the study supervisor's procedures on a scale from 1 (*strongly disagree*)

to 5 (*strongly agree*) for statements such as "I have been able to express my views and feelings during the study supervisor's procedures" and "The study supervisor's procedures were based on accurate information" (The complete measure is reproduced in Appendix A). Coefficient alpha reliability for the current study was .87.

Situational Uncertainty

As previously discussed, the current study operationalized situational uncertainty in three ways: team uncertainty, social presence, and media richness (Measures are reproduced in Appendix B). First, because of a lack of existing measures of psychological uncertainty in teams, a 15-item measure was created for the current study. Items were constructed based on uncertainty management theory (Tangirala & Alge, 2006; van den Bos & Lind, 2002; van Prooijen et al., 2005) and general uncertainty research (Cramton, 2001; Duncan, 1972; Langan-Fox, 2002; Ostroff & Kozlowski, 1992). Participants responded to a series of statements, such as "I understood the expectations other team members had of me" and "I understood other team members' goals for the discussion" on a scale from 1 *(strongly disagree)* to 5 *(strongly agree)*. Coefficient alpha reliability for the current study's measure was .84.

Second, perceptions of media richness were assessed using Webster and Trevino's (1995) six-item scale. Some item wording underwent minor changes to ensure understanding by undergraduate students. Participants were asked whether their communication medium (i.e., "ways to communicate with others, including face-to-face discussion, telephone, e-mail, and instant messaging") demonstrated characteristics such as "Give[s] and receives timely feedback," and "Use[s] rich and varied language" on a scale from 1 *(not at all)* to 5 *(to a great extent)*. Subsequent research has added to the

scale's initial validity evidence by contributing predictive (Cable, Yang, & Yu, 2006) and convergent validity evidence (Trevino, Webster, & Stein, 2000), as well as demonstrated strong psychometric properties (Webster & Hackley, 1997). For the current study, coefficient alpha reliability was .82.

Third, social presence was measured using Gunawardens and Zittle's (1997) nine-item social presence scale. Participants were asked to respond to a series of statements regarding their team members such as "I felt that my point of view was acknowledged by other participants" and "I felt comfortable conversing with others" on a scale from 1 *(not at all)* to 5 *(very much so)*. In its development, the scale demonstrated convergent validity evidence (Gunawardens & Zittle, 1997) and has functioned adequately in past research (Russo & Campbell, 2004; Shin, 2003). For the current study, coefficient alpha reliability was .83.

Performance

Following Colquitt et al. (2006), task performance was assessed via participants' performance on a reading comprehension task measuring understanding of a passage presented with the experimental task. Reading comprehension tasks have been successfully used in prior justice work (e.g., Chan, Scmitt, Jennings, Clause, Delbridge, 1998; Colquitt et al., 2006).

The passage in this study was different than passages used in prior studies (e.g., Colquitt et al., 2006), but was chosen because it would be viewed by participants as relating to the study's tasks, therefore strengthening the argument to generalize findings to performance in work settings. Participants were given five minutes to read the passage and answer eight associated questions. The initial scale consisted of four items, but

during pilot testing, ceiling effects emerged, with nearly all participants responding correctly to all questions. The revised eight-item scale contained additional, slightly more challenging items, with the goal of maximizing variance in scores. Items were still only moderately difficult, as they were designed to measure effort-based performance rather than ability-based performance (see Colquitt et al., 2006). Scores on this exercise could range from 0 *(no answers correct)* to 8 *(all answers correct)* (The complete measure is reproduced in Appendix C). Because this scale was dichotomously scored (i.e., correct/incorrect), a coefficient alpha reliability estimate was not appropriate.

Supervisory Trust

In the current study, trust in supervisor was operationalized as cognition-based trust (i.e., whether individuals choose to trust an individual based on evidence of trustworthiness; Lewis & Weigert, 1985) and was measured using McAllister's (1995) six-item cognition-based trust scale. The scale has functioned quite well in past research (Bauer & Green, 1996), and researchers who have utilized the scale have added to its initial validity evidence (McAllister, 1995), showing, for example, factorial validity (Wilson, Straus, & McEvily, 2006). In the current investigation, individuals responded to statements regarding the study supervisor, such as "The study supervisor approaches his/her job with professionalism and dedication," and "Given the study supervisor's track record, I see no reason to doubt his/her competence and preparation for the job" on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*) (The complete measure is reproduced in Appendix D). In addition to McAllister's measure, one item, written for use in the current study, was added to the scale to assess global trust: "I see my study supervisor as

trustworthy," on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*). Coefficient alpha reliability was .91.

State Anger

As opposed to past justice research using one-item measures for state anger (e.g., Krehbiel & Cropanzano, 2000; van den Bos & Miedema, 2000; Weiss et al., 1999), the current study utilized a multi-item measure to increase the chances of adequate construct measurement. Specifically, participants completed the five-item State Anger Feelings subsection from the State-Trait Anger Inventory (STAXI; Spielberger, 1988; Spielberger & Snydeman, 1994). The STAXI has demonstrated consistent convergent and discriminant validity evidence (Fuqua, Leonard, Masters, Smith, Campbell, & Fisher, 1991; Spielberger, 1988; Spielberger, Jacobs, Russell, & Crane, 1983). Prior to the justice manipulation, individuals responded to statements regarding their baseline emotional state "at this moment," such as "I feel angry," and "I am furious" on a scale of 1 (*not at all*) to 4 (*very much so*) (Negative emotions measures are reproduced in Appendix E). Following the justice manipulation, participants used the same scale to rate their anger when thinking about the procedures used by the study supervisor to determine reward allocation. For the current study, coefficient alpha reliabilities were .90 (baseline assessment) and .80 (post-manipulation assessment).

State Negative Affectivity

Negative affectivity (NA) refers to the extent to which individuals experience unpleasant emotions such as irritability (Watson, Clark, & Tellegen, 1988). State negative affectivity was assessed using a portion of the Positive and Negative Affect Schedule (PANAS: Watson et al., 1988). The negative affectivity subscale consists of 10

items. The PANAS has consistently demonstrated adequate convergent and discriminant validity evidence (Watson et al., 1988), and has been utilized by many researchers (Crawford & Henry, 2003; DePaoli & Sweeney, 2000; Huebner & Dew, 1995; Roesch, 1998; Watson & Clark, 1991). In the NA subscale, participants are presented with 10 emotions/feelings (example: "hostile"), and are asked to mark the degree to which they are currently experiencing each emotion. Prior to the manipulation, participants rated how much they felt each emotion "at this moment" on a scale from 1 (*very slightly or not at all*) to 5 (*extremely*). Following the justice manipulation, participants used the same scale to rate their emotions when thinking about the procedures used by the study supervisor to determine reward allocation. Coefficient alpha reliabilities for the current study were .75 (baseline assessment) and .80 (post-manipulation assessment).

Counterproductive Behavior

Many studies have shown that intentions to engage in a particular behavior predict that behavior (Fishbein & Ajzen, 1975); however it has been consistently demonstrated that there is not a one-to-one correspondence between intentions and behavior (Hulin & Judge, 2003). For example, in a study of turnover, Tett and Mayer (1993) found that intentions to turnover and actual turnover were only moderately correlated ($r = .45$). Because the focus of counterproductive work behavior is on the behavior itself (Martinko, Gundlach, & Douglas, 2002), it is likely better to measure counterproductive behaviors rather than intentions to commit them. For example, in a recent laboratory study, Colquitt et al. (2006) operationalized counterproductive behavior as the theft of expensive looking pens used during the study.

The current study operationalized counterproductive behavior by determining whether participants engaged in cyberloafing. Recently, researchers have investigated cyberloafing (i.e., using computers for non-task related purposes, such as checking personal e-mail or Internet surfing; Lim, 2002) as a type of production deviance (i.e., minimal but harmful actions that detract from performance; Robinson & Bennett, 1995). Cyberloafing was measured using Spector Pro, a monitoring and recording software program that tracks all activities performed on a computer, including Internet usage.

Two types of cyberloafing scores were computed for each participant: whether they cyberloafed when instructed to verify their rankings for the group task (henceforth, cyberloafing during re-ranking), as well as whether they cyberloafed at other times following the fairness manipulation, such as during the reading comprehension exercise or when completing surveys (henceforth, other cyberloafing). The former operationalization is most generalizable to cyberloafing in organizations because participants were instructed to spend the entire time carefully reviewing their rankings. Therefore, this type of cyberloafing behavior would be directly interfering with their assigned task and would therefore be considered production deviance. For the second operationalization, participants may have engaged in non-study related internet usage simply because they were finished with the task or survey. Therefore, though the goal was to collect as much cyberloafing data as possible, results from the first operationalization are a likely "cleaner" operationalization of the behavior.

Because of the low observed base rate for cyberloafing (13 participants cyberloafed during re-ranking, and eight participants participated in other cyberloafmg) coupled with the extreme variation in the number of seconds spent on websites unrelated

to the study (cyberloafing during re-ranking $M = 2.42$, $SD = 16.39$, minimum = 0, maximum = 243; cyberloafing during re-ranking $M = 3.01$, $SD = 18.85$, minimum = 0, maximum = 164), a continuous operationalization of time spent on cyberloafing was abandoned in lieu of a dichotomous one (*yes/no*).

Uncertainty Intolerance

This study measured uncertainty intolerance using the 27-item Intolerance of Uncertainty Scale (Buhr & Douglas, 2002). In its development and subsequent use, the scale has demonstrated adequate convergent, discriminant, and factorial validity (Buhr & Dugas, 2006; Dugas et al., 2004), and has functioned well in prior work (Ciarrochi, Said, & Deane, 2005; Dugas & Hedayati, 2005; Dugas, Hedayati, Karavidas, Burh, Francis, & Phillips, 2005; Laugeson, Dugas, & Bukowski, 2003). In the scale's development, items were written to represent four factors of the construct (Burh & Dugas, 2002). Factor 1, uncertainty-act, represents whether uncertainty prevents individuals from acting (current study $\alpha = .83$). Factor 2, uncertainty-stress, represents whether individuals find uncertainty stressful (current study $\alpha = .84$). Factor 3, uncertainty-unexpected, represents whether individuals view unexpected events as negative (current study $\alpha = .68$). Factor 4, uncertainty-unnatural, represents whether individuals view uncertainty as going against the "natural order of things" (current study $\alpha = .69$). Participants were asked to rate, on a scale of 1 *(very uncharacteristic of me)* to 5 *(very characteristic of me)*, to items such as "Uncertainty makes me uneasy, anxious, or stressed" and "I can't stand being taken by surprise" (Dispositional uncertainty scales are reproduced in Appendix F).

Risk Aversion

Risk aversion was assessed using a ten-item scale from the International Personality Item Pool (IPIP: Goldberg, 1999). The IPIP measures constructs similar to those of the NEO-PI-R (Costa & McCrae, 1992). The IPIP has been used in prior work (Heaven & Bucci, 2001; Johnson, 2005; Mihura, Meyer, & Bel-Bahar, 2003) and has demonstrated validity evidence in measuring the Five Factor Model and its facets (Goldberg, 1999), with convergent correlations between NEO-PI-R and IPIP scales averaging .73 (Mihura, Meyer, & Bel-Bahar, 2003). Participants responded to items such as "I take risks" (reverse coded), and "I would never make a high risk investment" on a scale from 1 (*very inaccurate*) to 5 (*very accurate*). Coefficient alpha reliability in this study was .90.

Design

It has been remarked that a variety of methods, such as experimental and correlational studies, should be used to investigate organizational justice (van den Bos, 2001). The current study employed a controlled laboratory experiment for four reasons. First, an experimental design is likely more appropriate for theory testing than a correlational design because of the high level of control (Lind et al., 2001; Tangirala & Alge, 2005; van den Bos, 2001). Second, to learn precisely how moderating variables affect justice-to-outcome relationships, an experiment was chosen based on observations that "the cognitive processes associated with fairness judgments are best understood through controlled laboratory studies" (Tangirala & Alge, 2006, p. 5). Third, whereas correlational studies are founded "upon some untested assumptions of causality" (van den Bos, 2001, p. 256), the current study will provide causal evidence for the relationship

between justice and outcomes, as well as the moderating influence of situational and dispositional moderators. Finally, because laboratory and field studies often produce relationships of similar magnitude (Cohen-Charash & Spector, 2001), findings will likely generalize to organizational practices.

Manipulating Virtualness

Following previous team research (Chidambaram & Tung, 2005), the current study utilized small teams of between three and six participants (see Dennis, George, Jessup, Nunamaker, & Vogel, 1988; Martins et al., 2004; Price, Lavelle, Henley, Cocchiara, & Buchanan, 2006). As previously stated, recent conceptualizations acknowledge that teams possess varying levels of virtualness (see Martins et al., 2004), therefore a tripartite operationalization of virtualness was adopted: virtual teams (100% virtual communication), co-located teams (100% face-to-face communication), and hybrid teams (mix of virtual and face-to-face communication; see Martins et al., 2004).

Virtual Team Communication

The current investigation utilized a chat room program created for the study as the method for virtual team communication. The program requires participants to log in at the same time, and messages from each were observable to all other participants as well as the study supervisor (see Aubert & Kelsey, 2003). From a central computer, the study supervisor controlled the chat room and sent messages and reminders to team members.

Procedure

The original design of the study had participants reporting to experimental sessions in groups of 12 under the cover study of "Communication in Problem Solving." It was predicted that between 10 and 12 individuals would report to the session, thereby

allowing researchers to randomly assign participants into one of two groups (e.g., virtual / no voice, hybrid / voice, etc.) to be run in separate locations. However, because of recruitment issues, for some sessions, fewer than six participants were present and only one group could be run. When this was the case, one group was randomly chosen to be run (e.g., virtual no voice). Therefore, assignment was done as randomly as possible, although because of recruitment issues, hybrid group data were not collected during the middle third of the data collection.

Data collection lasted a period of two weeks, with between two and five sessions per day for a total of 48 sessions. Each session lasted approximately one and a half hours. First, when applicable, participants were told whether they were assigned to "Group 1" or "Group 2." Second, consistent with prior work (Straus, 1994), in lieu of using participants' names, each was assigned an alias (e.g., Participant A, Participant B, etc.) by choosing slips of paper from a box. For virtual group participants, aliases served as participants' screen names (i.e., Participant A, Participant B, and so on), visible to other participants with each statement they typed while instant messaging. During face-to-face discussions, co-located participants were seated behind placards displaying their alias, and hybrid group participants were identified by both methods, depending on the phase of the study. To ensure that participants experienced working in newly formed groups where members were not well acquainted, participants were instructed not to speak to each other until instructed to do so (Straus, 1994), and individuals who were acquainted prior to the study were separated into different groups, or at the very least, seated apart from one another when in the same group.

When more than one group was run at a time, following assignment into groups (e.g., Group 1, Group 2), Group 1 remained in the room, while Group 2 was taken to a separate but proximate room of roughly equal size, furniture arrangement, and lighting (Yao & Flanagin, 2000). When there were only enough participants to run Group 1, participants remained in the room to which they reported for data collection. All participants were seated at conference tables facing one another, each with a laptop and wireless Internet access. For co-located groups, participants remained in this arrangement for the duration of the study. For virtual groups, once participants were seated, partitions were placed around them so their view of other participants was completely obstructed (see Yao & Flanagin, 2006). For hybrid groups, partitions were placed around participants roughly halfway through the session, after the first half of the group discussion occurred in a face-to-face manner.

For all conditions, prior to the introduction of the group task, the study supervisor orally communicated his or her role in the study. Specifically, participants were told that the study supervisor's role was to oversee the study, give directions, explain how to use the software, be an official time-keeper, and determine rewards. This explanation was necessary to increase the chance that participants viewed the study supervisor in a similar manner as they would a supervisor in a work setting (see Yao & Flanagin, 2006).

Next, study supervisors explained how to log onto the campus wireless Internet, whereupon participants pulled up the web-based survey, and, for virtual and hybrid groups, the study chat room.[2] Each participant then created a unique ID number linking

[2] When multiple groups utilizing chat rooms were run at one time, each group (i.e., Group 1 and Group 2) had a separate chat room.

responses across surveys. Measures of dispositional uncertainty (uncertainty intolerance, risk aversion) were then completed, followed by baseline state anger and state negative affectivity. Following the completion of these measures, the group task was introduced.

Group Task

In choosing a task for the current investigation, a principal goal was to maximize experimental realism (i.e., participants' involvement in the study such it was taken seriously; Aronson, Wilson, & Brewer, 1998). This decision was based on the goal of generalizing to organizations where team members are psychologically invested in their work and rewards. As such, prior fairness methodologies using vignettes (DeCremer & Blader, 2006) were ruled out because this type of methodology is not always personally relevant to participants (Velten, 1968). Similarly, past justice research using tasks leading to a minimal monetary reward (e.g., $5; Colquitt et al., 2006) were also seen as potentially limiting participants' psychological involvement.

This study's experimental task was a publicly available variation of the Desert Survival Situation (Balthazard, 1999; see also Yao & Flanagin, 2006), a popular research task and management training exercise. The Desert Survival simulation requires participants to imagine that they are stranded in the desert following a plane crash, and have salvaged a number of items from the plane, which they are then asked to list in order of their usefulness for survival. Similarly, the task for the current investigation, Lost at Sea, asked participants to imagine that after a yachting trip on the South Pacific, they had been stranded by a fire and are confined to life rafts. Participants were then presented with a list of 15 items (e.g., fifteen feet of nylon rope, shark repellant) and were asked to rank their usefulness for survival (for full exercise and instructions, see Appendix G).

Group members were told that their rankings of these items would be compared with survival experts' rankings to determine their "correctness" (for prior work utilizing this manipulation, see Ford, Nemiroff, & Pasmore, 1977; Slevin, Boone, Russo, & Allen, 1998).

Simulations similar to this have been used in both justice (Krehbiel & Cropanzano, 2000; Weiss et al., 1999) and virtual teams research (Burgoon, Bonito, Bengtsson, Cederberg, Lundeberg, & Allspach, 2000; Yao & Flanagin, 2006). Prior work has noted that this type of simulation is content free (Szumal, 2000); in other words, because the task is most likely outside participants' areas of expertise, their attention is focused more on group processes and problem solving and less on prior knowledge. Though survival tasks (e.g., Desert Survival, Lost at Sea) were originally constructed to measure group decision making, they have also been used to elicit communication (Yao & Flanigan, 2006) and manipulate justice (Krehbiel & Cropanzano, 2000). Moreover, it has been remarked that this type of task contains high experimental control and mimics features of work-related conversations (Burgoon et al., 2000; Yao & Flanagin, 2006).

When used in research, survival tasks usually first have participants rank items individually, then discuss their rankings with a group to reach consensus (see Potter, Balthahard, & Cooke, 2000). This procedure is useful when researchers are interested in group decision making (Balthazard, 1999). Because the current study focuses on interpretations of supervisory PJ and the relative uncertainty of virtual groups, the procedure was changed slightly to accommodate these goals. Similar to past research on technologically-mediated groups (see Burgoon et al., 2000; Chidambaram & Tung, 2005), the Lost at Sea task consisted of three phases: task introduction, group discussion,

and individual rankings of survival items. During task introduction, participants received directions for the simulation via a web page. For the discussion, they were told: "The purpose of this discussion is to help you individually rank each item at the end of the group discussion. Essentially five heads are better than one, and you and your group members can help each other think through your ranking strategies."

In the group discussion phase, participants were given a total of 10 minutes (co-located groups), 12 minutes (hybrid groups), or 15 minutes (virtual groups), to discuss how to rank items. During the individual ranking phase (see Burgoon et al., 2000), participants were given five minutes to rank the items on their own. The allotment of time for each phase was based on multiple pilot testing sessions, particularly to determine time allotment for the group discussion for each type of session (i.e., virtual, hybrid, co-located; Tangirala & Alge, 2006). Pilot work corroborated research indicating that virtual teams often take more time to complete the same tasks compared with co-located teams (e.g., Baltes et al., 2001), thus slightly more time was allotted for virtual team discussion, followed by hybrid teams, and then co-located teams.

Following prior work, communication methods differed as a function of team type. For virtual groups, following Chidambaram and Tung (2005), all three phases were completed electronically; task introduction occurred in a web-based manner, discussion occurred via the chat room, and individual rankings were made via an online survey. For hybrid teams, task introduction occurred in a web-based manner, five minutes of discussion occurred face-to-face, seven minutes of discussion took place via the chat room, and individual rankings were made via an online survey. For co-located teams,

task introduction occurred in a web-based manner, ten minutes of group discussion occurred face-to-face, and individual rankings were made via an online survey.

Interactions with the study supervisor also differed as a function of team type. For all sessions, the initial overview of the study, the study supervisor's role, instructions for logging onto the wireless Internet, completing web-based surveys, and if applicable, using the instant messaging software, were delivered orally by the study supervisor. For co-located groups, all subsequent interactions with the study supervisor occurred in the same manner. For virtual groups, following the Lost at Sea task introduction, the majority of subsequent interactions with the study supervisor occurred via instant messaging. For hybrid groups, the study supervisor interacted with participants orally until the group discussion turned to the chat room, at which point nearly all subsequent communications occurred via the chat room. Based on pilot feedback from participants to strengthen the fairness manipulation, it was orally presented to all participants in the study, regardless of group type.

Justice Manipulation

Per Leventhal's (1980) rules, and following much PJ research, the current study manipulated voice given to participants by the study supervisor (Folger et al., 1979; Lind et al., 1998; van den Bos, 1999; van den Bos et al., 1996; van den Bos et al., 1998; van Prooijen et al., 2005). Other possible operationalizations of PJ (e.g., lack of consistency, lack of accuracy; Leventhal, 1980) were ruled out because early pilot participants indicated that manipulating these elements did not produce strong perceptions of fairness or unfairness.

After the task was completed and participants entered individual rankings, the study supervisor notified them that the best performing individual in the session (i.e., the person with rankings most resembling those of survival experts) would receive a $50 Visa gift card (see Strauss, 1994; van Prooijen et al., 2005). They were also told that because participants had discussed rankings as a group, it is likely that their rankings could be similar or even identical to those of other group members. They were told that in prior studies like this one, responses were similar about 80% of the time.

The original manipulation for voice was as follows. However, as will be discussed, based on pilot testing, it had to be strengthened to maximize variance between fair and unfair conditions. Similar to van Prooijen et al. (2005), participants in the voice condition were to be given the opportunity to justify why they felt their contribution to the team's discussion warranted the $50 gift card if their rankings were similar to the rankings of other group members. Participants were to be instructed to write, in a few sentences, why they believed their performance (i.e., participation and teamwork) justified the prize. In the no voice condition, participants were to be told that while other groups in the past have had the opportunity to have input, they would not have the opportunity to justify why they deserved the prize and that the decision would be left completely up to the opinion of the study supervisor. When the fairness manipulation was pilot tested, participants reported that they simply did not perceive unfairness in the procedures in the no voice condition or fairness in the procedures of the voice condition. Therefore, the following changes were made to strengthen the manipulation.

Voice conditions. For the voice conditions, the study script was changed so that study supervisors stressed how much they cared about participants' opinions, as well as

that participants could appeal the final decision once it was made (other characteristics typically associated with high PJ perceptions; Leventhal, 1980):

> "Please click the NEXT button in the survey, and tell me in a few sentences why you believe you deserve the prize. I will consider everyone's input very carefully, because your opinions are important. Also, if, once I have made my decision, you are uncomfortable with the outcome, I will allocate some time for you to appeal the decision I have made."

Participants were given two minutes to compose their input, a length of time pilot participants believed was sufficient to provide their opinion without feeling rushed.

No voice conditions. Based on feedback from multiple participants, it was determined that this sample would likely see it as extremely unfair if all participants were able to give their input, yet only the input for the voice condition would be considered.[3] This approach is logically viable and supported by prior research. Logically, as pilot participants reported, having input and not having it considered is far worse than not having input in the first place; in the former case, participants became invested in their input, whereas in the latter case, they did not have the chance to do so. Although this manipulation is somewhat novel, justice literature supports its logic. For example, prior research has noted that when individuals expect something from their supervisor (e.g., being given the opportunity to give their input), but their expectations are not met (e.g., their input is not considered), they will perceive unfairness and react accordingly (Greenberg, Bies, & Eskew, 1991).

[3] This suggestion came from a pilot participant at the later stages of the piloting process.

Whereas participants in the voice condition had two minutes to voice their opinion, participants in the no voice condition were abruptly cut off by an annoyed study supervisor after 30 seconds. Here, participants were told that their input would not matter (i.e., lack of voice consideration), that other study supervisors usually consider participants' input (i.e., lack of consistency), and that the study supervisor's decision would be final (i.e., lack of ability to appeal). Moreover, the perceived adequacy of the supervisor's explanation for not providing voice was designed to be low, which has been found to further strengthen unfairness perceptions (Shapiro, Buttner, & Barry, 1994):

> "Please click the NEXT button in the survey, and tell me in a few sentences why you believe you deserve the prize. *[after 30 seconds]* Okay, I think that's enough. Please submit your answers by clicking NEXT. Okay, everyone, I'm going to be honest with you. The experimenter is asking me to look at your input when I make this decision. I let you write for a moment because that's what I'm required to do, and that's what other study supervisors usually do. When I decide who wins the $50 gift card, I'm supposed to take your input into account, but I don't really think it matters. I'm just going to base my decision on your rankings. *[Say the following flippantly]* When people have the same rankings and I have to do a tiebreaker or something, I'll just pick one. Once I finish going through your rankings, my decision will be final, and it will not be changed for any reason."

Finally, to ensure that various research assistants serving as study supervisors delivered both manipulations in a convincing and consistent matter, thorough training was conducted, where study supervisors rehearsed and received feedback on their delivery of both manipulations, with particular attention paid to the no voice condition.

Before moving forward, it is important to acknowledge that in strengthening the justice manipulation, slight contamination may have resulted. Whereas the original manipulation altered only voice accorded to participants across fair and unfair conditions (i.e., PJ only), the final manipulation may have manipulated interactional justice (IJ) as well. For example, in fair conditions, participants may have experienced increased IJ because study supervisors communicated that participants' opinions mattered. In contrast, participants in unfair conditions may have experienced lower IJ because study supervisors gruffly communicated the insignificance of participants' opinions.

Measuring Study Variables

Immediately following the justice manipulation, PJ, supervisory trust, and emotions (i.e., state anger and state negative affectivity) data were collected. Either orally or via the chat room, the study supervisor communicated that while he or she tallied the votes (and if applicable, read participants' justifications for receiving the prize), participants were to complete a survey from the Psychology Department (see Tangirala & Alge, 2006). To minimize suspicion that these variables were relevant to the study, PJ and trust measures were accompanied by a letter from the Psychology Department (adapted from Tangirala & Alge, 2006) requesting that participants answer questions about their treatment during the study and their reactions to the study supervisor (for the text of this letter, see Appendix H). Because baseline state anger and state negative affectivity measures had already been collected in the web-based survey at the beginning of the study, their inclusion in the Psychology Department survey would have likely aroused suspicion; therefore, they were presented in a web-based manner immediately following the Psychology Department survey. Next, participants were given five minutes to

complete the reading comprehension task, which was also administered via the web-based survey. They were told, either virtually or orally, "Now please click the NEXT button and complete the reading comprehension exercise. You will have five minutes."

Following the reading comprehension exercise, the stage was set for the possibility of cyberloafing. The study supervisor instructed participants to spend five minutes carefully re-checking their individual rankings of survival items. During this time, because the study supervisor was supposedly engrossed in tallying results, and because all participants were already working on computers, it would have been easy for participants to engage in cyberloafing without the study supervisor's knowledge.

Next, measures of situational uncertainty (i.e., team uncertainty, media richness, social presence) were administered via the web-based survey. Data for this component of the procedure were collected last so participants were not inappropriately primed to consider situational uncertainty while completing the experimental task and other measures. At the conclusion of data collection, demographic data were collected (gender, age, race), and participants answered the following question: "In today's session, my input mattered when the study supervisor determined who would get the $50 prize," with response options, "*Yes, my input mattered*" and "*No, my input did not matter*." Following the completion of these measures, participants were debriefed. During debriefing, participants were told the true nature of the study, and that no one would receive the $50 prize. However, any participants who correctly ranked the items would split a $200 cash prize, to be announced at the end of data collection. For a pictorial summary of data collection procedures for each of 6 conditions, 2 (voice / no voice) x 3 (virtual / hybrid / co-located), see Appendix I.

Results

In the following sections, I present the results of the current investigation. First, I outline decisions regarding how to treat study data (i.e., individual / group level data, hybrid data, data from different sized groups). Second, I describe the process of scale creation for all variables, including examinations of distinctiveness between similar operationalizations of certain constructs (e.g., dispositional uncertainty). Third, I present descriptive data and preliminary analyses for data in each of the study's six conditions, including a manipulation check for the fairness manipulation. Fourth, I present results for each hypotheses. The section concludes with a brief summary of results.

Decisions Regarding Study Data

The following sections outline decisions made regarding how to treat study data. First, I explain why analyses focused on the individual, rather than the group, level. Second, I discuss the inclusion of hybrid groups in analyses. Finally, I present results of analyses supporting combining data across participants in different sized groups.

Data Analysis Strategy

As previously mentioned, the current study focused on individual perceptions of justice, outcomes, and moderating variables between justice and outcome. Therefore, consistent with most justice research (see Colquitt et al., 2002, for an exception), all analyses were conducted at the individual, rather than group, level (i.e., HLM was not appropriate). Further contributing to the justification for testing the study's model at an

individual level, prior research has indicated that uncertainty management theory's propositions may not hold at the group level (van Prooijen et al., 2005). Finally, it is important to note that individuals likely had similar experiences across groups because of random assignment, rigorous study supervisor training, and detailed study protocols.

A Note Regarding Hybrid Groups

As previously discussed, because of recruitment issues, I was unable to collect as much data for hybrid groups as was planned. Specifically, whereas virtual and co-located teams had sufficient sample sizes (N = 129 and N = 128, respectively), hybrid teams were not as well represented in the sample (N = 45). To determine whether data for hybrid groups should be included in subsequent hypothesis testing, two sets of analyses were conducted. First, for all variables (PJ, performance, state anger, DS-NA, baseline state anger, baseline DS-NA, team uncertainty, media richness, social presence, and risk aversion, four factors of uncertainty intolerance), I examined homogeneity of variances across group type. For 12 out of 15 variables, non-significant F values for Levine's tests (i.e., equality of error variances) indicated similar variances across groups (exceptions: PJ, $F(2, 285) = 11.98, p < .01$, team uncertainty, $F(2, 285) = 4.54, p < .05$, and baseline negative affectivity, $F(2, 285) = 4.63, p < .05$). Because the vast majority of variables showed remarkably similar variance structures, this provides evidence for including hybrid group data, although it is important to interpret results with caution given the fact that not all variables demonstrated this structure.

Second, for all study variables (see above), I examined heterogeneity of variance-covariance matrices of virtual, hybrid, and co-located groups. First, as is desirable, the log determinants for each group fell in a similar range (Virtual = -17.08, Hybrid = -23.23,

Co-located = -21.28), indicating that the samples likely do not differ largely. Next, the Box's M value was 378.90, $F(240, 45426.99) = 1.42$, $p < .01$, indicating that the groups appear to be slightly different in terms of their variance-covariance matrices. However, it is important to point out that Box's M is a notoriously strict test, particularly with larger samples (Tabachnick & Fidell, 1996).

In conclusion, although results did not indicate a complete lack of differences between variance and covariance structures across group type, given the accumulated results, I decided to include hybrid groups, particularly because their investigation is arguably essential to understanding virtual teams (Martins et al., 2004). In studies with unequal sample sizes across cells, past work has suggested analytical procedures giving each cell equal weight regardless of sample size; however, this was likely not the best choice because of the resulting loss of power, interpretability and generalizability (Tabachnick & Fidell, 1996). Therefore, though different sample sizes per cell are not ideal (Cohen, Cohen, West, & Aiken, 2003), all data were included without weighting cases across groups.

Investigating Team Size

Because of the logistics involved in laboratory experiments with undergraduates, it was impossible to consistently create teams of exactly the same size. Following previous research on teams (Chidambaram & Tung, 2005), the current study utilized small teams of three ($N = 32$), four ($N = 86$), five ($N = 108$) and six ($N = 76$) participants (see Dennis et al., 1988; Martins et al., 2004; Price et al., 2006). To minimize variability and to obtain as close to four to five participants as possible, research assistants posing as confederates participated in the study when necessary.

Prior research has found no difference in team outcomes (e.g., performance) based on minor differences in team size (e.g., between three and five members: Baltes et al., 2001; Chidambaram & Tung, 2005; Jarvenpaa & Leidner, 2006; Laughlin et al., 2006; Potter & Baltharard, 2002; Watson, 1987; Zigurs et al., 1988). To ensure that participants had similar experiences regardless of team size, two types of analyses were conducted before data from different sized teams were collapsed. First, I determined whether mean differences existed in study variables as a function of team size (see Laughlin et al., 2006). Second, I examined the similarity of variance-covariance matrices across different team sizes.

First, to determine equivalency on all study variables (PJ, performance, state anger, DS-NA, baseline state anger, baseline DS-NA, team uncertainty, media richness, social presence, risk aversion, uncertainty intolerance) a one way, between-subjects MANOVA was conducted with the above variables as dependent variables and group size as the independent variable. MANOVA was chosen over ANOVA to control for experimentwise error (i.e., minimizing Type I error for individual dependent variables; see Tabachnick & Fidell, 1996). Overall, there was no statistically significant difference on a linear combination of dependent variables based on group size, $F(45, 802.88) = 1.37$, *n.s.*, Wilk's Lamda = 0.80, $\eta^2 = .07$. This suggests the viability of combining samples for different sized groups.

Next, I examined heterogeneity of variance-covariance matrices for each group size (3, 4, 5, 6) using a Box's M test. The Box's M value was 508.73, $F(360, 47616.57) = 1.24$, $p < .01$, indicating that the groups are slightly different in terms of their variance-covariance matrices. However, as previously mentioned, Box's M is a strict test with

large samples (Tabachnick & Fidell, 1996). Moreover, when examining the log determinants for each sample, they were similar (Group size of 3 = -24.12, Group size of 4 = -18.95, Group size of 5 = -19.03, Group size of 6 = -20.27), indicating that the samples did not differ considerably. Thus, because of the similarity in log determinants and the non-significant MANOVA results, the decision was made to combine data across group size for subsequent analyses.

Scale Creation

Factor structures were analyzed in one of two manners. First, factor structures of uncertainty intolerance (Buhr & Dugas, 2002), risk aversion (Goldberg, 1999), state anger (Spielberger, 1988), state negative affectivity (Watson et al., 1988), and procedural justice (Colquitt, 2001) were analyzed using confirmatory factor analysis (CFA) via EQS 6.1 (Bentler, 2005). To determine model fit, four popular indices were used. The normed fit index (NFI), comparative fit index (CFI), and goodness of fit index (GFI) generally indicate good fit above .90, and the root mean square error of approximation (RMSEA) indicates good fit below .05 (see Byrne, 1994; Hu & Bentler, 1999).

Second, exploratory factor analyses (EFA) were conducted on team uncertainty (created for the current study), social presence (Gunawardena & Zittle, 1997), and supervisory trust (McAllister, 1995) using SPSS. These scales were evaluated using EFA either because of a lack of sufficient prior validity evidence (social presence, team uncertainty), or the addition of items to the existing scale (supervisory trust; see Grimm & Yarnold, 1995). For each EFA, I report the associated information as recommended by Ford, MacCallum, and Tait (1986).

Confirmatory Factor Analyses

Uncertainty intolerance. Consistent with past work (Buhr & Dugas, 2002), a four-factor structure produced an adequate fit, $\chi^2(318) = 702.81, p < .001$, NFI = .83, CFI = .88, GFI = .90 , RMSEA = .06. Though some fit indices were slightly lower than what is considered "good," fit was acceptable, especially considering that items loaded onto the factors originally suggested by Buhr & Dugas (i.e., uncertainty-act, uncertainty-stress, uncertainty-unexpected, and uncertainty-unnatural).

State anger. Because a one-factor subscale of the STAXI was utilized, a one-factor fit was expected to be theoretically appropriate: baseline state anger: $\chi^2(5) = 210.72, p < .001$, NFI = .77, CFI = .77, GFI = .81, RMSEA = .30; post-manipulation state anger: $\chi^2(5) = 135.51, p < .001$, NFI = .89, CFI = .80, GFI = .86 , RMSEA = .29. Lower than optimal CFI, NFI, and GFI indices suggest that sampling error may explain item covariance (Grimm & Yarnold, 1997), and the high RMSEA indicates a possible mismatch between predicted and observed item covariances. However, no modification of items produced a better fit to the data. While the data fit a one-factor model better than alternate models (2 factors, 3 factors), fit indices (particularly the RMSEA) were nevertheless sub-optimal, therefore extreme caution should be exercised in interpreting results for this scale.

State negative affectivity. Consistent with past work (Watson et al., 1988), a one-factor solution was tested first, which produced adequate fit statistics for the baseline data, $\chi^2(35) = 284.46, p < .001$, NFI = .81, CFI = .83, GFI = .83, RMSEA = .15, but lower than desired fit statistics for the post-manipulation data, $\chi^2(35) = 442.90, p < .001$, NFI = .67, CFI = .69, GFI = .74, RMSEA = .20. These results were not unexpected; by design, NA items (Watson et al., 1988) measure a variety of negative emotions, some of

which are likely not related to justice perceptions (e.g., guilty, ashamed). Moreover, other emotions may have been endorsed simply because students were nervous to participate in the study (e.g., scared, nervous, jittery, afraid). These factors may have resulted in items not "hanging together" in a one-factor solution.

Because of the poor model fit and theoretical reasons for excluding certain emotions in the scale, without examining the factor loadings of the above CFA, I performed a content analysis on the scale's items to choose items with the most relevance to justice judgments (see Krehbiel & Cropanzano, 2000; Weiss et al., 1999). As a result, six items were dropped (guilty, ashamed, scared, nervous, jittery, afraid) and four items were retained (distressed, upset, hostile, irritable). Because the remaining items closely mirror the construct of distress, it was necessary to re-name this measure to reflect this emphasis. The new measure was termed Distress Specific Negative Affectivity (DS-NA). A CFA resulted in an acceptable fit, baseline DS-NA: $\chi^2(2) = 5.10$, *n.s.*, NFI = .99, CFI = .97, GFI = .99, RMSEA = .07; post-manipulation DS-NA: $\chi^2(2) = 9.55$, $p < .01$, NFI = .98, CFI = .95, GFI = .98, RMSEA = .11.

Because of the sub-optimal fit for the state anger scale and the moderate conceptual overlap of state anger and DS-NA ($r_{baseline} = .61$, $p < .001$, $r_{post\ manipulation} = .42$, $p < .001$), it could be argued that the scales could be combined. The viability of this possibility was tested via both EFA and CFA. EFA analyses revealed that particularly for post-manipulation measures of state anger and DS-NA, two factors emerged, with items loading on expected factors. CFA results for post-manipulation measures indicated that a two-factor solution ($\chi^2(26) = 223.19$, $p < .01$, NFI = .88, CFI = .90, GFI = .85, RMSEA = .16) was superior to a one-factor solution ($\chi^2(27) = 484.83$, $p < .01$, NFI = .75,

CFI = .76, GFI = .72, RMSEA = .24, $\Delta\chi^2(1) = 221.64, p < .001$). Similarly, for baseline measures, a two-factor solution ($\chi^2(26) = 312.32, p < .01$, NFI = .79, CFI = .81, GFI = .82, RMSEA = .19) was superior to a one-factor solution ($\chi^2(27) = 414.38, p < .01$, NFI = .73, CFI = .73, GFI = .75, RMSEA = .22, $\Delta\chi^2(1) = 102.06, p < .001$). Based on these results and the fact that each scale had a different response format and scale, combining items into one negative emotions scale does not appear to be appropriate; however, especially given the high RMSEA values for each scale, results should be interpreted with caution.

Procedural justice. Consistent with past work (Colquitt, 2001), a one-factor structure produced an adequate fit, $\chi^2(14) = 60.55, p < .001$, NFI = .94, CFI = .93, GFI = .95, RMSEA = .10.

Exploratory Factor Analyses

Team uncertainty. For this and subsequent scales, EFAs were conducted using maximum likelihood extraction and oblique rotation when more than one factor was involved (Ford et al., 1986). Additionally, the number of factors retained was determined by examining the scree plot (where eigenvalues are plotted and the number of factors is determined by the drop-off of eigenvalues, Cattell, 1966; Ford et al., 1986), as well as when "additional factors... account[ed] for trivial variance" (Ford et al., 1986, p. 294). The scree plot indicated one factor, which accounted for 28.94% of the variance. Adding additional factors would have led to only minor increases in variance accounted for (2^{nd} factor = 8.29%, 3^{rd} factor = 5.86%). Following recommendations of Ford et al. (1986), items with loadings of above .40 were retained (i.e., items 1-7, 10), and those below .40 were dropped (i.e., items 8, 9, 12-14; for factor loadings, see Table 2). The resulting

solution was a simple solution (i.e., all factors loaded highly with no high cross-loadings; Thurstone, 1947).

Furthermore, because the scale was newly created, additional item analyses were conducted to determine the suitability of the scale for use in the current study. As previously stated, coefficient alpha reliability was high at .85 (Crocker & Algina, 1986), and for all items, this coefficient did not increase if an item was deleted (i.e., alpha if item deleted). Moreover, item-total correlations were moderate to high (range = .38 to .62, M = .48), indicating that for each participant, item scores related to scale scores (Murphy & Davidshofer, 1998).

Media richness. EFA results (maximum likelihood extraction) suggested a one-factor with a simple solution. Specifically, the scree plot dropped off after one factor (variance explained = 43.62%), and additional factors did not substantially contribute to the total percentage of variance explained (2^{nd} factor = 1.57%, 3^{rd} factor = 1.08%). All items loaded on the factor above .40 (for factor loadings, see Table 3).

Social presence. EFA results (maximum likelihood extraction, oblique rotation) suggested three factors. Specifically, the scree plot dropped off after three factors (Factor 1 variance explained = 29.92%, Factor 2 = 15.77%, Factor 3 = 1.18%). Due to many cross-loadings, this solution was not ideal. Moreover, one factor emerged containing only reverse coded items (i.e., items 1, 6). When the EFA was re-run with the aforementioned items dropped, the scree plot suggested one factor, and all factor loadings were above .40 (for factor loadings, see Table 4).

Supervisory trust. EFA results (maximum likelihood extraction) suggested a one-factor solution. Specifically, the scree plot dropped off after one factor (variance

explained = 56.20%), and no additional factors with an eigenvalue over 1.0 emerged. With the exception of one item that was subsequently dropped ("If people knew more about the study supervisor, they would be more concerned and monitor his/her performance more closely"), all items loaded on the factor above .40 (for factor loadings, see Table 5).

Investigating Construct Distinctiveness

Many variables examined in this study share construct overlap, and could be considered slightly different operationalizations of similar underlying constructs. First, media richness, social presence, and team uncertainty operationalized situational uncertainty. Second, uncertainty intolerance and risk aversion operationalized dispositional uncertainty. To determine distinctiveness for each set of variables, correlations between each were examined.

The two dispositional uncertainty operationalizations were moderately correlated (see Table 6). Specifically, within the scale of uncertainty intolerance, though factors were highly correlated with one another (i.e., *r* between .44 and .76), their correlations with risk aversion were, although significant, much lower (i.e., *r* between .15 and .29). Therefore, due to a lack of a strong relationship between factors of uncertainty intolerance and risk aversion, each dispositional uncertainty hypothesis was tested separately.

The three situational uncertainty operationalizations were low to moderately (though significantly) correlated with one another (i.e., *r* between .17 and .39, Table 7). Therefore, due to a lack of a strong relationship between team uncertainty, media

richness, and social presence, I tested each component of hypotheses including situational uncertainty separately.

Descriptive Statistics and Correlations Between Variables

For descriptive information for variables, see Table 8. For correlational and reliability information for justice and continuous outcomes (reading comprehension, supervisory trust, baseline state anger, state anger, baseline DS-NA, DS-NA) see Table 9. For correlational and reliability information for dispositional and situational uncertainty (factors of uncertainty intolerance, risk aversion, media richness, team uncertainty, social presence), see Table 10. The following section presents results regarding variable normality and relationships between justice and outcomes.

Normality of Variables

As shown in Table 8, means and standard deviations for most variables fell within normal ranges, and variables are normally distributed. Exceptions include reading comprehension scores, and both baseline and post-manipulation state anger and DS-NA, whose distributions appear to be skewed, kurtotic, or both. First, the mean reading comprehension score suggests a strong ceiling effect (M = 7.23, SD = 1.02, Skew = -0.63, Kurtosis = 2.94). Second, both baseline and post-manipulation measures of state anger were positively skewed and lepkurtotic[4] (baseline: M = 1.25, SD = 0.38, Skew = 2.58, Kurtosis = 9.43; post-manipulation: M = 1.36, SD = 0.63, Skew = 1.91, Kurtosis = 2.67). Third, this pattern also emerged for baseline and post manipulation DS-NA (baseline: M = 1.36, SD = 0.51, Skew = 2.39, Kurtosis = 6.69; post-manipulation: M = 1.20, SD = 0.39, Skew = 3.37, Kurtosis = 14.14).

[4] It has been noted that lepkurtotic distributions may underestimate variance in a variable (Tabachnick & Fidell, 1996).

Following recommendations (Tabachnick & Fidell, 1996), transformations were attempted to normalize the above non-normal data. Given the shape of the reading comprehension distribution, four transformations were attempted (reflect and square root, reflect and logarithm, reflect and inverse, multiple square roots; Tabachnick & Fidell, 1996); however, no transformation increased the normality of the distribution. Data for this variable were expected to fall into a normal distribution, as reading comprehension scores were proposed to differ as a function of fairness (see Colquitt et al., 2006). Therefore, the shape of the distribution did not reflect the theoretical construct, and this violation of normality was deemed severe.

The shape of distributions for emotions variables (baseline and post-manipulation state anger and DS-NA), however, were theoretically expected to be non-normal. In one prior study, participants reported that they felt mildly to moderately angry only a few times per day or even per week (Averill, 1983); therefore, it is unlikely that participants would enter the study with a high level of emotion (i.e., baseline state anger and DS-NA) or that the manipulation would be strong enough to elicit such reactions (i.e., post manipulation state anger or DS-NA). Moreover, in the initial development of the PANAS (Watson et al., 1988), the authors reported that individuals were less likely to report negative affectivity than they were to report positive affectivity, and that levels of negative affectivity tended to decrease as the timeframe of the measure decreased (e.g., NA for the moment vs. NA over the past year). Consistent with this reasoning, all emotion variables displayed positive skew, such that the majority of responses clustered towards the lower end of the distribution. Nevertheless, four transformations were

attempted (square root, log, inverse, multiple square roots; Tabachnick & Fidell, 1996) to normalize the distributions, yet none improved them.

Because the non-normal nature of the data reflects the theoretical construct, this violation of normality was judged less severe than violations for reading comprehension. Moreover, it has been noted that regression is robust to violations of normality, especially with large sample sizes (Tabachnick & Fidell, 1996). Moreover, Tabachnick and Fidell (1996) state that for samples over approximately 200, risks associated with skewed or kurtotic data are reduced. Therefore, because of the larger sample size, I proceeded with parametric statistics rather than non-parametric ones (see Tabachnick & Fidell, 1996).

Relationships Between Justice and Outcomes

An examination of the correlations between justice and outcome variables indicates that as a whole, fairness perceptions were related to outcomes.[5] As assumed from prior work indicating main effects between justice and outcomes, PJ was significantly correlated with state anger ($r = -.46, p < .001$; Weiss et al., 1999), DS-NA ($r = -.30, p < .001$; for NA, see Hubley, 1999), and supervisory trust ($r = .72, p < .001$; Cohen-Charash & Spector, 2001; Colquitt et al., 2001). Further adding support to the argument that negative emotions were indeed caused by the justice manipulation, baseline state anger and DS-NA showed no relationship with PJ (baseline state anger: $r = -.03$, *n.s.*, baseline DS-NA: $r = -.03$, *n.s.*). Moreover, even though a chi-square test was

[5] For all analyses, to maximize *N*, pairwise deletion was used to handle missing data. As noted by Cohen et al., (2003), this procedure is justified if and only if data are missing randomly. When data are missing randomly, "each statistic is an unbiased estimate of its population parameter for full data, and therefore the analyses are similarly unbiased" (Cohen et al., 2003, p. 434). This was the case for the current study, insofar as missing data were uncommon, and when data were missing, there were no consistent items or scales for which this occurred.

not possible given the low base rate of cyberloafing, individuals cyberloafed more frequently in unfair conditions ($N_{re\text{-}ranking} = 13$; $N_{other} = 8$) than fair ones ($N_{re\text{-}ranking} = 0$; $N_{other} = 0$). Counter to prior work, the measure of motivated performance, reading comprehension, did not correlate significantly with PJ ($r = .02$, *n.s.*; Colquitt et al., 2006; see also Cohen-Charash & Spector, 2001).

Manipulation Check for Fairness Manipulation

Following previous research manipulating voice (van den Bos & Lind, 2001), it was important to determine whether (a) there were significant differences in PJ judgments as a function of voice (independent samples *t*-test) and (b) whether significantly more individuals perceived that their input mattered in the voice condition than in the no voice one (chi-square test).

First, an independent samples *t*-test indicated that overall, individuals perceived significantly higher fairness in the voice condition ($M = 4.35$, $SD = 0.51$) to the no voice one ($M = 3.59$, $SD = 0.74$), $t(268) = 10.29$, $p < .001$, $d = 1.25$. Second, chi-square results indicated that significantly more individuals perceived that their input mattered in the "voice" condition than the no voice condition, $\chi^2(1)$ 51.30, $p < .001$, $\eta^2 = .18$. Based on these results, it can be concluded that the fairness manipulation was effective, and that fairness perceptions were generally higher in the voice condition and lower in the no voice condition. Despite the significant *t* statistic across voice and no voice groups, it is important to note that even in no voice condition, mean fairness perceptions were not extremely low (e.g., 2.5 out of 5); instead, they were slightly lower (3.59 out of 5) than mean fairness perceptions in the voice condition (4.35 out of 5). The reader is

encouraged to keep this in mind when subsequent results are presented regarding "unfair" conditions.

Examining Study Variables by Condition

Prior to analyzing hypotheses, I investigated how and whether each situational variable (PJ, trust, state anger, DS-NA, media richness, team uncertainty, social presence) differed as a function of experimental condition (i.e., virtual / hybrid / co-located; voice / no voice). For conceptually distinct variables (PJ, trust), univariate ANOVAs were conducted to assess main effects and interactions across each of the six experimental conditions. For conceptually similar variables, MANOVAs were conducted (DS-NA, anger, media richness, team uncertainty, social presence).

Procedural Justice

Results of a two way, between-subjects ANOVA with trust as the dependent variable and fairness and virtualness as the independent variables indicated significant differences in PJ as a function of fairness ($F(1, 295) = 105.16$, $p < .001$, $\eta^2 = .26$) and fairness * virtualness ($F(2, 295) = 2.99$, $p < .01$, $\eta^2 = .05$), and non-significant results for virtualness ($F(2, 295) = 0.74$, *n.s.*, $\eta^2 = .01$). For PJ, means were higher in voice conditions ($M = 4.35$, $SD = 0.51$) than no voice conditions ($M = 3.59$, $SD = 0.74$), serving as further evidence of the effectiveness of the justice manipulation. Consistent with uncertainty management theory, for the fairness * virtualness interaction Tukey's *a* indicated significant differences between means for fair virtual groups ($M = 4.44$, $SD = 0.45$) and both unfair hybrid ($M = 3.27$, $SD = 0.98$) and unfair virtual groups ($M = 3.49$, $SD = 0.77$) (see Table 11).

Trust

Results of a two way, between-subjects ANOVA with trust as the dependent variable and fairness and virtualness as the independent variables indicated significant differences in trust as a function of fairness ($F(1, 295) = 57.40, p < .001, \eta^2 = .32$), but not virtualness ($F(2, 295) = 1.33$, *n.s.*, $\eta^2 = .01$), or fairness * virtualness ($F(2, 295) = 2.02$, *n.s.*, $\eta^2 = .01$). For trust, means were significantly higher in voice conditions ($M = 4.51$, $SD = 0.43$) than no voice conditions ($M = 3.60$, $SD = 0.87$, $p < .05$).

Distress-Specific Negative Affectivity and State Anger

To determine mean differences as a result of experimental condition, a two way, between-subjects MANOVA was conducted with DS-NA and state anger as dependent variables, and fairness and virtualness as independent variables. Results indicated a significant multivariate effect on the combined dependent variables for fairness ($F(2, 291) = 15.86, p < .001$, Wilk's Lamda = .90, $\eta^2 = .10$) and for fairness * virtualness ($F(4, 582) = 2.68, p < .05$, Wilk's Lamda = .96, $\eta^2 = .02$), but not for virtualness ($F(4, 582) = 0.66$, *n.s.*, Wilk's Lamda = .99, $\eta^2 = .01$).

Because significant results emerged for fairness and fairness * virtualness, separate univariate ANOVAs were conducted for each dependent variable. When DS-NA was considered separately, DS-NA was significantly lower in voice conditions ($M = 1.13$, $SD = 0.26$) than no voice ones ($M = 1.27$, $SD = 0.49$), $F(2, 292) = 8.48, p < .01, \eta^2 = .03$), but non-significant results emerged for fairness * virtualness ($F(2, 295) = 0.34$, *n.s.*, $\eta^2 = .00$). When state anger was considered separately, anger was significantly lower in voice conditions ($M = 1.15$, $SD = 0.37$) than no voice ones ($M = 1.56$, $SD = 0.77$), $F(1, 292) = 31.62, p < .001, \eta^2 = .10$). Additionally, for the fairness * virtualness interaction, Tukey's

a indicated significant differences between means between fair virtual groups ($M = 1.08$, $SD = 0.08$) and both unfair hybrid ($M = 1.71$, $SD = 0.13$) and unfair virtual groups ($M = 1.67$, $SD = 0.07$) (see Table 12).

Media Richness, Team Uncertainty, Social Presence

To determine mean differences as a result of experimental condition, a two way, between-subjects MANOVA was conducted with media richness, team uncertainty, and social presence as dependent variables, and fairness and virtualness as independent variables. Results indicated a significant multivariate effect on the combined dependent variables for virtualness ($F(6, 570) = 20.26$, $p < .001$, Wilk's Lamda = .68, $\eta^2 = .18$), but not for fairness ($F(3, 280) = 0.31$, *n.s.*, Wilk's Lamda = 1.00, $\eta^2 = .03$) or fairness * virtualness ($F(6, 570) = 0.77$, *n.s.*, Wilk's Lamda = .98, $\eta^2 = .01$). Because of the significant multivariate F values for virtualness, univariate tests were completed next; these analyses encompass Hypothesis 1 and are presented below.

Hypothesis 1

Hypothesis 1 predicted that virtual team members would experience the greatest uncertainty relative to co-located teams, with hybrid groups falling somewhere in between the two, and was tested via three ANOVAs following a significant MANOVA result. Differences in team uncertainty (H1a), media richness (H1b) and social presence (H1c) were tested as a function of virtualness (virtual, hybrid, co-located).

Team Uncertainty

Significant between-subject effects emerged for team uncertainty as a function of group type, $F(2, 287) = 7.01$, $p < .01$, $\eta^2 = .05$. However, results of planned comparisons (i.e., Tukey *a*) revealed that differences were in the opposite direction than predicted,

with co-located team members reporting more, rather than less, team uncertainty than virtual team members ($p < .05$). Significant mean differences in team uncertainty existed between virtual teams ($M = 3.02$, $SD = 0.68$) and co-located teams ($M = 3.25$, $SD = 0.51$), as well as between virtual teams and hybrid teams ($M = 3.28$, $SD = 0.48$); however, means for co-located and hybrid teams were not significantly different. Hypothesis 1a was therefore not confirmed, with participants in virtual groups on average reporting less team uncertainty than participants in co-located groups did.

Media Richness

Significant between-subject effects emerged for media richness as a function of group type, $F(2, 287) = 48.17$, $p < .001$, $\eta^2 = .25$. Results of planned comparisons revealed differences in the predicted direction, with members of virtual groups reporting less media richness than members of co-located groups did. Tukey's *a* indicated significant mean differences in media richness between virtual teams ($M = 2.47$, $SD = 0.78$) and co-located teams ($M = 3.38$, $SD = 0.80$), as well as between virtual teams and hybrid teams ($M = 3.31$, $SD = 0.79$, $p < .05$); however, means for co-located and hybrid teams were not significantly different. Hypothesis 1b was therefore confirmed, with participants in virtual groups on average reporting less media richness than participants in co-located groups, though hybrid groups were more similar to co-located groups in terms of media richness than they were to co-located ones.

Social Presence

Significant between-subject effects emerged for social presence as a function of group type, $F(2, 287) = 3.32$, $p < .05$, $\eta^2 = .02$. However, results of planned comparisons revealed that differences were in the opposite direction than predicted, with co-located

team members reporting less, rather than more, social presence than virtual team members. Tukey's *a* indicated mean differences in social presence between virtual teams ($M = 3.85$, $SD = 0.66$) and co-located teams ($M = 3.65$, $SD = 0.59$, $p < .05$), but not between hybrid teams ($M = 3.83$, $SD = 0.72$) and either virtual or co-located teams. Hypothesis 1c was therefore not confirmed, with participants in virtual groups on average reporting more social presence than participants in co-located groups did.

Operationalization of Situational Uncertainty in Subsequent Hypotheses

As discussed above, Hypothesis 1 was supported for the variable of media richness only, whereas opposite-than-predicted relationships arose for social presence and team uncertainty. It therefore became necessary to determine how situational uncertainty variables would be handled in subsequent analyses (i.e., Hypotheses 2 – 6). As previously discussed, a primary goal of the current investigation was to analyze relationships suggested by theory; therefore, I made the decision to test subsequent hypotheses using media richness only. Specifically, the current study supported media richness theory (i.e., media richness decreased as communication richness decreased; Daft & Lengel, 1986), and therefore built upon those supportive results to test uncertainty management theory. Conversely, social presence theory (Short et al., 1976) was not supported (i.e., situational uncertainty decreased, rather than increased; social presence increased, rather than decreased) as groups became increasingly virtual. To remain consistent with the goals of this study as well as the theories guiding it, team uncertainty and social presence were therefore abandoned as operationalizations of situational uncertainty due to virtualness.

Analyses for Hypotheses 2 - 6

Hypotheses 2 – 6 proposed that situational uncertainty due to virtualness would moderate relationships between PJ and individual outcomes (see Figures 1 and 2). Various options were explored for testing Hypotheses 2 – 6, including mediated moderation (Muller, Judd & Yzbert, 2005) and structural equations modeling, but published methods were not applicable to the proposed model. Therefore, a new method for testing these hypotheses was derived. In Step 1, for the variable of situational uncertainty for which Hypothesis 1 was supported (i.e., media richness), a variable was created that removed as much variance due to dispositional factors as possible (i.e., dispositional uncertainty, gender). In Step 2, this residual variable was tested as a moderator of each justice-to-outcome relationship.

Step 1: Creating Residualized Media Richness Variable

Variance in media richness scores should be due to individual differences (e.g., dispositional uncertainty), situational effects (e.g., the manipulation of team virtualness), and random error. To focus as exclusively as possible on the moderating effects of uncertainty due to situational effects, I partialed out variance due to individual differences, then examined the moderating effects of the residual variable (i.e., residualized media richness). A hierarchical regression equation was performed, in which media richness was regressed on all collected measures of individual differences that could account for variance in uncertainty perceptions, specifically dispositional uncertainty (i.e., both risk aversion and uncertainty intolerance) and gender (for gender differences in the experience of uncertainty, see Hiroyuki &, Michihiko, 2005). The model was not significant, indicating that as a whole, the variables of risk aversion, the

four factors of uncertainty intolerance, and gender did not explain a significant amount of variance in media richness, $F(6, 290) = 1.74$, *n.s.*, $R^2 = .04$. Because R^2 was greater than .00, however, a residual score was calculated representing the difference between participants' predicted and actual media richness scores.

Variance in residual media richness scores represented variability across participants in situational uncertainty, with the effects of measured individual differences removed; however, residual score variances also likely contained variance due to unmeasured individual differences, other situational effects, or random error. The extent to which these latter effects were potential contaminants was estimated as follows: Residualized media richness scores were regressed onto dispositional uncertainty scores, gender, and team type (represented by dummy coding). The model was significant, indicating that the variables of virtualness, risk aversion, the four factors of uncertainty intolerance, and gender explained a significant amount of variance in residualized media richness scores, $F(8, 289) = 11.80$, $p < .001$, $R^2 = .25$. Though the R^2 value for the model was high (Cohen, 1988), the fact that it did not reach 1.0 indicates that unmeasured variables and random error may account for substantive variance in residual scores. Residualized media richness scores were nevertheless retained, as they served as a more accurate approximation of uncertainty due to team type than non-residualized media richness scores; specifically, it can be argued that partialling out any irrelevant variance is an improvement, as contributions of team type on uncertainty are likely more closely isolated than if non-residualized media richness scores were examined.

Step 2: Tests of Moderation

When possible, for Hypotheses 2 - 6, the residualized media richness variable calculated in Step 1 was used to test each hypothesis, where situational uncertainty was proposed to moderate each justice-to-outcome relationship. Moderation procedures followed procedures recommended by Cohen et al. (2003; see also Baron and Kenny, 1986); however, predictors were not centered because the improvement in scaling interpretations centering provides were not relevant for the purposes of the current investigation. Consistent with most research, this study assumed that effects of independent variables on dependent ones "var[ied] linearly with respect to the moderator" (p. 1176), rather than "the moderator alter[ing] the independent-dependent variable relation in a step function" (Baron & Kenny, 1986, p. 1176). More specifically, analyses were conducted as follows. First, main effects for PJ and residualized media richness were entered in an equation predicting each outcome (e.g., supervisory trust). Next, a new variable representing the product of PJ and residualized media richness was entered. A significant regression coefficient for the product term would indicate that effects of PJ on the outcome were moderated by uncertainty due to virtual team type (see Cohen et al., 2003). Results are presented separately for each hypothesis, below.

Hypothesis 2

Hypothesis 2 predicted that situational uncertainty due to virtualness would moderate the positive relationship between PJ and individual performance. Recall from an earlier section that reading comprehension scores were severely non-normal (M = 7.23 out of 8, SD = 1.02, Skew = -1.63, Kurtosis = 2.94). Especially because prior justice research using reading comprehension to operationalize performance demonstrated its

variability dependent upon fairness perceptions (Colquitt et al., 2006), it is equally unexpected that the scale did not significantly correlate with PJ. Moreover, with such strong ceiling effects, there was so little variance ($\sigma^2 = 1.04$) in the variable, such that analyzing it would be of little value. Therefore, Hypothesis 2 was not tested. Subsequent hypotheses involving performance will therefore not be discussed.

Hypothesis 3

Hypothesis 3 predicted that situational uncertainty due to virtualness would moderate the positive relationship between PJ and supervisory trust. For moderation to be met, two conditions must be satisfied. First, there must be a significant relationship between the predictor, PJ, and the criterion, in this case, supervisory trust. This condition was met, $\beta = 0.71$, $SE = 0.05$, $p < .001$, $R^2 = .50$. Second, moderation is demonstrated when the regression coefficient for the interaction term is significant (i.e., PJ * residualized media richness). Here, this condition was not met, $\beta = 0.02$, $SE = 0.05$, *n.s.*, $\Delta R^2 = .00$, *n.s.* Hypothesis 3 was therefore not supported, and media richness did not moderate the relationship between PJ and supervisory trust.

Hypothesis 4

Hypothesis 4 predicted that situational uncertainty due to virtualness would moderate the negative relationship between PJ and state anger. Baseline state anger was entered into the regression equation as a control variable. Controlling for baseline state anger, there was a significant relationship between the predictor, PJ, and the criterion, state anger, $\beta = -0.29$, $SE = 0.03$, $p < .001$, $\Delta R^2 = .08$, $p < .001$. The second condition, however, was not met; the regression coefficient for the interaction term (i.e., PJ * residualized media richness) was not significant, $\beta = -0.05$, $SE = 0.06$, *n.s.*, $\Delta R^2 = .00$,

n.s. Hypothesis 4 was therefore not supported, and residualized media richness did not moderate the relationship between PJ and state anger.

Hypothesis 5

Hypothesis 5 predicted that situational uncertainty due to virtualness would moderate the negative relationship between PJ and state negative affectivity. Baseline DS-NA was entered into the regression first as a control variable. Controlling for baseline DS-NA, there was a significant relationship between the predictor, PJ, and the criterion, DS-NA: $\beta = -0.29$, $SE = 0.03$, $p < .001$, $\Delta R^2 = .08$, $p < .001$. The second condition, however, was not met; the regression coefficient for the interaction term (i.e., PJ * residualized media richness interaction) was not significant, $\beta = 0.03$, $SE = 0.03$, *n.s.*, $\Delta R^2 = .00$, *n.s.* Hypothesis 5 was therefore not supported, and residualized media richness did not moderate the relationship between PJ and DS-NA.

Hypothesis 6

Hypothesis 6 predicted that situational uncertainty due to virtualness would moderate the negative relationship between PJ and counterproductive behavior, such that the relationship would be stronger when uncertainty was high rather than low. Because of the low observed base rate for cyberloafing, it was not possible to investigate this relationship via moderated regression or chi-square tests (e.g., for chi-square tests, the expected frequency per cell was below 5; Chernoff & Lehmann, 1954). Therefore, Hypothesis 6 was not tested. Subsequent hypotheses involving cyberloafing will therefore not be discussed.

Hypothesis 7

Hypothesis 7 predicted that uncertainty intolerance would moderate relationships between PJ and outcome variables (H7b: supervisory trust, H7c: state anger, H7d: state negative affectivity), such that relationships would be stronger for individuals high in uncertainty intolerance than for individuals low in uncertainty intolerance. Recall that this study's measure for uncertainty intolerance contained four factors. Results for each factor and each outcome are presented in the following sections.

Hypothesis 7b: Trust

Uncertainty intolerance: Uncertainty-act. First, a significant relationship between PJ and supervisory trust existed, $\beta = 0.71$, $SE = 0.05$, $p < .001$, $R^2 = .50$. Second, moderation was demonstrated; the regression coefficient for the interaction term between PJ and uncertainty-act (i.e., uncertainty leading to an inability to act) was significant, $\beta = 0.64$, $SE = 0.07$, $p < .05$, $\Delta R^2 = .01$, $p < .05$. Hypothesis 7b was supported for uncertainty-act; individuals who feel unable to act under conditions of uncertainty have stronger reactions to fairness and unfairness than those who are able to act under uncertainty. Specifically, a disordinal interaction was demonstrated, where high uncertainty intolerance on this factor related to slightly higher supervisory trust when fairness was present, and slightly lower supervisory trust when less fairness was present (see Figure 3[6]).

[6] Following prior work on uncertainty management theory (Diekmann et al., 2004), estimated values of each outcome were calculated based on values of PJ and uncertainty at one standard deviation above and one standard deviation below and above the mean.

Uncertainty intolerance: Uncertainty-stress. Moderation was demonstrated; the regression coefficient for the interaction term between PJ and uncertainty-stress (i.e., uncertainty leading to stress) was significant, $\beta = 0.65$, $SE = 0.06$, $p < .05$, $\Delta R^2 = .01$, $p < .01$. Hypothesis 7b was supported for uncertainty-stress; individuals who feel stress under conditions of uncertainty have stronger reactions to fairness and unfairness than those who do not feel stress under uncertainty. Specifically, a disordinal interaction was demonstrated, where high uncertainty intolerance on this factor related to slightly higher supervisory trust when fairness was present, and slightly lower supervisory trust when less fairness was present (see Figure 4).

Uncertainty intolerance: Uncertainty-unexpected. Moderation was demonstrated; the regression coefficient for the interaction term between PJ and uncertainty-unexpected (i.e., individuals who view unexpected events as negative) was significant, $\beta = 0.68$, $SE = 0.07$, $p < .05$, $\Delta R^2 = .01$, $p < .01$. Hypothesis 7b was therefore supported; those viewing unexpected events negatively have stronger reactions to fairness and unfairness than those who do not view unexpected events negatively. Specifically, a disordinal interaction was demonstrated, where high uncertainty intolerance on this factor related to slightly higher supervisory trust when fairness was present, and slightly lower supervisory trust when less fairness was present (see Figure 5).

Uncertainty intolerance: Uncertainty-unnatural. Moderation was demonstrated; the regression coefficient for the interaction term between PJ and uncertainty-unnatural was significant, $\beta = 0.83$, $SE = 0.06$, $p < .01$, $\Delta R^2 = .02$, $p < .01$. Hypothesis 7b was supported for uncertainty-unnatural, and individuals who believe that uncertainty is not a natural state have stronger reactions to fairness and unfairness than those who are more

comfortable with uncertainty. Specifically, a disordinal interaction was demonstrated, where high uncertainty intolerance on this factor related to slightly higher supervisory trust when fairness was present, and slightly lower supervisory trust when less fairness was present (see Figure 6).

Hypothesis 7c: State Anger

Uncertainty intolerance: Uncertainty-act. As with Hypothesis 4, to control for participants' state anger not due to the manipulation, baseline state anger was entered into the regression equation as a control variable, $\beta = 0.33$, $SE = 0.10$, $p < .001$, $R^2 = .04$. Moreover, a significant relationship between PJ and state anger existed, $\beta = -0.39$, $SE = 0.04$, $p < .001$, $\Delta R^2 = .21$, $p < .001$. Moderation was not demonstrated; the regression coefficient for the interaction term between PJ and uncertainty-act (i.e., uncertainty leading to an inability to act) was not significant, $\beta = -0.16$, $SE = 0.07$, *n.s.*, $\Delta R^2 = .00$, *n.s.* Hypothesis 7c was therefore not supported for uncertainty-act, as it did not moderate the relationship between PJ and state anger.

Uncertainty intolerance: Uncertainty-stress. Moderation was not demonstrated; the regression coefficient for the interaction term between PJ and uncertainty-stress was not significant, $\beta = -0.16$, $SE = 0.07$, *n.s.*, $\Delta R^2 = .00$, *n.s.* Hypothesis 7c was therefore not supported for uncertainty-stress, as it did not moderate the relationship between PJ and state anger.

Uncertainty intolerance: Uncertainty-unexpected. Moderation was not demonstrated; the regression coefficient for the interaction term between PJ and uncertainty-unexpected was not significant, $\beta = -0.08$, $SE = 0.07$, *n.s.*, $\Delta R^2 = .00$, *n.s.*

Hypothesis 7c was therefore not supported for uncertainty-unexpected, as it did not moderate the relationship between PJ and state anger.

Uncertainty intolerance: Uncertainty-unnatural. Moderation was not demonstrated; the regression coefficient for the interaction term between PJ and uncertainty-unnatural was not significant, $\beta = -0.16$, $SE = 0.06$, *n.s.*, $\Delta R^2 = .00$, *n.s.* Hypothesis 7c was therefore not supported for uncertainty-unnatural, as it did not moderate the relationship between PJ and state anger; however, an inspection of main effects indicates that individuals high on uncertainty intolerance on this factor reported higher state anger than individuals low on uncertainty intolerance (see Figure 7).

Hypothesis 7d: Distress Specific Negative Affectivity

Uncertainty intolerance: Uncertainty-act. As with Hypothesis 5, baseline DS-NA was entered first into the regression as a control variable, $\beta = 0.39$, $SE = 0.04$, $p < .001$, $R^2 = .15$. Moreover, as previously discussed, a significant relationship between PJ and DS-NA existed, $\beta = -0.29$, $SE = 0.03$, $p < .001$, $\Delta R^2 = .09$, $p < .001$. Moderation was demonstrated; the regression coefficient for the interaction term between PJ and uncertainty-act was significant, $\beta = -0.86$, $SE = 0.04$, $p < .01$, $\Delta R^2 = .02$, $p < .01$. Hypothesis 7d was supported for uncertainty-act; individuals who feel unable to act under conditions of uncertainty have stronger reactions to fairness and unfairness than those who are able to act under uncertainty. Specifically, a disordinal interaction was demonstrated, where high uncertainty intolerance on this factor related to slightly lower

[7] Because the regression equation contained control variables (here, baseline DS-NA), the values of the dependent variable, DS-NA, are not reflective of actual scale means; however, the pattern of the interaction, which is the primary focus of this investigation, is correct (Aiken & West, 1991). This is true for all subsequent interaction plots when baseline emotions are controlled.

DS-NA when fairness was present and slightly higher DS-NA when less fairness was present (see Figure 8[7]). It is also important to note that because means for DS-NA were generally low (M = 1.20, SD = 0.40, falling somewhere between the scale anchors of 1 = *very slightly or not at all* and 2 = *a little*) regardless of dispositional uncertainty (this is true for all significant moderation results in following sections). A significant interaction term therefore suggests that those high in uncertainty-act report slightly more DS-NA than those low in uncertainty-act, although levels of the emotion were low to begin with.

Uncertainty intolerance: Uncertainty-stress. Moderation was not demonstrated; the regression coefficient for the interaction term between PJ and uncertainty-stress was not significant, β = -0.50, SE = 0.04, *n.s.*, ΔR^2 = .01, *n.s.* Hypothesis 7d was therefore not supported for uncertainty-stress; individuals who feel stress under conditions of uncertainty do not have stronger reactions to fairness and unfairness than those who do not feel stress in uncertainty.

Uncertainty intolerance: Uncertainty-unexpected. Moderation was demonstrated; the regression coefficient for the interaction term between PJ and uncertainty-unexpected was significant, β = -1.04, SE = 0.02, $p < .01$, ΔR^2 = .01, $p < .01$. Hypothesis 7d was supported for uncertainty-unexpected; individuals who believe unexpected events are negative have stronger reactions to fairness and unfairness than those who do not view unexpected events negatively. Specifically, an ordinal interaction was demonstrated, where high uncertainty intolerance on this factor related to higher DS-NA when less fairness was present, but roughly equal DS-NA when fairness was present (see Figure 9).

Uncertainty intolerance: Uncertainty-unnatural. Moderation was demonstrated; the regression coefficient for the interaction between PJ and uncertainty-unnatural (i.e.,

individuals who believe that uncertainty is not a natural state) was significant, $\beta = -0.67$, $SE = 0.04$, $p < .05$, $\Delta R^2 = .01$, $p < .05$. Hypothesis 7d was therefore supported for uncertainty-unnatural; individuals who believe that uncertainty is not a natural state have stronger reactions to fairness and unfairness than those who do not hold this belief. Specifically, an ordinal interaction was demonstrated, where high uncertainty intolerance on this factor related to higher DS-NA when less fairness was present, but roughly equal DS-NA when fairness was present (see Figure 10).

Hypothesis 8

Hypothesis 8 predicted that risk aversion would moderate the relationship between all justice-to outcome relationships (H8b: supervisory trust, H8c: state anger, H8d: state negative affectivity), such that relationships would be stronger for individuals high in risk aversion than for individuals low in risk aversion. Results for each outcome are presented below.

Hypothesis 8b: Supervisory Trust

First, a significant relationship between PJ and supervisory trust existed, $\beta = 0.72$, $SE = 0.18$, $p < .001$, $R^2 = .52$. Moderation was not demonstrated; the regression coefficient for the interaction term between PJ and risk aversion was not significant, $\beta = 0.35$, $SE = 0.06$, *n.s.*, $\Delta R^2 = .00$, *n.s.* Hypothesis 8b was therefore not supported; individuals who are risk averse do not have stronger reactions to fairness and unfairness than those who are more comfortable with risk.

Hypothesis 8c: State Anger

Moderation was not demonstrated; the regression coefficient for the interaction term between PJ and risk aversion was not significant, $\beta = -0.11$, $SE = 0.07$, *n.s.*, $\Delta R^2 =$

.00, *n.s.* Hypothesis 8b was therefore not supported for risk aversion; individuals who are risk averse do not have stronger reactions to fairness and unfairness than those who are more comfortable with risk.

Hypothesis 8d: Distress Specific Negative Affectivity

Moderation was demonstrated; the regression coefficient for the interaction term between PJ and risk aversion was significant, $\beta = -0.55$, $SE = 0.04$, $p < .05$, $\Delta R^2 = .01$, $p < .05$. Hypothesis 8d was supported for risk aversion; individuals who are risk averse have stronger reactions to fairness and unfairness than those who are more comfortable with risk. Specifically, an ordinal interaction was demonstrated, where high risk aversion related to higher DS-NA when less fairness was present, but DS-NA levels were roughly equal across risk aversion when fairness was present (see Figure 11).

Research Question: The Importance of Situational and Dispositional Interactions

Though a priori predictions were not proposed, analyses for this research question followed procedures proposed by LeBreton and colleagues (LeBreton, Hargis, Griepentrog, Oswald, & Ployhart, 2007; Johnson & LeBreton, 2004). Specifically, I examined the relative contribution of PJ, situational uncertainty * PJ interactions, and dispositional uncertainty * PJ interactions to the prediction of outcome variables. Specifically, LeBreton et al. (2007) outline two complementary, yet distinct, methods in which to test the importance of variables: incremental importance and relative importance. They argue that examining either method in isolation may lead to incorrect conclusions, whereas examining both allows industrial/organizational psychologists to evaluate their models in a "balanced and thorough manner" (LeBreton et al., 2007, p. 4).

Incremental Importance

Incremental importance focuses on the incremental validity of a measure, and tests whether a variable of interest (e.g., situational uncertainty * PJ interaction) explains unique variance in the dependent variable over and above variance attributable to existing predictors (see Darlington, 1968). For the analyses that follow, I attempted to test the incremental validity of each interaction in two ways. First, I examined whether each dispositional uncertainty * PJ interaction contributed unique variance in each outcome over PJ and the PJ * situational uncertainty interaction. Second, I conducted the analyses in reverse by determining the incremental variance of each situational uncertainty * PJ interaction over and above PJ and each PJ * dispositional uncertainty interaction. While the former set of analyses would make a theoretical contribution by determining the appropriateness of incorporating dispositional uncertainty into uncertainty management theory, the latter analyses would be practically useful. If, for example, the interaction including situational uncertainty does not contribute unique variance over the interaction of dispositional uncertainty, organizations may not need to be as concerned with virtual team members' reactions to unfairness as they do with the reactions of those who are dispositionally avoidant of uncertainty.

Relative Importance

Though testing incremental variance provides valuable information, it does not come without associated weaknesses. Specifically, researchers have pointed out that if existing predictors in the model are correlated with a predictor being added to it, the results of incremental importance might cause one to "make incorrect or misinformed decisions about the relative efficacy of the new variable" (LeBreton et al., 2007, p. 5).

To address this issue, the second approach of examining the importance of a variable is by examining its relative importance (see Johnson & LeBreton, 2004). Here, researchers can investigate the unique contribution of the predictor to the regression equation "in the presence of other predictors" (LeBreton et al., 2007, p. 5), and the practical importance of the predictor is not masked by existing contributions of other predictors.

A commonly recommended method of testing relative importance is by examining relative weights (Johnson, 2000; see also Jackson & LeBreton, 2004). The procedure for calculating each predictor's relative weight is straightforward. First, a new set of uncorrelated predictor variables is calculated that are "maximally correlated" with original predictor variables, but unrelated to each other (LeBreton et al., 2007, p. 4). Next, the criterion is regressed on these newly created predictors, where resulting standardized regression coefficients are examined. Finally, these coefficients are squared and combined with the coefficients from the regression of the original set of predictor variables on the newly created predictor variables. The resulting weights sum to the total model's R^2, and, perhaps even more straightforwardly, they can be reported as a percentage of their contribution to the model R^2. Therefore, the examination of relative weights allows researchers to determine the variance in the total R^2 for the model for which each predictor is responsible, even if it is related to other predictors.

Decision rules for testing relative importance. Before testing the relationships outlined above, it was necessary to form decision rules for determining which variables would be included in relative importance tests. Following recommendations, before conducting relative importance analyses, I identified significant correlations by examining correlation matrices for each set of predictors and criteria (LeBreton et al.,

2007; Jackson & LeBreton, 2004). As previously mentioned, the three variables of interest in predicting outcomes were PJ, PJ * situational uncertainty interactions, and PJ * dispositional uncertainty interactions. Because the goal was to determine the contribution of each type of interaction over PJ's main effects, relative importance tests were conducted if at least two out of the three above variables were correlated with a given criterion. If this was the case, it was therefore possible to determine predictor was most important. That said, the third variable (e.g., PJ * situational uncertainty) was included in analyses regardless of whether it significantly correlated with the criterion, in the interest of determining its relationship to the criterion relative to other predictors.

If fewer than two of the three variables of interest were significantly correlated with the criterion, it made little sense to determine which contributed the most variance; in these cases, the analysis was not conducted. Moreover, if other variables from the original moderation were not correlated with the outcome (e.g., baseline state anger, baseline DS-NA, dispositional uncertainty main effects), they were also left out of the analysis.

Incremental Validity and Importance of Dispositional Over Situational Interactions

For supervisory trust, state anger, and DS-NA, though there were significant correlations between PJ and each outcome, such relationships did not emerge for any PJ * situational uncertainty interaction term. Specifically, no significant correlations emerged between the interaction term and each outcome, therefore it was not appropriate to determine whether PJ * dispositional uncertainty interactions provided incremental validity over PJ * situational uncertainty interactions in predicting outcomes.

Trust. For this and each subsequent outcome, five sets of analyses were conducted, one for risk aversion, and four for uncertainty intolerance (uncertainty-act, uncertainty-stress, uncertainty-unexpected, uncertainty-unnatural). Predictors showing a significant relationship with trust were included in the model; however, to determine the importance or unimportance of the PJ * situational interaction, it was always included in the model, regardless of whether it correlated with the criterion.

First, for uncertainty-act, two predictors from the original regression correlated with trust, and were thus included (PJ $r = .72, p < .001$; PJ * Uncertainty-act $r = .40, p < .001$); based on the decision rules for examining interactions, though the situational interaction was not significant (PJ * situational uncertainty $r = .07$, *n.s.*), it was also included. Because uncertainty-act was not correlated with trust ($r = -.02$, *n.s.*), it was left out of the model (see LeBreton et al., 2007).

Results of incremental importance analyses revealed that neither interaction explained significant incremental validity over PJ (PJ, $R^2 = .52, p < .001$; PJ * dispositional uncertainty interaction $\Delta R^2 = .00$, *n.s.*, PJ * situational uncertainty interaction, $\Delta R^2 = .00$, *n.s.*). However, results of relative importance revealed that although PJ was the most important predictor of trust (contributing 84.5% to the total model R^2 of .52), the dispositional uncertainty interaction also emerged as a somewhat important contribution (15.1%). On the contrary, the situational uncertainty interaction term did not contribute (0.4%).

Second, for uncertainty-stress, two predictors from the original regression correlated with the trust and were thus included (PJ, $r = .72, p < .001$; PJ * uncertainty-stress, $r = .40, p < .001$); based on the decision rules for examining interactions, though

the situational interaction was not significant (PJ * situational uncertainty $r = .07$, *n.s.*), it was also included. Because uncertainty-stress was not correlated with trust ($r = -.04$, *n.s.*), it was left out of the model (see LeBreton et al., 2007).

Results of incremental importance analyses revealed that neither interaction explained significant incremental validity over PJ (PJ, $R^2 = .52$, $p < .001$; PJ * dispositional uncertainty interaction, $\Delta R^2 = .00$, *n.s.*, PJ * situational uncertainty interaction, $\Delta R^2 = .00$, *n.s.*). However, for both samples, results of relative importance revealed that although PJ was the most important predictor of trust (contributing 85.3% to the total model R^2 of .52), the dispositional uncertainty interaction also emerged as a somewhat important contribution (14.3%). On the contrary, the situational uncertainty interaction term did not contribute (0.4%).

Third, for uncertainty-unexpected, two predictors from the original regression correlated with the trust, and were thus included (PJ, $r = .72$, $p < .001$; PJ * uncertainty-unexpected, $r = .44$, $p < .001$); based on the decision rules for examining interactions, though the situational interaction was not significant (PJ * situational uncertainty $r = .07$, *n.s.*), it was also included. Because uncertainty-unexpected was not correlated with trust ($r = -.03$, *n.s.*), it was left out of the model (see LeBreton et al., 2007).

Results of incremental importance analyses revealed that neither interaction explained significant incremental validity over PJ (PJ, $R^2 = .52$, $p < .001$; PJ * dispositional uncertainty interaction, $\Delta R^2 = .00$, *n.s.*, PJ * situational uncertainty interaction, $\Delta R^2 = .00$, *n.s.*). However, for both samples, results of relative importance revealed that although PJ was the most important predictor of trust (contributing 81.1% to the total model R^2 of .52), the dispositional uncertainty interaction also emerged as a

somewhat important contribution (18.5%). On the contrary, the situational uncertainty interaction term did not contribute (0.4%).

Fourth, for uncertainty-unnatural, two predictors from the original regression correlated with the trust, and were thus included (PJ, $r = .72, p < .001$; PJ * uncertainty-unnatural, $r = .40, p < .001$); based on the decision rules for examining interactions, though the situational interaction was not significant (PJ * situational uncertainty $r = .07$, *n.s.*), it was also included. Because uncertainty-unnatural was not correlated with trust ($r = -.02$, *n.s.*), it was left out of the model (see LeBreton et al., 2007).

Results of incremental importance analyses revealed that neither interaction explained significant incremental validity over PJ (PJ, $R^2 = .52, p < .001$; PJ * dispositional uncertainty interaction, $\Delta R^2 = .00$, *n.s.*, PJ * situational uncertainty interaction, $\Delta R^2 = .00$, *n.s.*). However, for both samples, results of relative importance revealed that although PJ was the most important predictor of trust (contributing 84.5% to the total model R^2 of .52), the dispositional uncertainty interaction also emerged as a somewhat important contribution (15.1%). On the contrary, the situational uncertainty interaction term did not contribute (0.4%).

Fifth, for risk aversion, two predictors from the original regression correlated with trust and were thus included (PJ, $r = .72, p < .001$; PJ * risk aversion, $r = .42, p < .001$); based on the decision rules for examining interactions, though the situational interaction was not significant (PJ * situational uncertainty $r = .07$, *n.s.*), it was also included. Because risk aversion was not correlated with trust ($r = .03$, *n.s.*), it was left out of the model (see LeBreton et al., 2007).

Results of incremental importance analyses revealed that neither interaction explained significant incremental validity over PJ (PJ, $R^2 = .52, p < .001$; PJ * dispositional uncertainty interaction, $\Delta R^2 = .00$, *n.s.*, PJ * situational uncertainty interaction, $\Delta R^2 = .00$, *n.s.*). However, results of relative importance revealed that although PJ was the most important predictor of trust (contributing 82.8% to the total model R^2 of .52), the dispositional uncertainty interaction also emerged as a somewhat important contribution (16.8%). On the contrary, the situational uncertainty interaction term did not contribute for either sample (0.4%).

State anger. First, for uncertainty-act, three predictors from the original regression correlated with state anger, and were thus included (baseline state anger, $r = .20, p < .001$; PJ, $r = -.46, p < .001$; PJ * uncertainty-act, $r = -.19, p < .001$); based on the decision rules for examining interactions, though the situational interaction was not significant (PJ * situational uncertainty $r = -.05$, *n.s.*), it was also included. Because uncertainty-act was not correlated with state anger ($r = .09$, *n.s.*), it was left out of the model (see LeBreton et al., 2007).

Results of incremental importance analyses revealed that neither interaction explained significant incremental validity over PJ and baseline stage anger (baseline state anger, $R^2 = .04, p < .01$; PJ, $\Delta R^2 = .21, p < .001$; PJ * dispositional uncertainty interaction, $\Delta R^2 = .00$, *n.s.*, PJ * situational uncertainty interaction, $\Delta R^2 = .00$, *n.s.*). However, for both samples, results of relative importance revealed that although PJ was the most important predictor of state anger (contributing 75.1% to the total model R^2 of .24), the dispositional uncertainty interaction also emerged as a small contribution (9.0%),

especially given the contribution of baseline state anger (15.6%). The situational uncertainty interaction term did not contribute (0.3%).

Second, uncertainty-stress produced different results; four predictors from the original regression correlated with state anger, and were thus included (baseline state anger, $r = .20, p < .001$; PJ $r = -.46, p < .001$; uncertainty-stress, $r = .17, p < .01$; PJ * uncertainty-stress, $r = -.12, p < .05$); based on the decision rules for examining interactions, though the situational interaction was not significant (PJ * situational uncertainty $r = -.05$, *n.s.*), it was also included. Results of incremental importance analyses revealed that neither interaction explained significant incremental validity over PJ and baseline stage anger (baseline state anger, $R^2 = .04, p < .01$; PJ, $\Delta R^2 = .21, p < .001$; uncertainty-stress, $\Delta R^2 = .01$, *n.s.*; PJ * dispositional uncertainty interaction, $\Delta R^2 = .01$, *n.s.*, PJ * situational uncertainty interaction, $\Delta R^2 = .00$, *n.s.*). However, results of relative importance revealed that although PJ was the most important predictor of trust (57.5% to the total model R^2 of .26), the dispositional uncertainty interaction emerged as the next most important contribution (15.9%), followed by uncertainty-stress (13.6%), and baseline state anger (12.8%). The situational interaction did not contribute (0.3%).

Third, for uncertainty-unexpected, three predictors from the original regression correlated with state anger (baseline state anger, $r = .20, p < .001$; PJ, $r = -.46, p < .001$; PJ * uncertainty-unexpected, $r = -.20, p < .001$). As with the above analyses, though the situational interaction was not significant for either sample (PJ * situational uncertainty, $r = -.05$, *n.s.*), it was also included. Results of incremental importance analyses revealed that neither interaction explained significant incremental validity over PJ (baseline state anger, $R^2 = .04, p < .001$; PJ $\Delta R^2 = .21, p < .001$; PJ * dispositional uncertainty

interaction, $\Delta R^2 = .00$, *n.s.*; PJ * situational uncertainty interaction, $\Delta R^2 = .00$, *n.s.*). However, results of relative importance revealed that although PJ was the most important predictor of baseline state anger (contributing 74.9% to the total model R^2 of .25), the dispositional uncertainty interaction also emerged as a small contribution (9.6%), especially given the contribution of baseline state anger (15.1%). The situational uncertainty interaction term did not contribute (0.3%).

Fourth, for uncertainty-unnatural, three predictors from the original regression correlated with state anger (baseline state anger, $r = .20, p < .001$; PJ, $r = -.46, p < .001$; PJ * uncertainty-unnatural, $r = -.17, p < .01$). Though the situational interaction was not significant (PJ * situational uncertainty, $r = -.05$, *n.s.*), it was also included. Because uncertainty-unnatural was not correlated with state anger ($r = .10$, *n.s.*), it was left out of the model (see LeBreton et al., 2007).

Results of incremental importance analyses revealed that neither interaction explained significant incremental validity over PJ and baseline stage anger (baseline state anger, $R^2 = .04, p < .001$; PJ, $\Delta R^2 = .21, p < .001$; PJ * dispositional uncertainty interaction, $\Delta R^2 = .00$, *n.s.*; PJ * situational uncertainty interaction, $\Delta R^2 = .00$, *n.s.*). However, results of relative importance revealed that although PJ was the most important predictor of state anger (contributing 76.9% to the total model R^2 of .25), the dispositional uncertainty interaction also emerged as a small contribution (7.8%), though the contribution of baseline state anger was much higher (15.1%). The situational uncertainty interaction term did not contribute (0.3%).

Fifth, for risk aversion, three predictors from the original regression correlated with state anger (baseline state anger, $r = .20, p < .001$; PJ, $r = -.46, p < .001$; PJ * risk

aversion, $r = -.21, p < .001$). Though the situational interaction was not significant (PJ * situational uncertainty, $r = -.05$, *n.s.*), it was also included. Because risk aversion was not correlated with state anger ($r = .05$, *n.s.*), it was left out of the model (see LeBreton et al., 2007).

Results of incremental importance analyses revealed that neither interaction explained significant incremental validity over PJ and baseline stage anger (baseline state anger, $R^2 = .04, p < .001$; PJ, $\Delta R^2 = .21, p < .001$; PJ * dispositional uncertainty interaction, $\Delta R^2 = .00$, *n.s.*; PJ * situational uncertainty interaction, $\Delta R^2 = .00$, *n.s.*). However, results of relative importance revealed that although PJ was the most important predictor of state anger (contributing 74.3% to the total model R^2 of .25), the dispositional uncertainty interaction also emerged as a small contribution (10.0%), though the contribution of baseline state anger was slightly higher (15.4%). The situational uncertainty interaction term did not contribute (0.3%).

Distress specific negative affectivity. For all uncertainty intolerance factors and risk aversion, though there were significant correlations between PJ and each outcome, such relationships did not emerge for between PJ * dispositional uncertainty interaction terms and DS-NA. As such, as previously mentioned, it was not appropriate to determine whether the PJ * situational uncertainty interaction provided incremental validity over the PJ * dispositional uncertainty interaction in predicting DS-NA.

Summary of Results

In summary, although results did not provide overwhelming support for the study's hypotheses, many relationships emerged as predicted (for a tabular representation of the

study's results, see Table 13). First, results for Hypothesis 1b indicated that, overall, virtual teams reported lower media richness perceptions than co-located teams.

Second, full or near full support was shown for many dispositional uncertainty variables (Hypotheses 7b, 7d, 8d). Hypothesis 7b was supported for all four factors of uncertainty intolerance (uncertainty-act, uncertainty-stress, uncertainty-unexpected, uncertainty-unnatural). Individuals high on these factors reported higher supervisory trust in voice conditions, and lower supervisory trust in no voice conditions, than those low on these factors. Hypothesis 7d was supported for three out of the four uncertainty intolerance factors (uncertainty-act, uncertainty-unexpected, uncertainty-unnatural). Here, high uncertainty intolerance related to higher DS-NA in the no voice condition, and for uncertainty-act, lower DS-NA in the voice condition. Finally, Hypothesis 8d was supported, where individuals higher in risk aversion tended to report higher DS-NA in no voice conditions than individuals who were more comfortable with risk.

Two analyses produced results in the opposite direction than predicted. Analyses for Hypotheses 1a and 1c produced opposite effects, with participants in virtual groups reporting higher, rather than lower, social presence, and lower, rather than higher, team uncertainty than co-located groups. As a result, only media richness was applied in subsequent hypotheses as a variable representing uncertainty due to virtualness.

Moreover, despite the lack of a priori hypotheses, conclusions can be made for the research question proposed in this study (i.e., what is the importance of PJ and each interaction?). First, overall, PJ's main effects explain most of the relationships with outcomes relative to PJ's interactions with dispositional and situational uncertainty. That said, however, PJ * dispositional uncertainty interactions did indeed carry some

additional importance in predicting outcomes. This was not the case for PJ * situational uncertainty interactions, which contributed effectively no variance or importance in predicting criteria.

Many hypotheses were not supported. First, no hypotheses for situational uncertainty as a moderator were supported. Hypothesis 3 was not supported, as the residualized media richness variable did not moderate the relationship between PJ and supervisory trust. Null results also emerged for Hypothesis 4 (state anger) and 5 (DS-NA). Moreover, though many predictions for dispositional uncertainty as a moderator were supported, others were not. Hypothesis 7c was not supported, as zero out of four factors of uncertainty intolerance moderated the relationship between PJ and state anger. Additionally, Hypothesis 7d was not supported for uncertainty-stress, as individuals who felt stress under conditions of uncertainty did not have stronger reactions to fairness and unfairness in terms of DS-NA than those who do not feel stress under uncertainty. Finally, null results emerged for Hypotheses 8b and 8c, predicting that risk aversion would moderate the relationships between PJ and trust and state anger, respectively.

In addition, because of the nature of some data, some hypotheses could not be investigated. First, because of non-normal performance data, it was not possible to determine whether situational uncertainty moderated the relationship between justice and performance (Hypothesis 2). Similarly, non-normal performance data prevented analyses for Hypotheses 7a and 7b, where uncertainty intolerance and risk aversion were hypothesized to moderate the relationship between PJ and performance. Second, because of the low base rate for cyberloafing, it was not possible to determine whether situational or dispositional uncertainty moderated the relationship between justice and cyberloafing

(Hypothesis 6). Similarly, Hypotheses 7e and 8e, predicting that uncertainty intolerance and risk aversion would moderate the relationship between PJ and cyberloafing, could not be examined.

Discussion

The purpose of this study was to test uncertainty management theory by extending it to situational uncertainty due to virtual teams as well as dispositional uncertainty. The study's hypothesized model was tested via an experimental investigation using introductory psychology students randomly assigned to groups with varying virtualness and fairness. Results indicated that levels of situational uncertainty due to virtual teams emerged as predicted for media richness only, but that media richness due to team type did not moderate relationships between PJ and outcomes (supervisory trust, anger, distress-specific negative affectivity). Conversely, dispositional uncertainty often moderated relationships between PJ and outcomes. These results support extending uncertainty management theory to include dispositional uncertainty, but do lend not support the theory's extension to situational uncertainty due to virtualness.

The following sections review and interpret findings for study hypotheses regarding situational uncertainty due to working in virtual teams as well as moderating effects of situational and dispositional uncertainty in justice-to-outcome relationships. Finally, I discuss the relative importance of each type of moderator. Limitations and future directions will then be presented, concluding with theoretical and practical applications of the current investigation.

Situational Uncertainty Due to Virtual Teams

Media Richness

Results emerged as predicted for the residualized media richness variable (i.e., situational uncertainty due to team type). Consistent with Daft and Lengel's (1986) propositions that structural and technical mechanisms can facilitate or inhibit richness of communication media, virtual team members reported lower media richness perceptions compared to co-located teams, and hybrid groups fell in the middle. Results were consistent with media richness theory, with poorer information exchange (e.g., less availability of feedback, transmission of non-verbal messages, transmission of varied information; Maruping & Agarwal, 2004; Straus, 1996) in virtual teams compared with co-located ones. Despite small effect sizes ($\eta^2 = .05$), the current study may be valuable for practitioners because it adds to growing literature demonstrating that virtual teams tend to have difficulty exchanging information, particularly for complex or rich messages (Harvey et al., 2005; Langan-Fox, 2002; Ramon & Cohen, 2005; Sproull & Kiesler, 1986; Townsend et al., 1998; Walther et al., 2001; Workman et al., 2003). Because relationships between virtualness and media richness emerged as predicted, supportive results for this hypothesis also "set the stage" for testing uncertainty management theory (i.e., situational uncertainty's moderating effects in justice to outcome relationships), which will be discussed shortly.

Social Presence and Team Uncertainty.

While media richness perceptions were lower in virtual teams compared with co-located ones, findings for uncertainty regarding social dynamics (social presence, team uncertainty) did not emerge as hypothesized. In fact, results were in the opposite

direction than predicted, with participants in virtual and hybrid groups reporting higher, rather than lower, social presence, and lower, rather than higher, team uncertainty compared with co-located groups.

It is not surprising that findings were similar for team uncertainty and social presence, particularly because of the conceptual overlap of the moderately correlated variables ($r = .40, p < .001$). Whereas media richness focuses on information exchange, social presence and team uncertainty focus on knowledge of social factors (e.g., other team members' perceptions, one's role in the team). The current study measured social presence as the salience of other team members (i.e., whether participants felt comfortable conversing and interacting with other participants, felt a sense of community, and felt that their point of view was acknowledged by others; Short et al., 1976). Team uncertainty measured participants' understanding of their function in the team (i.e., their role, expectations for behavior, others team members' perspectives and perceptions of them). Therefore, findings for social presence and team uncertainty may have converged because of similar conceptual foci.

The above findings run counter to past research. Past work has demonstrated, for example, that "it may be hard for [virtual] team members to remain aware of each others' presence" (Ramon & Cohen, 2005, p. 262), and that it is difficult to build relationships with others in virtual contexts (Hinds & Bailey, 2003; Ramon & Cohen, 2005, p. 264). Perhaps most relevant to social presence and team uncertainty, team members communicating via instant messaging have been found to possess decreased understanding of other team members compared with co-located teams (Fulk & DeSanctis, 1995; Langan-Fox, 2002; Sarbaugh-Thompson & Feldman, 2000; Walther et

al., 2001). Moreover, researchers have shown that virtual team members lack information regarding the context within which other team members function (Cramton, 2001).

Although the current study's findings run counter to hypotheses and some prior research, other work supports these results. First, recent research indicates virtual team members are able to form a relationship with fellow teammates even without the presence of non-verbal signs (Majchraz et al., 2005, p. 132). Second, relative to co-located teams, virtual teams have been shown to display status equalization (Dubrovsky, Kiesler & Sethna, 1991; Martins et al., 2004), participation equalization (Majchrzak et al., 2005; see also Walther, 1996) and reduced negative social influence (Dubrovsky, 1985), all of which could result in increased comfort with and certainty regarding one's function in the team and one's understanding of other team members.

Third, and perhaps most persuasive, research has shown that virtual communication media can actually surpass face-to-face communication in affection and emotion (i.e., hyper-personalization; Walther, 1996; Walther et al., 2001). Therefore, in this investigation, characteristics of other team members may have been hyper-personalized. For example, social identity-deindividuation theory (Lea & Spears, 1992) argues that individuals communicating virtually build powerful stereotypical perceptions of other team members based on little information, resulting in increased perceptions of social presence and social information (see also Fiol & O'Connor, 2005).

Specific to the current study, the hyper-personal communication of virtual teams may have been further exaggerated by two factors. First, the current study's sample, college students, may have been particularly comfortable forming impressions of others

because they are part of the "virtual generation" (i.e., individuals who matured in the face of ubiquitous technology; Barbian, 2001). Indeed, researchers have found that over time, individuals who use technology adapt to virtual communication media, such that the media begins to take on the richness of face-to-face communication (Hiltz, Johnson, & Alge, 1978; Rice & Love, 1987). Therefore, because participants had likely been using technology such as chat rooms for a large portion of their lives (Townsend et al., 1998), the hyper-personal nature of this communication medium could have been further exaggerated.

A second factor exaggerating the hyper-personal nature of virtual communication may have been the limited amount of time that teams worked together. In support, Walther et al. (2001) found that when photographs of other team members were presented to participants prior to virtual discussions, participants experienced increased intimacy perceptions with other team members, but only for groups who had just met. Groups that had worked together prior to the introduction of the photographs showed no such effects. Walther et al's (2001) method of showing team members' photographs to participants prior to communication is tantamount to the current study's practice of allowing participants to see each other prior to group assignment.

Therefore, building on Walther et al's (2001) findings, because the study was conducted with newly formed, short term groups where members saw each other before working together virtually, the hyper-personal nature of the medium of communication could have been exaggerated. This may have caused participants to more easily form impressions of other team members, therefore further exaggerating the hyper-personal nature of virtual communication. Future researchers are encouraged to examine whether

allowing initial physical contact indeed increases the hyper-personal nature of communication, and if so, why. If this explanation is supported, future researchers wishing to ensure a "cleaner" virtualness manipulation could ensure that participants do not come into any contact in person prior to interacting virtually.

Despite past research supporting the current study's findings, it is possible that unexpected results regarding social presence and team uncertainty emerged largely or entirely because of methodological factors. While much research on virtual teams conceptualizes them as being geographically and temporally dispersed (Martins et al., 2004), participants in this study experienced a shared context (i.e., a research study) as well as a shared location. When a shared context or location is lacking, virtual team members experience uncertainty because of reduced shared understanding (Hinds & Bailey, 2003). As such, the current study's operationalization of virtual teams may not have been successful at eliciting uncertainty due to the typical "out of sync" nature of virtual teams (Hinds & Bailey, 2003, p. 618, see also Cramton et al., 2001; Walther & Bunz, 2005). Future researchers are therefore encouraged to replicate findings in situations where participants do not share a context.

If results regarding social presence and team uncertainty indeed reflect true relationships rather than methodological artifacts, practical implications emerge. Findings refute warnings that virtual team members will "have a very different attitude toward the team" than co-located team members (e.g., reduced social presence; Townsend et al., 1998), and therefore require increased socialization time. Indeed, results of the current study suggest that virtual team members may feel more comfortable with other team members than co-located teams. Therefore, in forming short-term

groups, organizations may not need to be concerned about the supposed impersonal nature of communication, particularly because it is less important to develop social bonds between members (Walther, 1996). Instead, resources could be focused on task and technology training.

Regardless of the explanation for decreased team uncertainty and increased social presence in virtual groups, future researchers are urged to test uncertainty management theory's predictions in the reverse. Specifically, although uncertainty levels for these variables emerged in opposite-than-predicted directions, uncertainty management theory might still hold, where individuals in newly formed co-located teams experience more uncertainty relative to virtual groups, and may therefore demonstrate polarized reactions to fairness than virtual teams.

Situational Uncertainty as a Moderator of Justice to Outcome Relationships

Cyberloafing

Although the low base rate of observed cyberloafing prevented any formal hypothesis testing, results hint that cyberloafing could be more common in virtual teams experiencing unfairness than in co-located or hybrid ones. Indeed, in unfair conditions, more participants in virtual teams engaged in cyberloafing (cyberloafing during re-ranking: $N = 11$; other cyberloafing, $N = 6$) than participants in co-located teams (cyberloafing during re-ranking: $N = 1$; other cyberloafing, $N = 1$) or hybrid teams (cyberloafing during re-ranking: $N = 1$; other cyberloafing, $N = 1$). No participants cyberloafed in fair conditions, regardless of group type.

If researchers could formally support situational uncertainty due to working in virtual teams as strengthening the inverse relationship between justice and cyberloafing

behavior, the practical implication of these findings would be that organizations should ensure fair procedures in virtual teams to reduce cyberloafing. Indeed, in virtual teams, many types of uncertainty might be unavoidable (Griffith & Neale, 2001; Sarbaugh-Thompson & Feldman, 2000; Stanworth, 1998; Tangirala & Alge, 2006; Workman et al., 2003), therefore making fairness perceptions increasingly important to manage (Diekmann et al., 2005). Indeed, such results would "contradict economic perspectives on organizational behavior and managerial practice, which...think of...justice as some luxurious good, to be awarded to employees in quiet times" (Elvainio et al., 2005, p. 2509). Rather, fair procedures may be particularly important in the context of potentially uncertain organizational practices (e.g., virtual teams). Limiting unfairness in virtual teams might therefore be important to reduce activities detracting from task-related behavior. Again, however, these ideas are purely speculative and require empirical support.

Other Outcomes

Residualized media richness did not moderate the relationship between PJ and supervisory trust, anger or DS-NA.[8] There are two possible explanations for these results. First, though recent research has begun to lend support that situational uncertainty moderates the relationship between justice and outcomes such as health (Elvainio et al., 2005) and job satisfaction (Diekmann et al., 2004), it is possible that the predictions of uncertainty management theory do not hold in the context of virtual teams.

[8] Although hypotheses regarding state anger and DS-NA were not supported, preliminary analyses supported uncertainty management theory, indicating that hybrid and virtual teams experienced higher levels of state anger in unfair hybrid and virtual conditions, and lower levels of anger in fair virtual conditions.

This possibility is acknowledged in van den Bos and Lind's (2002) original theory, and the authors caution that the theory's propositions may not apply equally to all types of uncertainty.

Supporting this possibility, as already discussed, the hyper-personal nature of virtual teams failed to elicit the predicted levels of uncertainty for social presence and team uncertainty (see Fiol & O'Connor, 2005; Walther, 1996). And though media richness was significantly lower in virtual teams compared with co-located ones, it is possible that the level or type of situational uncertainty was not enough to cause the variable to moderate relationships between justice and outcomes (see Diekmann et al., 2005). Moreover, because uncertainty increases especially as individuals experience "insecurity about group membership and status," (Diekmann et al., 2005, p. 251), the non-social nature of media richness may have therefore masked moderating effects between justice and outcomes. If this were true, however, it would run counter to predictions of uncertainty management theory, which state that: "[uncertain] situations, *whether social or not*...provoke feelings of...confusion...[and] provide...stimul[i] for seeking and using fairness judgments" (italics added, Elvainio et al., 2005, p. 2502).

Null findings could have also emerged because of methodological issues surrounding the operationalization of virtual teams. Specifically, the study's design may have prevented individuals from being uncertain enough for predictions to be supported. For example, seeing team members face-to-face at the beginning of the study may have reduced uncertainty. Indeed, prior research indicates that uncertainty management theory is more likely to be supported if individuals experience high as opposed to moderate levels of uncertainty (Diekmann et al., 2005). Moreover, though the current study was

designed to elicit psychological involvement from participants, it is possible that their investment in the task was not high enough to elicit active information search to reduce uncertainty. Because Diekmann et al. (2005) supported uncertainty management theory's predictions in organizational situations when individuals "are uncertain...about things that are important to them" (p. 250), future research should isolate salient sources of uncertainty in virtual teams to more conclusively determine whether uncertainty management theory can be applied to virtual teams.

If indeed findings did not emerge because of methodological artifacts, null results in this area may be encouraging when applied to organizations. Specifically, findings indicate that reactions to unfairness are not particularly destructive and reactions to fairness are not particularly constructive in virtual teams compared with co-located ones. As such, it would not be necessary for organizations to conduct special training for virtual teams in the area of uncertainty management, either at an individual or team level (see Kraiger, 2003). Findings therefore lend support to the argument that "training and developing virtual team members is in many ways no different from training and developing good team members in general: developing skills in communication, goal setting, planning, and task proficiency are all as important for the virtual team as for the traditional team" (Townsend et al., 1998, p. 18), and do not indicate that virtual teams possess additional training needs beyond task based training, even when certain events could be viewed as unfair. However, because methodological artifacts may be a possible explanation for these findings, future researchers should not implement these findings in organizations until they are replicated

Dispositional Uncertainty as a Moderator of Justice to Outcome Relationships

The current study demonstrated that individuals possessing a dispositional desire to avoid uncertainty may react slightly more strongly to justice than those who are more comfortable with uncertainty. Supportive results emerged for uncertainty intolerance as a moderator of relationships between PJ and both trust and DS-NA. Here, uncertainty intolerance strengthened (a) positive relationships between PJ and supervisory trust and (b) negative relationships between PJ and DS-NA. Although effect sizes of interactions were small, results support uncertainty management theory's extension to dispositional uncertainty, which only one study to date has investigated (Colquitt et al., 2006).

Pending replication, particularly with larger effect sizes, these results would hold practical value for organizations. First and foremost, supportive results for the outcomes of supervisory trust and DS-NA suggest that managers should understand that workers who are intolerant of uncertainty may have slightly more polarized reactions to fairness and unfairness than those who are ambiguity tolerant. Indeed, managers may supervise teams composed of individuals with varying degrees of uncertainty intolerance. If, for example, a manager uses a procedure that may be viewed by direct reports as unfair, individuals uncomfortable with uncertainty may react particularly negatively to perceived unfairness compared to individuals who are more adaptable.

Second, findings could be applied to fairness training for managers. Prior quasi-experimental research has demonstrated that it is possible to train managers to be fair (e.g., Skarlicki & Latham, 1996). Results of this study indicate that as part of training needs analysis, organizational decision makers could determine the level of uncertainty intolerance of managers' direct reports (see Colquitt et al., 2006). This activity could be

classified as part of the "organization analysis" component of training needs analysis (McGehee & Thayer, 1961). Although organizations may be less likely to collect this type of data from workers than other personality traits (e.g., conscientiousness; Colquitt et al., 2006), it may be possible to deduce overall levels of uncertainty intolerance across jobs, departments, or units by applying Schneider's (1987) Attraction-Selection-Attrition model. Schneider proposes that individuals are drawn to jobs consistent with their personality, and that organizations often choose employees who exemplify their culture.

Applied to the current study, Schneider's model suggests that individuals who are intolerant of uncertainty might be drawn in greater number to jobs where conventional interests (i.e., Holland's six-factor taxonomy; Gottfredson & Holland, 1996) are common, such as accounting, finance, or law (U.S. Department of Labor, 1998; Peterson et al., 2001). Additionally, an organization's culture (Schein, 1985) might place more or less value, for example, on tolerance of uncertainty versus adaptation, drawing employees with commensurate levels of dispositional uncertainty. Moreover, even within the same industry, organizations could display different orientations towards ambiguity (Abdul-Rashid, Sambasivan, & Abdul-Rahman, 2004). Therefore, assuming practitioners could identify individuals, departments, units, or organizations with high uncertainty intolerance, fairness training interventions for supervisors may be particularly valuable.

An important caveat is in order; in spite of the above arguments, following previous research (Skarlicki & Latham, 1996), the current study argues that fairness training could be beneficial to nearly all managers; however, if additional resources are available or choices must be made regarding whom to train, the current study suggests it may be most effective to focus on managers of units with uncertainty intolerant

employees. Again, however, given the current status of the research, practitioners should not use uncertainty intolerance as a decision factor until the results of the current study are further supported.

In the midst of supportive results for the moderating effects of uncertainty intolerance on trust and DS-NA, null results emerged for anger. It is unclear why these results emerged, particularly because of the conceptual overlap between DS-NA and anger. Recall that CFA results for the current study's anger measure produced sub-optimal fit indices, suggesting that sampling error may explain covariance between items (Grimm & Yarnold, 1997). Moreover, model residuals (i.e., RMSEA) were particularly high, indicating a mismatch between predicted and observed covariance among items. The construct validity of the current study's operationalization of state anger may have therefore been diminished (Leong & Austin, 1996). Particularly because of support for the conceptually related scale of DS-NA, these null results are difficult to explain via theory or logic. Future researchers should therefore replicate findings using a well functioning anger scale before results are interpreted further.

Overall, findings for risk aversion were less supportive than findings for uncertainty intolerance, as risk aversion was found to moderate the relationship between PJ and DS-NA only. Given the construct space that uncertainty intolerance and risk aversion occupy, divergent findings are not particularly surprising. Whereas uncertainty intolerance reflects individuals' avoidance of uncertainty and ambiguity (i.e., feeling unsure, Reber, 1995), risk aversion reflects individuals' avoidance of risk and danger (i.e., feeling vulnerable to harm, Reber, 1995). Although past research argues that those high in risk aversion react more strongly to uncertainty than those low on the construct

(Colquitt et al., 2006), uncertainty intolerance may be a more accurate representation of dispositional tendencies to avoid uncertainty as conceptualized in uncertainty management theory (van den Bos & Lind, 2002). As such, though future researchers are not discouraged from investigating risk aversion, they are encouraged to simultaneously identify additional, potentially more appropriate, operationalizations of dispositional uncertainty (e.g., emotional uncertainty; Greco & Roger, 2001) to further test the moderating effects of uncertainty intolerance.

Relative Contributions of Situational and Dispositional Interactions

Consistent with past work on main effects between PJ and outcomes, PJ was by far the most substantial contributor to supervisory trust (e.g., Konovsky & Pugh, 1994) and anger (e.g., Barclay et al., 2005). That said, however, interactions between dispositional uncertainty and PJ did carry some importance in predicting outcomes. These results can be contrasted with interactions between situational uncertainty and PJ, which contributed little to no variance in predicting outcomes. Therefore, it can be concluded that dispositional uncertainty by PJ interactions carry weight only secondarily to PJ's main effects, and that situational uncertainty and PJ interactions are not important in explaining variance in trust and state anger.

Earlier, I argued that examining the contribution of dispositional interactions relative to the situational interactions would determine whether uncertainty management theory should be extended to dispositional uncertainty. Indeed, it appears that dispositional uncertainty mattered, whereas situational uncertainty did not; however, null findings for situational uncertainty due to virtualness may have resulted from less-than-ideal measurement (e.g., inability to partial out large amounts of variance in situational

uncertainty due to dispositional factors, less-than-ideal virtualness manipulation) rather than true null relationships. Conversely, dispositional uncertainty measures were comparatively psychometrically sound. Therefore, the measurement of dispositional uncertainty was likely "superior" relative to the measurement of situational uncertainty due to virtualness, which makes it difficult to conclusively determine that dispositional moderators are more important than situational moderators are. Future researchers testing uncertainty management theory are strongly encouraged to continue to include measures of dispositional uncertainty in their investigations, as well as high-quality measures of situational uncertainty due to virtualness. If this is done, the continued testing of relative importance of each may yield more promising results for both types of uncertainty.

Limitations

External Validity

Experimental design. As previously discussed, an experimental design was chosen based on prior recommendations for theory testing (van den Bos, 2001). Specifically, the study exhibited near total random assignment to experimental conditions as well as high experimental control (e.g., well trained study supervisors, detailed research protocols). Though laboratory and field studies often produce relationships of similar magnitude (Cohen-Charash & Spector, 2001), choosing an experimental design likely resulted in a trade-off between internal validity (i.e., the ability to infer causality from a design) and external validity (i.e., the ability to generalize study results to other samples and environments; Bordens & Abbott, 1999).

In support of external validity, however, many features of the current study closely mimicked conditions workers in organizations might encounter. First, the varying methods of interaction with the study supervisor are reflective of supervisory practices across team type (e.g., co-located supervisors communicating in a face-to-face manner and virtual supervisors communicating mostly through the chat room; see Robey, Min Khoo & Powers, 2000). Second, the study's introduction of performance based rewards (i.e., the $50 gift card) closely mirrors individual incentives (i.e., rewards for team members based on individual performance; Heneman, Fay & Wang, 2001). Particularly because research has shown individual incentives to increase individual performance (Gerhart & Milkovich, 1990; Kahn & Sherer, 1990), many organizations use such strategies (Heneman et al., 2002). That said, although the current study's incentives mirrored real-world activities, there was likely not a one-to-one correspondence between incentives in the study and incentives in organizations. Although the study was exhaustively pilot tested to maximize participants' investment in the reward, it is still possible that they did not "buy in" to the reward as strongly as employees would, underscoring the importance of testing the study's model in organizations. Similarly, although the fairness manipulation indeed showed significant differences between fair and unfair conditions, unfair conditions were rated only moderately fair as opposed to highly unfair. As pilot participants indicated, these higher than expected fairness ratings in unfair conditions may have been due to participants' lack of buy-in to or attention in the study, thereby tempering extremely unfair perceptions.

Sample. Past research using undergraduates for virtual teams research argues that results are indeed generalizable to workers in organizations (Hinds & Bailey, 2003; Yao

& Flanagin, 2006). However, because this sample was composed of college students who may differ from working adults (see Sears, 1986), a resulting decrease in external generalizability was possible. For example, because the study was conducted with introductory psychology students who tend towards apathy regarding research participation, participants may not have shared the same goals as employees in newly formed groups, such as a desire to learn normative behavior (Ahjua & Galvin, 2003) or form impressions of others' contributions (Levine & Moreland, 1990).

Design. Two potential external validity limitations exist regarding the study's design. First, for practical reasons, team members gathered in the same physical location prior to being split into groups. Therefore, all group members (virtual, hybrid, co-located) were able to see each other in person before being assigned to a group. Although this design may approximate organizational practices (see Griffith & Neale, 2001), the group type manipulation would likely have been strengthened had virtual participants reported to different physical locations (see Walther, 1994). This is especially true because research indicates that virtual team members can work together, often for years, without ever meeting face to face (Majchrzak et al., 2004; Walther et al., 2001). For example, Majchrzak et al. report that only 4% of 293 virtual team members surveyed reported meeting all of their virtual team members in person, and only 14% reported meeting one other virtual team member during the lifespan of the team.

Therefore, especially because of reported differences based on whether brief face-to-face contact has occurred (Sarbaugh-Thompson & Feldman, 2000; Walther et al., 2001), future researchers are urged to replicate the current study's results with a "cleaner" operationalization of virtual teams. In particular, researchers have suggested that "face to

face and pure virtual teams differ in non-linear ways from hybrid teams that meet occasionally [or initially]" (Fiol & O'Connor, 2005, p. 20); therefore, to fully understand differences between each of the three team types, it is imperative for future researchers to design studies including a "pure" virtual condition. Moreover, because researchers remain uncertain regarding the "proportion of electronic communication [that] is sufficient for a team to be classified as virtual" (Martins et al., 2004, p. 205), future researchers might expand the number of conditions (i.e., adding teams which are mostly virtual with some face to face communication and vice versa).

Similarly, it is worth noting that the current study's operationalization of hybrid team communication ordering (i.e., face-to-face interaction followed by virtual interaction) is only one of two possibilities (see Fiol & O'Connor, 2005). Alternately, hybrid team members could have first interacted virtually, followed by a face-to-face discussion. I chose the current study's operationalization of hybrid teams because it is likely more interesting to organizations. Specifically, if team members who have interacted briefly at their inception had experienced consistently similar uncertainty levels as co-located ones, support would have been lent to the value of early meetings between virtual team members (see Lipnack & Stamps, 1997). Results of the current study, however, were equivocal; in some instances (team uncertainty), hybrid teams more closely resembled co-located ones. In other instances (social presence), hybrid teams more closely resembled virtual teams. In still other instances, hybrid groups fell somewhere between virtual and co-located groups (media richness). Therefore, in addition to the essential task of collecting more data for hybrid groups, I encourage future researchers to test study hypotheses for the other ordering of hybrid group

communication (i.e., virtual contact followed by face-to-face interaction), which could lead to higher uncertainty than the operationalization of groups (Fiol & O'Connor, 2005).

In conclusion, though the current study has a fair amount of external validity because it was designed to mimic organizational conditions where possible, it would be desirable to generalize findings to workers. Indeed, researchers have recommended that uncertainty management theory's predictions regarding justice and outcomes be examined in applied settings to increase generalizability (Deikmann et al., 2005).

Measures and Statistical Conclusion Validity

In the current study, certain measures demonstrated weaknesses, underscoring the importance of future research. First, non-normal performance data prevented analyses to determine whether situational or dispositional uncertainty moderated the relationship between PJ and performance. Especially because past research has used remarkably similar operationalizations of performance in laboratory studies with students (Colquitt et al., 2006), the non-normal nature of data was surprising. At least two explanations exist for the nature of data for this variable. First, it is possible that the situation was so strong that it prevented variability in behavior regarding the reading comprehension task (i.e., high situation strength, Mischel, 1977). Specifically, this highly controlled laboratory study likely contained clear behavioral expectations for participants to diligently complete the measure (see Withey, Gellatly, & Annett, 2005), therefore masking any effects that fairness or uncertainty may have had on scores. Although the current study's design was conceptually similar to the workplace (i.e., supervisors should set clear behavioral expectations; Davis-Blake, & Pfeffer, 1989), the highly controlled nature of the study may have intensified situation strength. Similarly, high situation strength may

have led to the low observed base rate for cyberloafing, which was one of the factors preventing operationalizing the measure as a continuous variable. To determine the true nature of the relationship between uncertainty, PJ and performance and cyberloafing, future researchers are urged to investigate performance in field settings where situations are weaker and behavior and/or performance is more variable.

A second possibility for unexpected non-normal performance data is that items were too easy, particularly because participants read the passage upon which items were based earlier in the experiment. This can be contrasted with the reading comprehension measure used by Colquitt et al (2006), which presented participants with a novel passage regarding carpel tunnel syndrome, followed by accompanying, detailed reading comprehension questions. Therefore, had the passage been more complex or the items been more difficult, the desired variability in responses may have occurred.

As previously mentioned, cyberloafing data also limit the study's findings. Specifically, the low observed base rate and extreme variability in time spent cyberloafing prevented hypothesis testing to determine whether uncertainty moderated the relationship between justice and engagement in cyberloafing. Although the current study's measurement of cyberloafing behavior can be considered a strength because it measured actual behavior rather than intentions (see Colquitt et al., 2006; Lim, 2002), future researchers are encouraged to measure cyberloafing behavior in organizations, where we know the base rate is high (Lim, 2002). Doing so would create the possibility of operationalizing cyberloafing as a continuous variable and allow researchers to examine the relationship among uncertainty, justice, and cyberloafing.

A final cautionary note is in order regarding significant results obtained in the current study. Because a great number of analyses were conducted, it is possible that some findings emerged by chance. In other words, the multitude of hypotheses and accompanying analyses may have inflated Type I error rates (Cook & Campbell, 1979). This statistical possibility underscores the importance of future researchers replicating results.

Future Research Directions

Based on the results of this study, at least three areas for future research can be proposed. First, I recommend that researchers investigate co-located and virtual teams with longer life spans. Second, findings could be extended by testing relationships between uncertainty, IJ, and outcomes. Third, additional outcomes could be added to the proposed model.

Increased Team Life Span

As previously discussed, this study investigated participants' reactions to teams with a limited lifespan (i.e., less than two hours; see Rico & Cohen, 2005). Because differences between virtual and co-located groups emerge over time (Ahjua & Galvin, 2003), future researchers are encouraged to determine whether the current study's findings hold over longer time periods. For example, researchers could conduct longitudinal studies that follow virtual and co-located teams to determine whether relationships between justice and outcomes, as well as moderating effects of uncertainty, change as a function of time (e.g., Ahjua & Galvin, 2003; Maznevski & Chudoba, 2000; Martins et al., 2004). Indeed, prior work supporting uncertainty management theory in virtual teams has been conducted using virtual groups working together over longer

periods of time (Tangirala & Alge, 2006). Moreover, research in other contexts supporting situational uncertainty as a moderator of relationships between justice and outcomes has investigated permanent teams (Elvainio et al., 2005). Therefore, to determine boundary conditions of uncertainty management theory, I recommend that future researchers test uncertainty management theory with virtual teams with a longer lifespan.

Extending Findings to Interactional Justice

As discussed earlier in the paper, relative to DJ, PJ is viewed by many researchers as most to relevant to uncertainty management theory (van den Bos et al., 1998, see also Diekmann et al., 2005), particularly with regard to affective reactions (van den Bos, 2001). Despite theorizing that uncertainty management theory should apply to all forms of fairness (i.e., DJ, PJ, IJ; van den Bos & Lind, 2002), past research has not been supportive of uncertainty as a moderator of relationships between DJ and outcomes (Elvainio et al., 2005). As such, it does not seem fruitful for future researchers to investigate DJ in the context of uncertainty management theory for virtual teams or dispositional uncertainty.

In the few investigations of uncertainty management theory that have examined IJ, however, results have been supportive. Situational uncertainty has been shown to moderate relationships between IJ and health (Elvainio et al., 2005) as well as job satisfaction (Diekmann et al., 2004). Namely, this work has shown similar patterns of results for both PJ and IJ; future researchers are encouraged to determine whether findings for IJ resemble those found for PJ in the current study. In particular, prior studies have shown that effect sizes for interactions between IJ and outcomes are slightly

smaller than PJ interactions (Diekmann et al., 2004; Elovainio et al., 2005); therefore, especially because the current study showed small effect sizes for interactions, future research could reveal weaker or even non-significant effects for IJ. It is important to note that the current study's manipulation of PJ may have contained elements of IJ, therefore, to build on these results, future research should manipulate and measure PJ and IJ separately (e.g., high PJ / low IJ, high PJ / high IJ, etc.).

Investigating Additional Outcomes

The current study examined consistently supported outcomes of justice effects where prior research suggested the presence of moderators (i.e., Cohen-Charash & Spector, 2001). To extend tests of uncertainty management theory, I urge future researchers to investigate additional outcomes. For example, in past research (Konovsky, 2000), PJ has been shown to consistently relate to organizational citizenship behaviors (OCBs, i.e., voluntary behaviors on the part of employees promoting organizational functioning; Organ, 1988). Indeed, PJ has been found to have the strongest relationship to OCBs relative to DJ and IJ (Ball, Trevino, & Sims, 1994; Konovsky & Pugh, 1994; Moorman, 1991). Past explanations for these findings center on social exchange and social identity (Moorman & Byrne, 2005). The social exchange explanation argues that employees who are treated fairly reciprocate to their supervisor or organization by engaging in more than what is formally required of them (Moorman & Byrne, 2005). Therefore, particularly because recent theorizing has suggested that this relationship may be strengthened by moderators (Nowakowski & Conlon, 2005), future researchers are urged to test uncertainty management theory's predictions for PJ and IJ and OCBs.

Based on prior meta-analyses, other relevant outcomes may be conflict, job satisfaction, and turnover intentions (Colquitt et al., 2001; Cohen-Charash & Spector, 2001).

Theoretical and Practical Applications of the Current Investigation

The current study possesses at least three theoretical contributions. First, building on recent work (Diekmann et al., 2004; Elvainio et al., 2005), it tested uncertainty management theory in the relatively unexplored, yet vastly practically applicable, area of virtual teams (Cascio, 2000). Results indicated that although reactions to fairness were not strengthened by situational uncertainty due to virtual teams, virtualness did interact with fairness such that virtual participants had more polarized perceptions of fairness and unfairness than co-located individuals did (see also Tangirala & Alge, 2006). Second, this study further contributes to literature on moderators of justice-to-outcome relationships. Although many past studies have investigated situational (e.g., Ambrose & Schminke, 2003) and dispositional (e.g., Skarlicki et al., 1999) moderators of justice-to-outcome relationships, the current investigation provided the first known simultaneous test of both types of moderators. This approach is consistent with prior suggestions to approach phenomena via an interactionist perspective (Sedikides & Skowronski, 1990).

Third, in addition to comparing teams with varying levels of virtualness (see Ahjua & Galvin, 2003; Cramton, 2001), the current investigation provides a more realistic operationalization of virtual teams than many prior studies (e.g., Tangirala & Alge, 2006). Past treatments of virtual teams have tended to oversimplify their characteristics by creating an unrealistic dichotomy between entirely co-located and virtual teams; however, recent writing suggests that a tripartite conceptualization (i.e., co-located, hybrid, virtual) may be more appropriate because each type of team may have a

different relationship with related variables (Fiol & O'Connor, 2005). Therefore, although it is certainly possible for teams to function in a 100% virtual or 100% face-to-face fashion (see Aubert & Kelsey, 2003; Griffith & Neale, 2001; Javenpaa & Leidner, 2006; Majchrzak et al. 2004; Weiss, Massey, & Song, 2001), the current study followed suggestions to adopt a tripartite operationalization of teams (see Griffith & Neale, 2001; Martins et al., 2004; Sarbaugh-Thompson & Feldman, 2000). Indeed, it is possible that the inclusion of hybrid groups is necessary to understand the moderating effects of uncertainty on the relationship between justice and outcomes (see Walther, 1994).

This study also possesses practical implications. Again, counter to findings, in virtual teams, unfairness was not particularly destructive (e.g., leading to counterproductive behaviors) and fairness was not particularly constructive (e.g., leading to increased supervisory trust). Moreover, counter to past work, fairness perceptions did not differ across team type (Tangirala & Alge, 2006), nor did trust (Cascio, 2000; Majchrzak, 2004; Walther & Bunz, 2005). Therefore, organizations may not need to be concerned about expending additional resources to manage fairness or trust perceptions for virtual team members (Beugre, 1998) or for virtual team selection or training to maximize uncertainty management. Prior work has noted the importance of virtual team staffing (Harvey et al., 2004). Because results of the current study do not imply that that virtual teams are accompanied by "unique competency demands" (Harvey et al., 2004, p. 279; see also Furst et al., 1999) such as higher tolerance for uncertainty, decision makers may not need to worry about determining competencies that mitigate strong reactions to fairness and unfairness for virtual teams. More broadly, a lack of main effects and moderation suggest that virtual and co-located teams are similar in many ways.

Therefore, this research supports the utility of virtual teams relative to co-located ones (Cascio, 2000), providing that other challenges associated with virtual teams (e.g., lack of overlapping business hours) can be managed. Before results are used to justify organizational decisions, however, I urge future researchers to first replicate them in both field and laboratory settings.

Although organizations interested in managing fairness at a situational level may not need to treat virtual teams differently than co-located ones, results did indicate that certain individuals may experience intensified reactions to fairness because of dispositional uncertainty. Findings could be applied to both virtual and co-located teams. For example, because individuals who are dispositionally uncomfortable with uncertainty may have stronger reactions when unfairness is perceived than individuals who are comfortable with it, organizations may wish to assess dispositional uncertainty intolerance as part of team selection or team building, particularly when decisions may be perceived as unfair. Because dispositional uncertainty served a moderating role, however, I cannot recommend or caution against selecting based on these traits; rather, findings could help organizations understand how justice-to-outcome relationships differ as a function of individual differences.

At the very least, supportive findings from this study indicate that individuals with high levels of dispositional uncertainty intolerance may possess additional training needs beyond task based training. For example, organizations could conduct uncertainty management training at an individual or team level (see Kraiger, 2003), to alleviate the negative impact of unfairness. For example, in oncology research, physicians have implemented uncertainty management training for breast cancer survivors with

measurable success (Mishel, Germino, & Gil, 2005). A similar type of intervention might be useful for individuals or groups high in dispositional uncertainty.

Although the current study demonstrated that individuals high on dispositional uncertainty have more negative reactions to unfairness than those low on dispositional uncertainty, it also demonstrated that the former will have more positive reactions to fairness. Therefore, it is again difficult to argue that being high on dispositional uncertainty is "good" or "bad." Rather, dispositional uncertainty is a construct that managers and organizational decision makers must be aware of, particularly when decisions are being made that could be perceived unfair.

Conclusions

The current study answered prior calls for researchers to conduct experimental studies (Cohen-Charash & Spector, 2001) on moderators of justice effects (Nowakowski & Conlon, 2005) testing uncertainty management theory in specific contexts (van den Bos & Lind, 2002). In particular, I determined whether and how situational and dispositional uncertainty moderated relationships between procedural justice and outcomes. Findings suggested that dispositional uncertainty was more influential as a moderator than situational uncertainty was; specifically, situational uncertainty due to virtualness does not change relationships between justice and outcomes, but between person differences in reactions to justice exist. Given the importance of organizational justice in the workplace, I urge future researchers to continue to continue to apply uncertainty management theory to investigate moderators of justice effects. Doing so will help organizational decision makers further understand what factors intensify reactions to fairness and unfairness.

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Table 1

Means, Standard Deviations, Frequencies of Demographic Variables (N=302)

Variable	*Mean*	*SD*	*Frequency*	*Percentage*
1. Gender				
Male			91	30.1%
Female			202	68.9%
2. Age	19.35	1.64		
3. Race				
African-American			6	2.0%
White			250	82.8%
Asian American			11	3.6%
Hispanic / Latino/a			24	7.9%
Native American			2	0.7%
Other			2	0.7%

Table 2

Factor Loading Matrix for Team Uncertainty

	Item	Loading
1.	I knew how other team members felt about me.	.54
2.	I understood the expectations other team members had of me.	.68
3.	I felt sure about what my role in the team was.	.69
4.	I felt certain regarding how other team members viewed me.	.57
5.	I knew my place in the team.	.75
6.	I was able to understand what other team members needed from me.	.72
7.	I understood other team members' goals for the discussion.	.51
10.	When other team members contributed, I understood their perspective.	.47

Table 3

Factor Loading Matrix for Media Richness

	Item	Loading
1.	Give and receive timely feedback.	.56
2.	Transmit a variety of different information beyond verbal information (e.g., facial expressions).	.81
3.	Use rich and varied language.	.61
4.	Provide immediate feedback.	.55
5.	Convey multiple types of information (verbal and nonverbal).	.88
6.	Transmit varied information (e.g., words, numbers, pictures).	.40

Table 4

Factor Loading Matrix for Social Presence

	Item	Loading
3.	I felt comfortable conversing with others.	.82
4.	I felt a sense of community with my team members.	.48
5.	I felt comfortable participating in discussions with other team members.	.89
7.	I felt comfortable interacting with other participants in this study.	.87
8.	I felt that my point of view was acknowledged by other participants in this study.	.59

Table 5

Factor Loading Matrix for Supervisory Trust

	Item	Loading
1.	The study supervisor approaches his/her job with professionalism and dedication.	.88
2.	I see no reason to doubt the study supervisor's competence and preparation.	.87
3.	I can rely on the study supervisor not to needlessly make my participation in this study more difficult than necessary.	.78
4.	Most people, even those who aren't close friends of the study supervisor, trust and respect him/her.	.73
5.	Other team members in this session consider him/her to be trustworthy.	.70
7.	I see my study supervisor as trustworthy.	.83

Table 6

Correlations Between Uncertainty Intolerance and Risk Aversion (N = 294)

Variable	1	2	3	4
1. Uncertainty Intolerance: Uncertainty-act				
2. Uncertainty Intolerance Uncertainty-stress	.76**			
3. Uncertainty Intolerance: Uncertainty-unexpected	.51**	.59**		
4. Uncertainty Intolerance: Uncertainty-unnatural	.63**	.70**	.44**	
5. Risk Aversion	.19*	.29**	.26**	.15*

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

Table 7

Correlations Between Team Uncertainty, Media Richness and Social Presence (N = 294)

Variable	1	2
1. Team Uncertainty		
2. Social Presence	.39**	
3. Media Richness	.37**	.17**

Note. $^{**}p < .01$

Table 8

Descriptive Statistics for Study Variables (N = 302)

Variable	Mean	SD	Skew	SE	Kurtosis	SE
1. Risk Aversion	2.66	0.77	0.26	0.14	-0.21	0.28
2. Uncertainty Intolerance F1	2.16	0.59	0.13	0.14	-0.38	0.28
3. Uncertainty Intolerance F2	2.31	0.64	0.13	0.14	-0.09	0.28
4. Uncertainty Intolerance F3	2.74	0.65	-0.25	0.14	-0.46	0.28
5. Uncertainty Intolerance F4	2.43	0.68	0.34	0.14	0.26	0.28
6. Procedural Justice	3.97	0.74	-0.86	0.14	0.84	0.28
7. Reading Comprehension	7.23	1.02	-1.63	0.14	2.94	0.28
8. Supervisory Trust	4.10	0.80	-1.03	0.14	1.06	0.28
9. Baseline State Anger	1.25	0.38	2.58	0.14	9.43	0.28
10. State Anger	1.36	0.63	1.91	0.14	2.67	0.28
11. Baseline DS-NA	1.36	0.51	2.39	0.14	6.69	0.28
12. Anger DS-NA	1.20	0.39	3.37	0.14	14.14	0.29
13. Media Richness	2.98	0.88	0.02	0.14	-0.48	0.28
14. Social Presence	3.77	0.65	-0.68	0.14	1.44	0.28
15. Team Uncertainty	3.17	0.60	-0.51	0.14	0.42	0.28

Note. F1 = uncertainty-act, F2 = uncertainty-stress, F3 = uncertainty-unexpected, F4 = uncertainty-unnatural, DS-NA = Distress specific negative affectivity.
*$p < .05$, **$p < .01$

Table 9

Correlations Between Justice and Outcomes (N=302)

Variable	1	2	3	4	5	6	7
1. Procedural Justice	(.87)						
2. Reading Comprehension	.02	–					
3. Supervisory Trust	.72**	.05	(.91)				
4. Baseline State Anger	-.03	-.10	-.13*	(.80)			
5. State Anger	-.46**	-.08	-.40**	.20**	(.90)		
6. Baseline DS-NA	-.03	-.06	-.06	.62**	.20**	(.75)	
7. DS-NA	-.30**	-.12*	-.31**	.24**	.47**	.40**	(.77)

Note. DS-NA = Distress specific negative affectivity. When appropriate, coefficient alpha reliabilities are on the diagonal.
*$p < .05$, **$p < .01$

Table 10

Correlations Between Dispositional and Situational Uncertainty (N = 302)

Variable	1	2	3	4	5	6	7	8
1. Uncertainty Intolerance: Uncertainty-act	(.83)							
2. Uncertainty Intolerance: Uncertainty-stress	.76**	(.84)						
3. Uncertainty Intolerance: Uncertainty-unexpected	.51**	.59**	(.68)					
4. Uncertainty Intolerance: Uncertainty-unnatural	.63**	.70**	-.44**	(.69)				
5. Risk Aversion	.19**	.23**	.26**	.15**	(.90)			
6. Media Richness	-.08	-.08	-.07	-.03	.00	(.82)		
7. Social Presence	-.12*	-.09	-.02	-.07	-.07	.17**	(.84)	
8. Team Uncertainty	-.17*	-.11	-.07	-.15*	.02	.33**	.40**	(.83)

Note. Coefficient alpha reliabilities are on the diagonal.
*$p < .05$, **$p < .01$

Table 11

Descriptive Statistics for Procedural Justice as a Function of Experimental Condition

Variable	*M*	*SD*
1. Virtual / Voice	4.44	0.45
2. Hybrid / Voice	4.39	0.56
3. Co-located / Voice	4.25	0.53
4. Virtual / No Voice	3.49	0.77
5. Hybrid / No Voice	3.27	0.98
6. Co-located / No Voice	3.82	0.53

Table 12

Descriptive Statistics for State Anger as a Function of Experimental Condition

Variable	*M*	*SD*
1. Virtual / Voice	1.08	0.08
2. Hybrid / Voice	1.12	0.13
3. Co-located / Voice	1.25	0.07
4. Virtual / No Voice	1.67	0.07
5. Hybrid / No Voice	1.71	0.13
6. Co-located / No Voice	1.40	0.08

Table 13

Summary of Study Results

Hypothesis	*Support?*	*IV*	*DV*	*Moderator*	*Conclusions*
Hypothesis 1a	✗	Group type	Team uncertainty	n/a	Lower team uncertainty in virtual groups, higher in co-located groups.
Hypothesis 1b	✓	Group type	Media richness	n/a	Lower media richness in virtual groups, higher in co-located groups.
Hypothesis 1c	✗	Group type	Social presence	n/a	Higher social presence in virtual groups, lower in co-located groups.
Hypothesis 2	Not analyzed	Procedural Justice	Performance	Residual media richness	n/a
Hypothesis 3	✗	Procedural Justice	Supervisory Trust	Residual media richness	Media richness did not moderate the relationship between procedural justice and supervisory trust.
Hypothesis 4	✗	Procedural Justice	State Anger	Residual media richness	Media richness did not the moderate relationship between procedural justice and state anger.
Hypothesis 5	✗	Procedural Justice	Distress Specific Negative Affectivity	Residual media richness	Media richness did not moderate relationship between procedural justice and distress specific negative affectivity.
Hypothesis 6	Not analyzed	Procedural Justice	Cyberloafing	Residual media richness	n/a
Hypothesis 7a	Not analyzed	Procedural Justice	Performance	Factors 1 – 4 Uncertainty Intolerance	n/a
Hypothesis 7b	✓	Procedural Justice	Supervisory Trust	Uncertainty Intolerance: Uncertainty-act	Disordinal interaction: positive IV-DV relationship intensified for high uncertainty-act.
	✓	Procedural Justice	Supervisory Trust	Uncertainty Intolerance: Uncertainty-stress	Disordinal interaction: positive IV-DV relationship intensified for high uncertainty-stress.
	✓	Procedural Justice	Supervisory Trust	Uncertainty Intolerance: Uncertainty-unexpected	Disordinal interaction: positive IV-DV relationship intensified for high uncertainty-unexpected.
	✓	Procedural Justice	Supervisory Trust	Uncertainty Intolerance: Uncertainty-unnatural	Disordinal interaction: positive IV-DV relationship intensified for high uncertainty-unnatural.

Note. ✓ = hypothesis supported, ✗ = hypothesis not supported

Hypothesis	*Support?*	*IV*	*DV*	*Moderator*	*Conclusions*
Hypothesis 7c	✘	Procedural Justice	State Anger	Uncertainty Intolerance: Uncertainty-act	Uncertainty-act did not moderate relationship between procedural justice and state anger.
	✘	Procedural Justice	State Anger	Uncertainty Intolerance: Uncertainty-stress	Uncertainty-stress did not moderate relationship between procedural justice and state anger.
	✘	Procedural Justice	State Anger	Uncertainty Intolerance: Uncertainty-unexpected	Uncertainty-unexpected did not moderate relationship between procedural justice and state anger.
	✘	Procedural Justice	State Anger	Uncertainty Intolerance: Uncertainty-unnatural	Uncertainty-unnatural did not moderate relationship between procedural justice and state anger.
Hypothesis 7d	✓	Procedural Justice	Distress Specific Negative Affectivity	Uncertainty Intolerance: Uncertainty-act	Disordinal interaction: negative IV-DV relationship intensified for high uncertainty-act.
	✘	Procedural Justice	Distress Specific Negative Affectivity	Uncertainty Intolerance: Uncertainty-stress	Uncertainty-stress did not moderate relationship between procedural justice and distress specific negative affectivity.
	✓	Procedural Justice	Distress Specific Negative Affectivity	Uncertainty Intolerance: Uncertainty-unexpected	Ordinal interaction: negative IV-DV relationship intensified for high uncertainty-unexpected under conditions of unfairness, but not conditions of fairness.
	✓	Procedural Justice	Distress Specific Negative Affectivity	Uncertainty Intolerance: Uncertainty-unnatural	Ordinal interaction: negative IV-DV relationship intensified for high uncertainty-unnatural under conditions of unfairness, but not conditions of fairness.
Hypothesis 7e	Not analyzed	Procedural Justice	Cyberloafing	Factors 1 – 4 Uncertainty Intolerance	n/a
Hypothesis 8a	Not analyzed	Procedural Justice	Performance	Risk Aversion	n/a
Hypothesis 8b	✘	Procedural Justice	Supervisory Trust	Risk Aversion	Risk aversion did not moderate the relationship between procedural justice and supervisory trust.
Hypothesis 8c	✘	Procedural Justice	State Anger	Risk Aversion	Risk aversion did not moderate the relationship between procedural justice and state anger.
Hypothesis 8d	✓	Procedural Justice	Distress Specific Negative Affectivity	Risk Aversion	Ordinal interaction: negative IV-DV relationship intensified for high risk aversion under conditions of unfairness, but not conditions of fairness.
Hypothesis 8e	Not analyzed	Procedural Justice	Cyberloafing	Risk Aversion	n/a

Figure 1. Proposed model of situational and dispositional uncertainty as moderators of justice-to-outcome relationships.

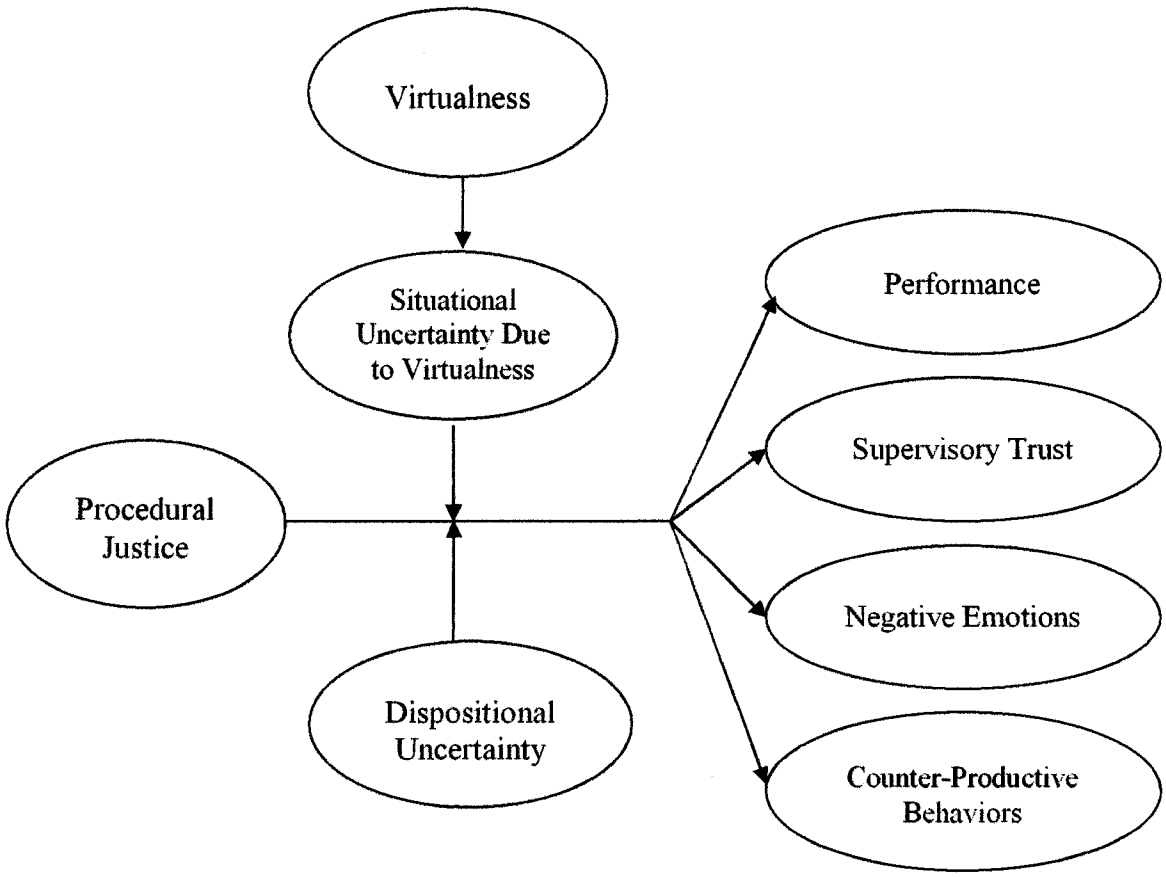


Figure 2. Hypotheses 1 – 8.

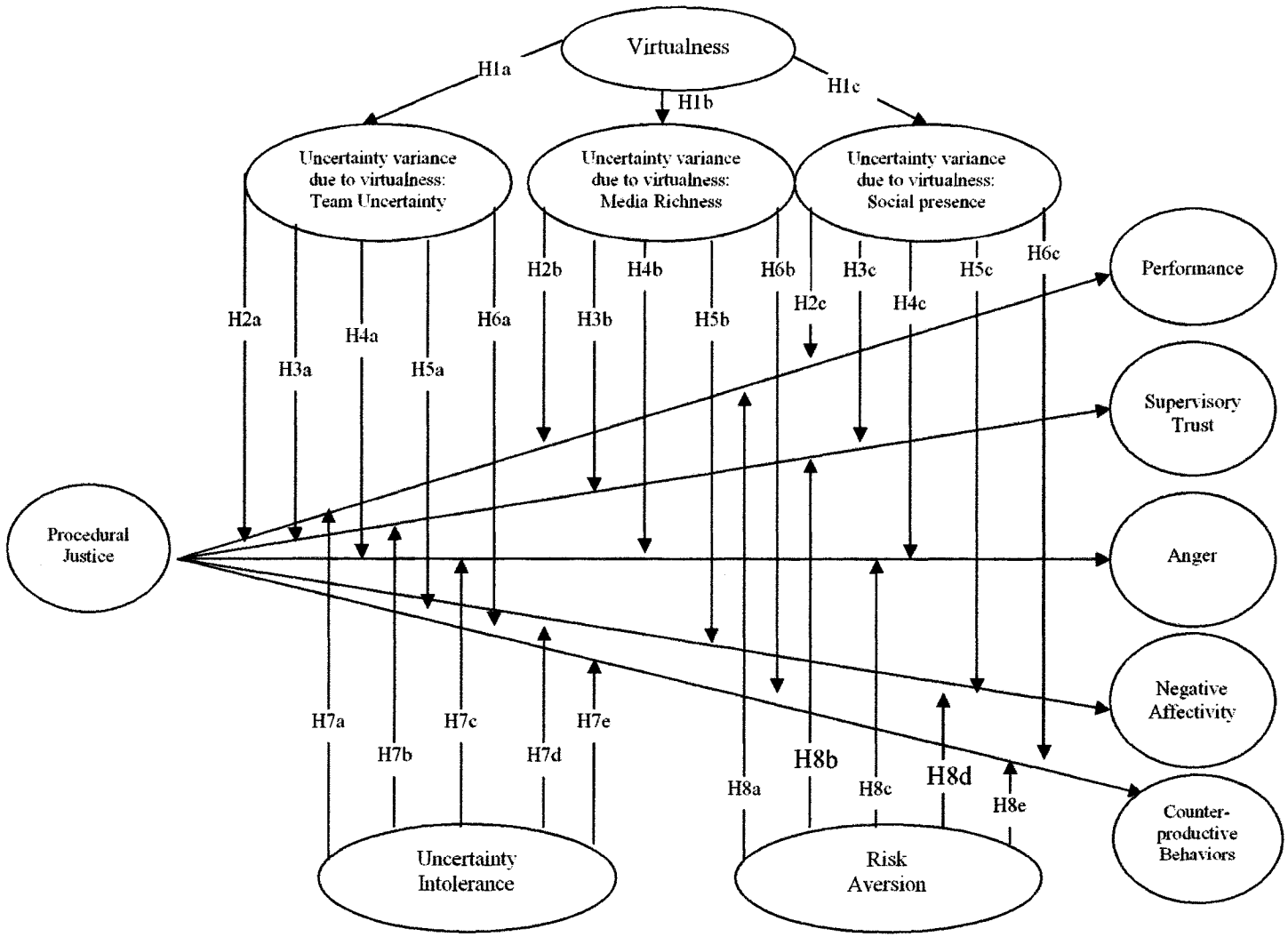


Figure 3. Results for Hypothesis 7b: Uncertainty-Act

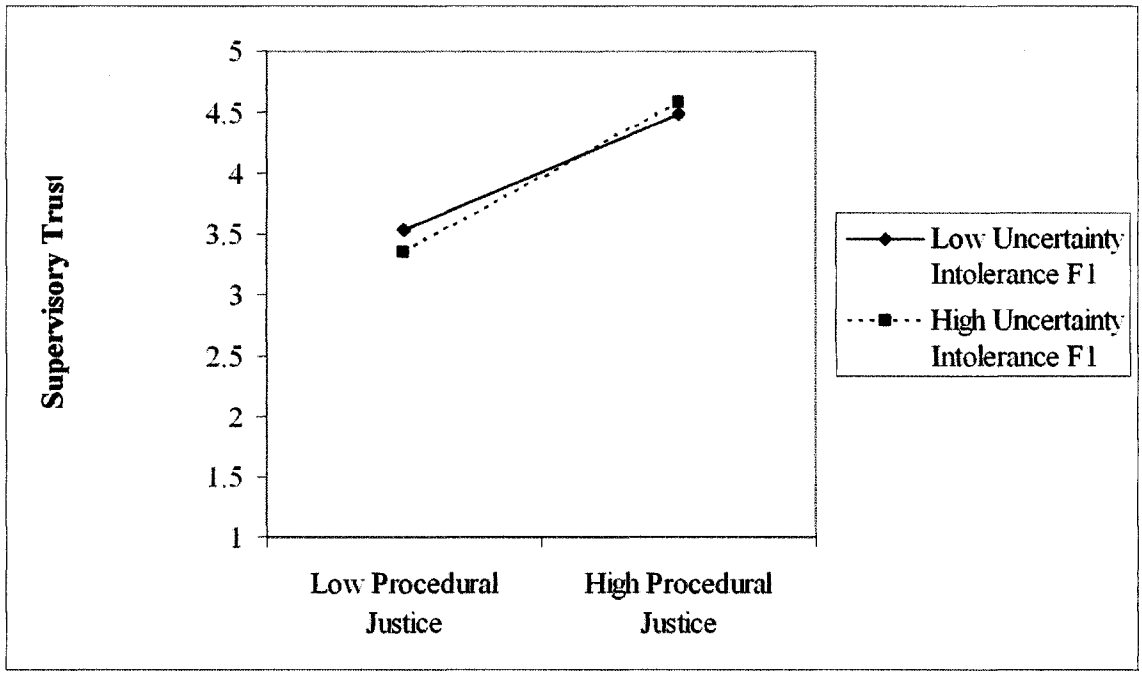


Figure 4. Results for Hypothesis 7b: Uncertainty-Stress

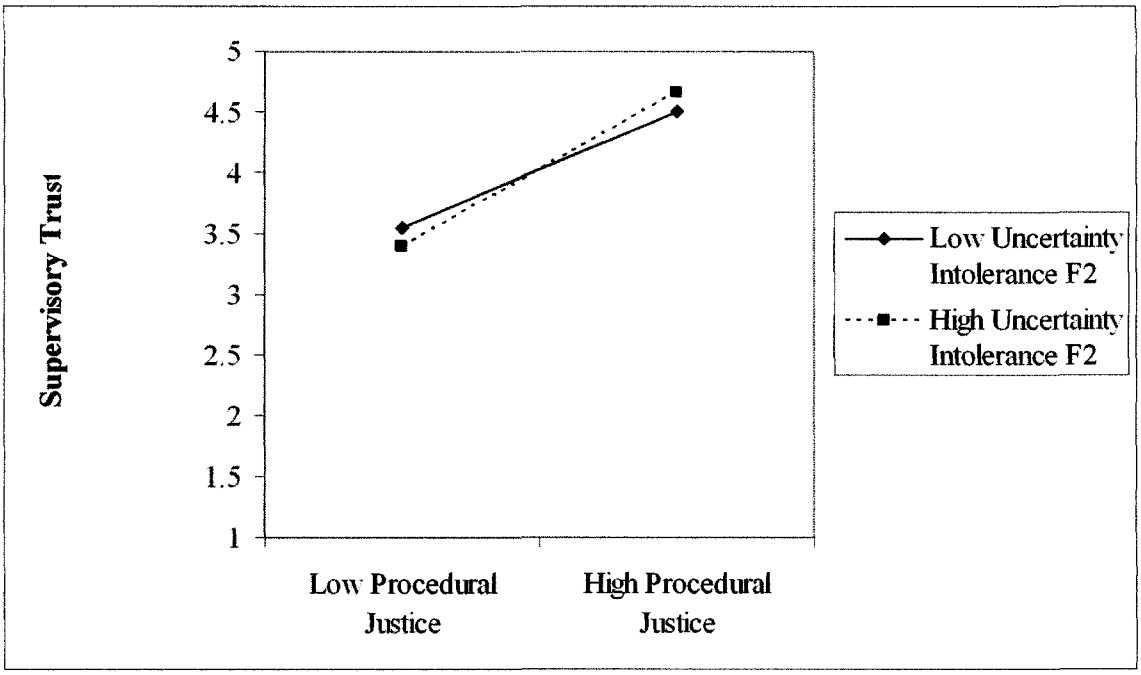


Figure 5. Results for Hypothesis 7b: Uncertainty-Unexpected

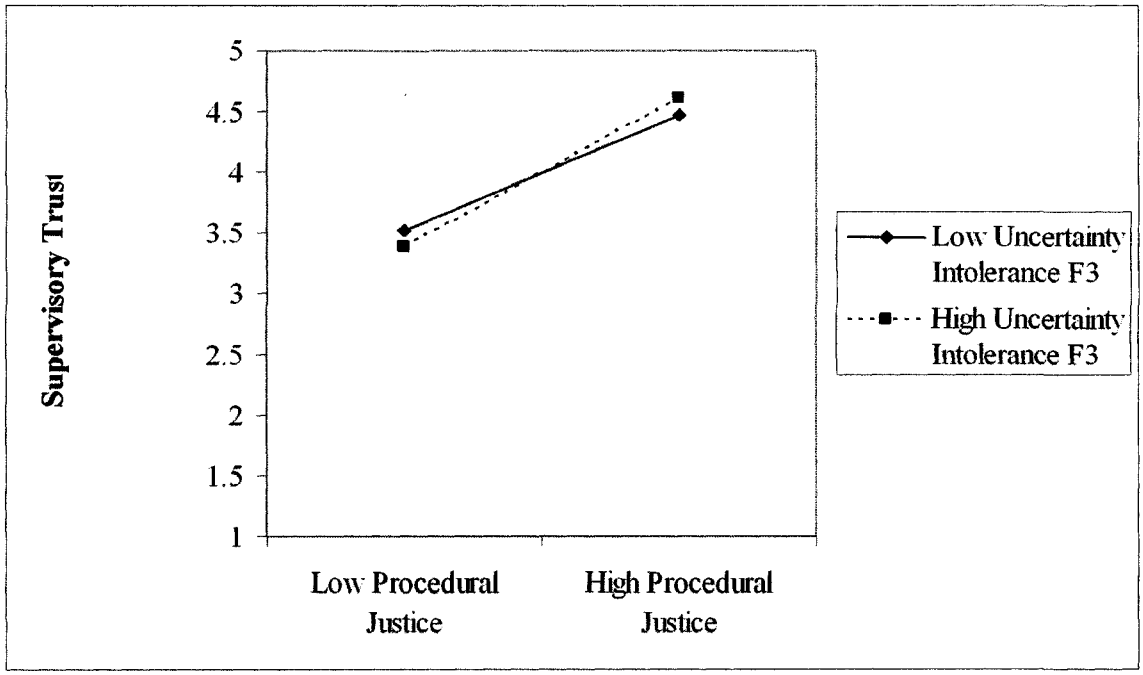


Figure 6. Results for Hypothesis 7b: Uncertainty-Unnatural

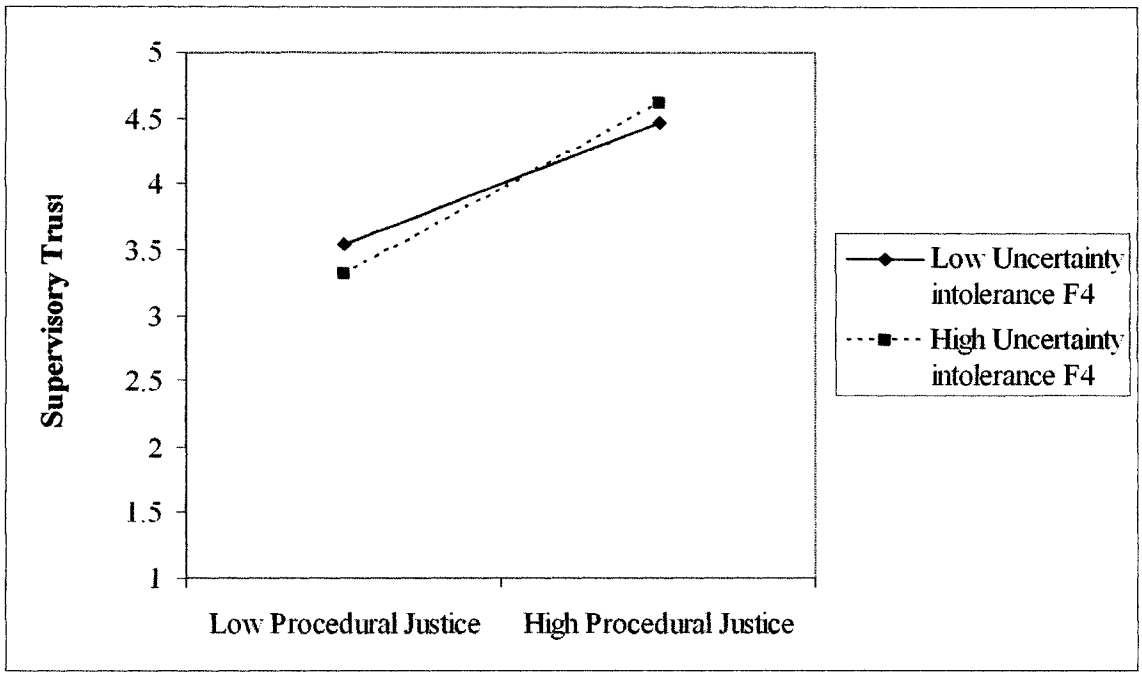


Figure 7. Results for Hypothesis 7c: Uncertainty-Unnatural

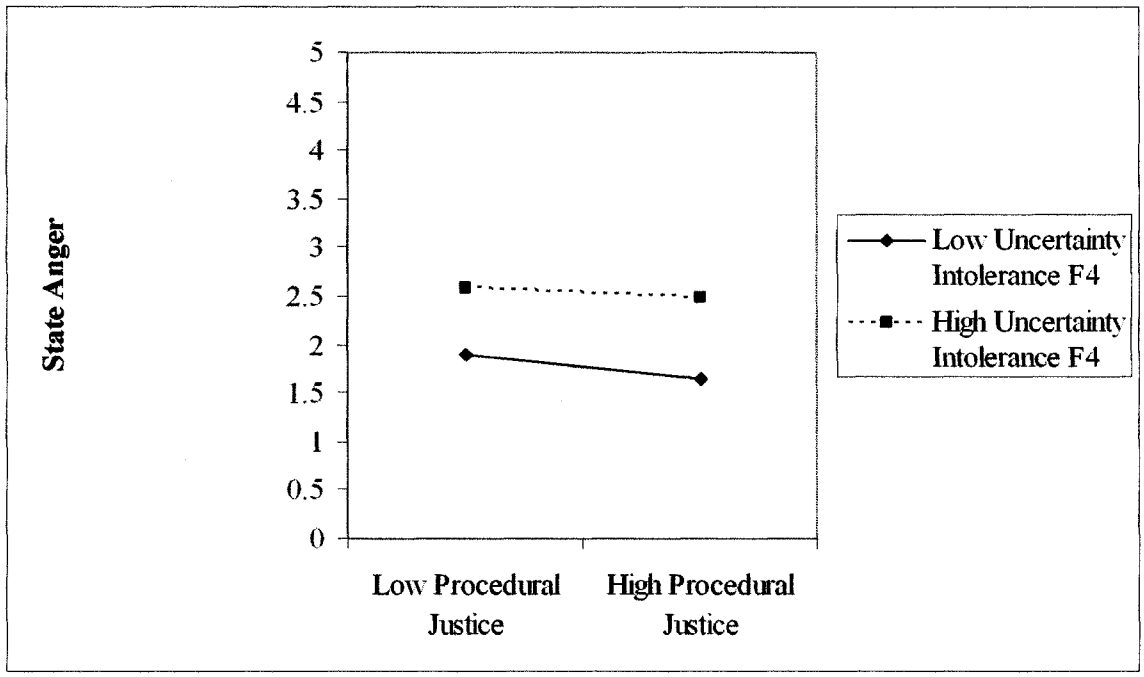


Figure 8. Results for Hypothesis 7d: Uncertainty-Act

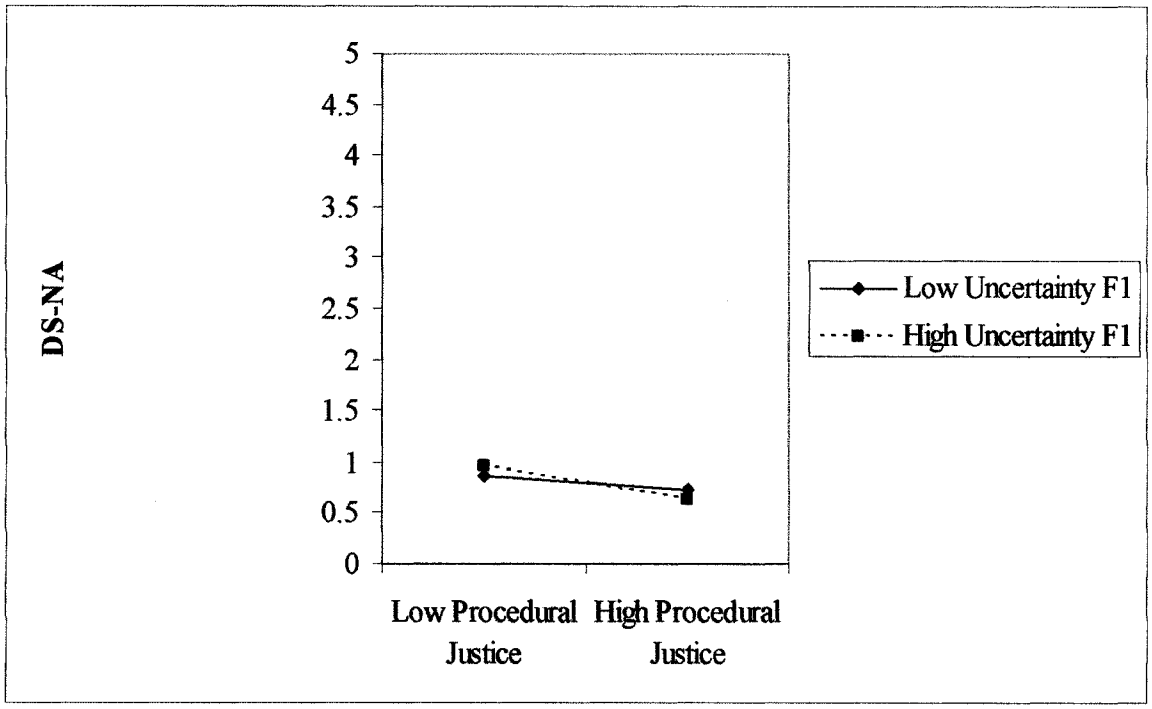


Figure 9. Results for Hypothesis 7d: Uncertainty-Unexpected

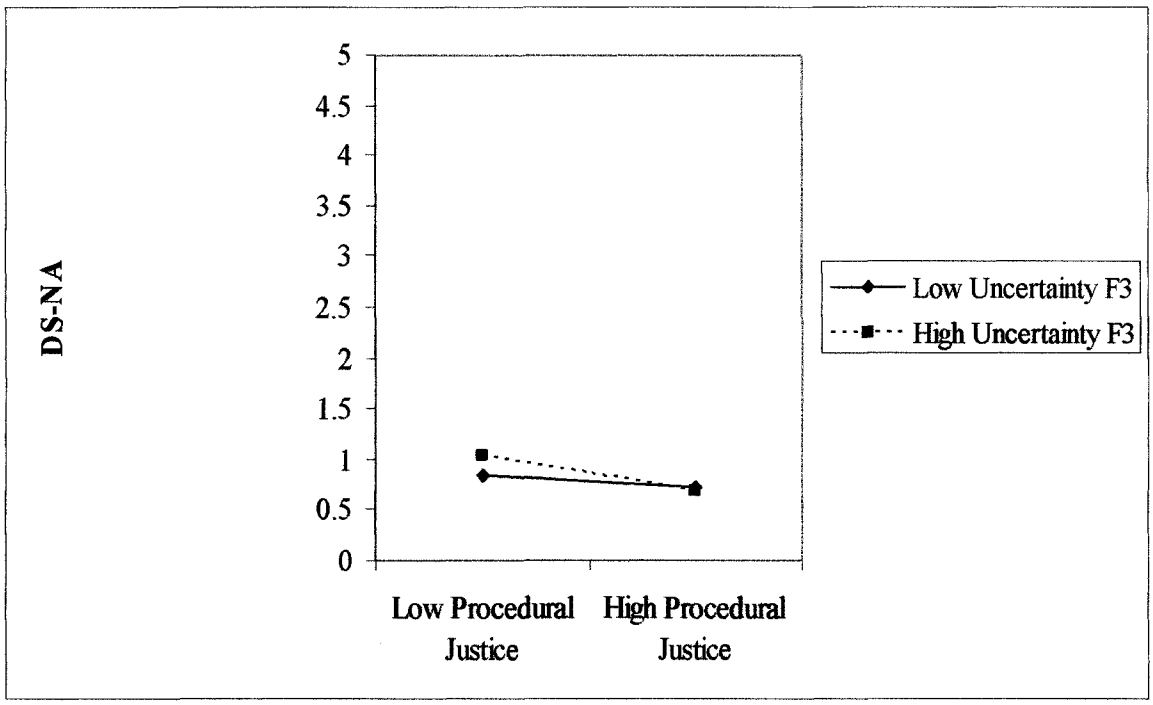


Figure 10. Results for Hypothesis 7d: Uncertainty-Unnatural

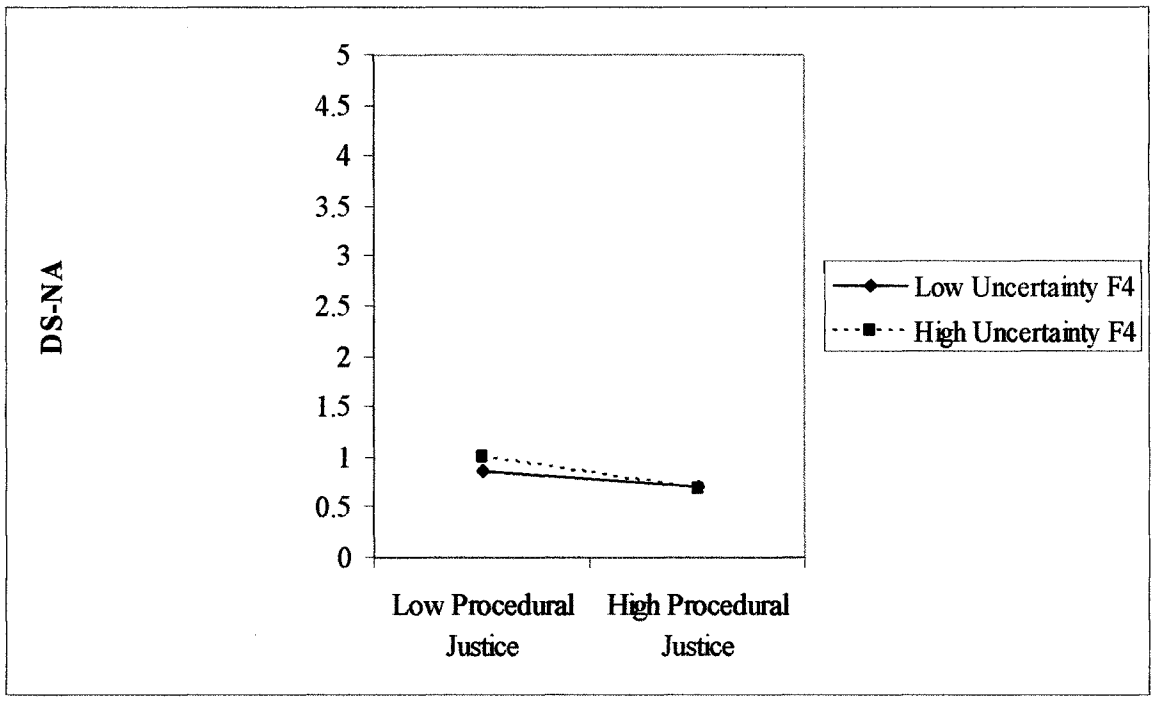
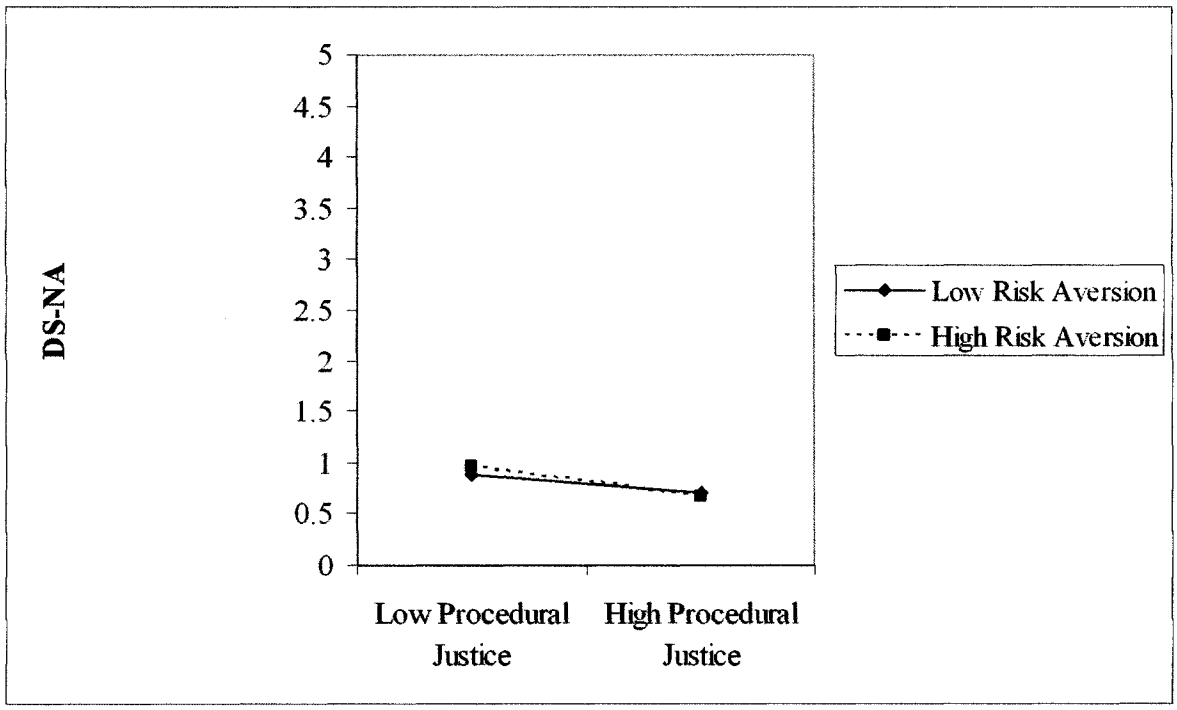


Figure 11. Results for Hypothesis 8d: Risk Aversion



Appendix A

Procedural Justice Scale

Strongly disagree 1	Disagree 2	Neither disagree nor agree 3	Agree 4	Strongly Agree 5

The following items refer to the procedures used to determine how rewards, such as cash prizes, were allocated in this study. Please read each statement, and circle the number on the scale that most closely corresponds with your attitude. *Please circle only one number per item, and leave none blank.*

1.	I have been able to express my views and feelings during the study supervisor's procedures.	1	2	3	4	5
2.	I have had influence over the outcome arrived at by the study supervisor's procedures.	1	2	3	4	5
3.	The study supervisor's procedures have been applied consistently.	1	2	3	4	5
4.	The study supervisor's procedures have been free of bias.	1	2	3	4	5
5.	The study supervisor's procedures were based on accurate information.	1	2	3	4	5
6.	I would be able to appeal decision arrived at by the study supervisor's procedures.	1	2	3	4	5
7.	The study supervisor's procedures upheld ethical and moral standards.	1	2	3	4	5

Appendix B

Situational Uncertainty Scales

Team Uncertainty Scale (Developed for use in the current study)

Strongly disagree 1	Disagree 2	Neither disagree nor agree 3	Agree 4	Strongly Agree 5

This scale consists of a number of statements that may or may not describe your experience in today's study. Read each statement, and then circle the appropriate number in the space next to it. *Please circle only one number, and leave none blank.* During the Lost at Sea discussion with my teammates.....

1.	I knew how other team members felt about me.	1	2	3	4	5
2.	I understood the expectations other team members had of me.	1	2	3	4	5
3.	I felt sure about what my role in the team was.	1	2	3	4	5
4.	I felt certain regarding how other team members viewed me.	1	2	3	4	5
5.	I knew my place in the team.	1	2	3	4	5
6.	I was able to understand what other team members needed from me.	1	2	3	4	5
7.	I understood other team members' goals for the discussion.	1	2	3	4	5
8.	I had sufficient information about other team members.	1	2	3	4	5
9.	I was able to observe the effort other team members put forth.	1	2	3	4	5
10.	When other team members contributed, I understood their perspective.	1	2	3	4	5
11.	I understood the motives of other team members.	1	2	3	4	5
12.	I was able to gather personal information about other team members.	1	2	3	4	5
13.	I could understand other team members' arguments.	1	2	3	4	5
14.	I was able to observe how other team members were acting to determine how I should behave.	1	2	3	4	5
15.	I could easily interpret information from other team members.	1	2	3	4	5

Perceived Media Richness Scale

Not at all 1	2	3	4	To a great extent 5

In our daily interactions, there are many ways to communicate with others, including face-to-face discussion, telephone, e-mail, and instant messaging.

Think of the method(s) in which you communicated *with other study participants* in this study. To what extent would you characterize this method (methods) as having the ability to:

1.	Give and receive timely feedback.	1	2	3	4	5
2.	Transmit a variety of different information beyond verbal information (e.g., facial expressions).	1	2	3	4	5
3.	Use rich and varied language.	1	2	3	4	5
4.	Provide immediate feedback.	1	2	3	4	5
5.	Convey multiple types of information (verbal and nonverbal).	1	2	3	4	5
6.	Transmit varied information (e.g., words, numbers, pictures).	1	2	3	4	5

Social Presence Scale

Strongly disagree 1	Disagree 2	Neither disagree nor agree 3	Agree 4	Strongly Agree 5

This scale consists of a number of statements that describe different feelings about your interaction with other team members during the Lost at Sea exercise. Read each statement and then circle the appropriate number in the space next to it. *Please circle only one number, and leave none blank.*

1.	Communication was impersonal.*	1	2	3	4	5
2.	This study provided an excellent stage for social interaction.	1	2	3	4	5
3.	I felt comfortable conversing with others.	1	2	3	4	5
4.	I felt a sense of community with my team members.	1	2	3	4	5
5.	I felt comfortable participating in discussions with other team members.	1	2	3	4	5
6.	Discussions in this study tended to be impersonal.*	1	2	3	4	5
7.	I felt comfortable interacting with other participants in this study.	1	2	3	4	5
8.	I felt that my point of view was acknowledged by other participants in this study.	1	2	3	4	5
9.	I was able to form distinct individual impressions of other participants in the study.	1	2	3	4	5

* = item is reverse coded

Appendix C

Reading Comprehension Exercise

To ensure your understanding of the exercise in which you just participated, you are now asked to complete a reading comprehension task. You will recognize the passage below, which you read at the beginning of the Lost at Sea task.

Please re-read the passage and answer the questions that follow.

> You have been a guest on a private yacht in the South Pacific. In the early afternoon you mentioned to the other passengers that it would be a great time for a siesta. They agreed and you departed for your cabin. You placed your billfold or purse and watch in a drawer with your other valuables and without undressing, you stretched out on your bunk.
>
> You were not sure how long you had been sleeping when you heard someone yell, "Fire!" You bounded out of bed, then just before opening the door, you stopped. You felt the door, realizing it was not hot, and left your cabin to investigate the yelling. The flames are billowing smoke on the top deck confirmed that the vessel was in trouble. Quickly ascertaining that all the crew and passengers were present, you pitched in and helped to fight the blaze.
>
> Unfortunately, the fire spread quickly. It was not subdued until the charred bow had broken off and was sinking. By this time, the stern was dangerously tilted and you knew it would not be long before it, too, would be sinking.
>
> On the positive side, the crew salvaged the rubber life raft and oars without damage. The raft was large enough to carry all the passengers, including the crew. The group was able to save only a few items from destruction, and there was also room on the raft for these.
>
> You are now on the raft. Because the navigational equipment was destroyed plus the fact that everyone was distracted by the fire, your location is unclear. Your best estimate is that you are approximately 1,000 miles south/southwest of the nearest land. Because of the cloud cover and the heavy smoke, you are not sure what time of day it is. Two people are wearing watches, but the timepieces do not agree. You presume night will be falling shortly. When the passengers empty their pockets, only a packet of cigarettes, several books of matches, and five one dollar bills were produced.
>
> You have survived the fire. Your next concern is to try to survive the sea.

1. When did you realize that the fire was serious and posed a dangerous situation?

    a. When you saw flames under the deck
    b. When smoke billowed under your door
    c. When you saw flames on the top deck
    d. When you woke up from your siesta

2. When you are on the raft, how sure are you regarding your location?

    a. You are certain
    b. You can only estimate
    c. You cannot even estimate

3. Whose idea was the afternoon siesta?

    a. The captain's
    b. Yours
    c. The other passengers'

4. At what point was the fire subdued?

    a. When the bow had broken off and was sinking
    b. When the stern had broken off and was sinking
    c. When the smoke stopped billowing on the top deck
    d. When the cabin cracked in half

5. At what time of day do you and your fellow passengers find yourselves stranded on the life raft?

    a. Early morning
    b. Late morning
    c. Early afternoon
    d. Late afternoon

6. What item was NOT in the pocket of your fellow passengers?

    a. Matches
    b. Cigarettes
    c. Change
    d. Money

7. Why did you wake up from your nap?

    a. You smelled smoke
    b. Someone yelled "Fire!"
    c. Your bunkmate woke you up
    d. Your bureau was engulfed in flames

8. Which item was NOT in your drawer while you were taking a siesta?

    a. Your valuables
    b. Your glasses
    c. Your billfold / purse
    d. Your watch

Appendix D

Supervisory Trust Scale

Strongly disagree 1	Disagree 2	Neither disagree nor agree 3	Agree 4	Strongly Agree 5

The following items refer to your feelings about your study supervisor. Please read each question, and circle your response on a scale from 1 (strongly disagree) to 5 (strongly agree).

1.	The study supervisor approaches his/her job with professionalism and dedication.	1	2	3	4	5
2.	I see no reason to doubt the study supervisor's competence and preparation.	1	2	3	4	5
3.	I can rely on the study supervisor not to needlessly make my participation in this study more difficult than necessary.	1	2	3	4	5
4.	Most people, even those who aren't close friends of the study supervisor, trust and respect him/her.	1	2	3	4	5
5.	Other team members in this session consider him/her to be trustworthy.	1	2	3	4	5
6.	If people knew more about the study supervisor, they would be more concerned and monitor his/her performance more closely.*	1	2	3	4	5
7.	I see my study supervisor as trustworthy.	1	2	3	4	5

* item is reverse coded

Appendix E

Negative Emotions Scales

State Anger Scale

Not at All 1	Somewhat 2	Moderately So 3	Very Much So 4

The following items refer to your emotions *at this moment / when you think about the procedures used to determine how rewards, such as cash prizes, were allocated in this study.* For the following items, please read each question, and circle your response on a scale from 1 (strongly disagree) to 5 (strongly agree).

1.	I feel angry.	1	2	3	4	5
2.	I am furious.	1	2	3	4	5
3.	I feel irritated.	1	2	3	4	5
4.	I am mad.	1	2	3	4	5
5.	I am annoyed.	1	2	3	4	5

State Negative Affectivity Scale

Very Slightly or Not At All 1	A Little 2	Moderately 3	Quite a Bit 4	Extremely 5

This scale consists of a number of words that describe different feelings and emotions. Read each item and then circle the appropriate number in the space next to that word. Indicate to what extent you feel this way *at this moment / when you think about the procedures used by the study supervisor to determine rewards, such as cash prizes.* Please circle only one number per descriptive word, and leave none blank.

1.	Distressed	1	2	3	4	5
2.	Upset	1	2	3	4	5
3.	Guilty	1	2	3	4	5
4.	Scared	1	2	3	4	5
5.	Hostile	1	2	3	4	5
6.	Irritable	1	2	3	4	5
7.	Ashamed	1	2	3	4	5
8.	Nervous	1	2	3	4	5
9.	Jittery	1	2	3	4	5
10.	Afraid	1	2	3	4	5

Appendix F

Dispositional Uncertainty Scales

Uncertainty Intolerance Scale

Very uncharacteristic of me 1	Uncharacteristic of me 2	Neutral 3	Characteristic of me 4	Very characteristic of me 5

This scale consists of a number of statements that may or may not describe you. Read each statement, and then circle the appropriate number in the space next to it. *Please circle only one number, and leave none blank.*

1.	Uncertainty stops me from having a strong opinion.	1	2	3	4	5
2.	Being uncertain means a person is disorganized.	1	2	3	4	5
3.	Uncertainty makes life intolerable.	1	2	3	4	5
4.	It's unfair having no guarantees in life.	1	2	3	4	5
5.	My mind can't be relaxed if I don't know what will happen tomorrow.	1	2	3	4	5
6.	Uncertainty makes me uneasy, anxious, or stressed.	1	2	3	4	5
7.	Unforeseen events upset me greatly.	1	2	3	4	5
8.	It frustrates me not having all the information I need.	1	2	3	4	5
9.	Uncertainty keeps me from living a full life.	1	2	3	4	5
10.	One should always look ahead to avoid surprises.	1	2	3	4	5
11.	A small unforeseen event can spoil everything, even with the best planning.	1	2	3	4	5
12.	When it's time to act, uncertainty paralyses me.	1	2	3	4	5
13.	Being uncertain means that I am not first rate	1	2	3	4	5
14.	When I am uncertain, I can't go forward.	1	2	3	4	5
15.	When I am uncertain, I can't function very well.	1	2	3	4	5
16.	Unlike me, others seem to know where they are going in their lives.	1	2	3	4	5
17.	Uncertainty makes me vulnerable, unhappy, or sad.	1	2	3	4	5
18.	I always want to know what the future has in store for me.	1	2	3	4	5

19.	I can't stand being taken by surprise.	1	2	3	4	5
20.	The smallest doubt can keep me from acting.	1	2	3	4	5
21.	I should be able to organize everything in advance.	1	2	3	4	5
22.	Being uncertain means I lack confidence.	1	2	3	4	5
23.	I think it's unfair that other people seem to be sure about their future.	1	2	3	4	5
24.	Uncertainty keeps me from sleeping soundly.	1	2	3	4	5
25.	I must get away from all uncertain situations.	1	2	3	4	5
26.	The ambiguities in life stress me.	1	2	3	4	5
27.	I can't stand being undecided about my future.	1	2	3	4	5

Risk Aversion Scale

Very Inaccurate 1	Moderately Inaccurate 2	Neither Inaccurate nor Accurate 3	Moderately Accurate 4	Very Accurate 5

This scale consists of a number of statements that may or may not describe you. Read each statement, and then circle the appropriate number in the space next to it. *Please circle only one number, and leave none blank.*

1.	I do dangerous things.*	1	2	3	4	5
2.	I enjoy being reckless.*	1	2	3	4	5
3.	I take risks.*	1	2	3	4	5
4.	I do crazy things.*	1	2	3	4	5
5.	I seek danger.*	1	2	3	4	5
6.	I am willing to try anything once.*	1	2	3	4	5
7.	I seek adventure.*	1	2	3	4	5
8.	I would never go hang-gliding or bungee-jumping.	1	2	3	4	5
9.	I would never make a high risk investment.	1	2	3	4	5
10.	I avoid dangerous situations.	1	2	3	4	5

* = item is reverse coded

Appendix G

Lost at Sea Instructions

You have been a guest on a private yacht in the South Pacific. In the early afternoon you mentioned to the other passengers that it would be a great time for a siesta. They agreed and you departed for your cabin. You placed your billfold or purse and watch in a drawer with your other valuables and without undressing, you stretched out on your bunk.

You were not sure how long you had been sleeping when you heard someone yell, "Fire!" You bounded out of bed, then just before opening the door, you stopped. You felt the door, realizing it was not hot, and left your cabin to investigate the yelling. The flames are billowing smoke on the top deck confirmed that the vessel was in trouble. Quickly ascertaining that all the crew and passengers were present, you pitched in and helped to fight the blaze.

Unfortunately, the fire spread quickly. It was not subdued until the charred bow had broken off and was sinking. By this time, the stern was dangerously tilted and you knew it would not be long before it, too, would be sinking.

On the positive side, the crew salvaged the rubber life raft and oars without damage. The raft was large enough to carry all the passengers, including the crew. The group was able to save only a few items from destruction, and there was also room on the raft for these.

You are now on the raft. Because the navigational equipment was destroyed plus the fact that everyone was distracted by the fire, your location is unclear. Your best estimate is that you are approximately 1,000 miles south/southwest of the nearest land. Because of the cloud cover and the heavy smoke, you are not sure what time of day it is. Two people are wearing watches, but the timepieces do not agree. You presume night will be falling shortly. When the passengers empty their pockets, only a packet of cigarettes, several books of matches, and five one dollar bills were produced.

You have survived the fire. Your next concern is to try to survive the sea.

Activity #1

You are to assume that your group comprises the survivors of the fire. This task will be an exercise in group discussion, and your group will talk about the usefulness of each of the 15 items that have been salvaged and brought aboard the raft. The purpose of this discussion is to help you individually rank each item at the end of the group discussion. Essentially, five heads are better than one, and you and your group members can help each other think through your ranking strategies. You will have 10 minutes total for this component of the task. You are free to take notes during this discussion if it is helpful to you.

Activity #2

Now that your group has discussed the merits of each item, your task is now to rank the following items in terms of their usefulness. Please the number "1"" next to the item you believe to be the most important to your survival and the number "2" by the second most important. Rank the entire list, so that number "15" represents the item that you believe is the least important to your survival. You will have 5 minutes to complete this task.

Item	Ranking (1 – 15)
Fifteen Feet of Nylon Rope	
Fishing Kit	
Five gallon can of water	
Maps of the Pacific Ocean	
Mosquito netting	
One case of U.S. Army C rations	
One quart of 160-proof Puerto Rican Rum	
Seat cushion flotation device	
Sextant	
Shark repellent	
Shaving mirror	
Small transistor radio	
Twenty square feet of opaque plastic	
Two boxes of chocolate bars	
Two gallon can of oil-gasoline mixture	

Appendix H

Psychology Department Letter

Department of Psychology

1876 Campus Delivery
Colorado State University
Fort Collins, CO 80523-1876

The Psychology Department at Colorado State University would like your input on **today's session** of the research experiment. You are requested to respond to the items that follow keeping in mind the way the session was conducted and how you and your team were treated by the study supervisor. This survey would be used by our office to evaluate how efficiently and properly this session of the research study has been conducted.

Our overall objective is to evaluate whether participants are being given the required resources to complete their tasks and evaluated accurately and properly in these kinds of research studies in the Psychology Department CSU. We consider that proper and fair treatment of participants in research studies is an essential part of maintaining the quality of research. Your responses are completely confidential. We request you to kindly put the questionnaire back in the envelope before returning it. Please answer all the questions in this questionnaire. Thank you!

Appendix I

Pictorial Representation of Procedure

Prior to the below procedure, participants were assigned to a group of between three to six participants. Study supervisors told participants about their role in the study, and provided an explanation regarding how to use the web-based surveys and the chat software. Following these initial instructions, the following took place.

Legend
= face-to-face presentation / discussion
= instant messaging / chat
= web-based survey
= paper-and-pencil survey

		High Procedural Fairness		*Low Procedural Fairness*
Virtual Groups		Dispositional uncertainty, baseline emotions measure		Dispositional uncertainty, baseline emotions measure
		Instruction and information about Lost at Sea Task		Instruction and information about Lost at Sea Task
		Group discussion *(15 minutes)*		Group discussion *(15 minutes)*
		Individual rankings *(5 minutes)*		Individual rankings *(5 minutes)*
		Voice explanation from study supervisor		Voice explanation from study supervisor
		Provision of voice		Provision of voice
		Psychology department survey		Psychology department survey
		Reading comprehension task *(5 minutes)*		Reading comprehension task *(5 minutes)*
		Reviewing rankings (Cyberloafing) *(5 minutes)*		Reviewing rankings (Cyberloafing) *(5 minutes)*
		Situational uncertainty measures and demographics		Situational uncertainty measures and demographics
		Participant Debriefing		Participant Debriefing

Hybrid Groups		Dispositional uncertainty, baseline emotions measure		Dispositional uncertainty, baseline emotions measure
		Instruction and information about Lost at Sea Task		Instruction and information about Lost at Sea Task
		Group discussion *(5 minutes)*		Group discussion *(5 minutes)*
		Group discussion *(7 minutes)*		Group discussion *(7 minutes)*
		Individual rankings *(5 minutes)*		Individual rankings *(5 minutes)*
		Voice explanation from study supervisor		Voice explanation from study supervisor
		Provision of voice		Provision of voice
		Psychology department survey		Psychology department survey
		Reading comprehension task *(5 minutes)*		Reading comprehension task *(5 minutes)*
		Reviewing rankings (Cyberloafing) *(5 minutes)*		Reviewing rankings (Cyberloafing) *(5 minutes)*
		Situational uncertainty measures and demographics		Situational uncertainty measures and demographics
		Participant Debriefing		Participant Debriefing
Co-Located Groups		Dispositional uncertainty, baseline emotions measure		Dispositional uncertainty, baseline emotions measure
		Instruction and information about Lost at Sea Task		Instruction and information about Lost at Sea Task
		Group discussion *(10 minutes)*		Group discussion *(10 minutes)*
		Individual rankings *(5 minutes)*		Individual rankings *(5 minutes)*
		Voice explanation from study supervisor		Voice explanation from study supervisor
		Provision of voice		Provision of voice
		Psychology department survey		Psychology department survey
		Reading comprehension task *(5 minutes)*		Reading comprehension task *(5 minutes)*
		Reviewing rankings (Cyberloafing) *(5 minutes)*		Reviewing rankings (Cyberloafing) *(5 minutes)*
		Situational uncertainty measures and demographics		Situational uncertainty measures and demographics
		Participant Debriefing		Participant Debriefing