


# The Effects of Scenario Planning on Participant Perceptions of Creative Organizational Climate

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## Abstract

This research reports on the effects of scenario planning on participant perceptions of organizational creative climate. Participants from scenario planning projects in four different organizations were asked to contribute to the study as well as participants from four similar organizations that did not receive scenario planning. The scenario work took place over the course of 3 months and data were collected as pre- and posttests. Comparisons were made that suggest some significant changes over the course of the intervention period for the intervention group, but not for the comparison group. Results and limitations are discussed in detail and recommendations for future research are provided.

## Keywords

scenario planning, creative organizational climate, research on scenario planning effects

## Introduction

The purpose of this study was to examine the effects of scenario planning on perceptions on organizational creative climate. Many scenario planning experts have claimed that scenario planning can positively affect organizational climate (Kahane, 2012; van der Heijden, 1996, 2004; Wade, 2012), but there is currently no evidence of such an impact. There is a clear logical rationale for how scenario planning could support a creative climate, and this research will explore the connection with a quasi-experimental approach.

The core purpose of scenario planning is to expand decision-maker views of what might happen in the future external environment (Wack, 1984c). Dialogue, conversation, and deep analysis of the external environment and its drivers are the main features of scenario planning and these activities are shared among a group of coparticipants. Diversity in viewpoint, experience, position in the organization, and alternative perspectives are purposefully sought to challenge the common opinions inside the organization (Wack, 1984a, 1984b).

While there is increasing variation in exactly what constitutes scenario planning, developers of the method intended it to be a deep study of the dynamics that drive a particular situation (Schwartz, 1996). By rigorously analyzing those dynamics, key relationships could be uncovered. Through exploration of different configurations of key relationships, pioneers were able to explore how the situations they faced could evolve in dramatically different ways to

what was expected (Derbyshire & Wright, 2014; Goodwin & Wright, 2010). For example, in the most notorious scenario planning case in history, Shell Oil famously avoided the oil crisis of 1973 because its decision makers had undergone the scenario planning process (van der Heijden, 1996; Wack, 1984c). Decision makers had worked through the wide range of all plausible possibilities of the future in their industry, envisioning scenarios in which a variety of unexpected and challenging occurrences arose. Consequently, when the crisis first began, they were able to adapt quickly, flexibly, because they had already prepared; they recognized the signals in their environment, and put strategies into place to cope (van der Heijden, 1996; Wack, 1984c; Wilkinson, 2014).

These kinds of processes were conducted over several months to a year, and required deep thinking and reflection. The ultimate value, as learned initially through the Shell scenarios, was that decision makers underwent a process through which they came to understand their worldviews better, see their assumptions more clearly, and recognize environmental signals in order to respond. While modern

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scenario consultants have streamlined the process and many offer one-day scenario exercises, our research is founded on the former approach.

The scenario planning intervention is described in more detail in the “Method” section, and to summarize, the approach used five workshops facilitated over the course of 8 weeks. The workshops were focused on exploring the critical uncertainties involved in the organizational situations, producing scenarios, generating strategic options, and using the scenarios to test and explore strategic decisions (Chermack, 2011). This approach was replicated as similarly as possible in four different organizations.

Scenario planning activities are designed to foster a creative exploration of what might be possible in the future. Such exercises seem likely to foster a climate supportive of varying opinions, new ideas, freedom to explore them, and innovation in applying them. However, research has not documented such a relationship, thus the need for this study.

While recent research has shown that scenario planning can support the development of a learning culture in organizations (Chermack, Lynham, & van der Merwe, 2005; Haeffner, Leone, Coons, & Chermack, 2012), other research has revealed problematic and contrary aspects of scenario planning (Derbyshire & Wright, 2014; Goodwin & Wright, 2010; Wright, Bradfield, & Cairns, 2013; Wright & Goodwin, 2009). For example, Wright and Goodwin (2009) found that scenario planning can actually narrow mental models and limit the range of possible outcomes by simplifying uncertainty to an extreme. Further study has suggested that scenario planning can actually make organizations even more prone to blindsiding than they would be without it (Derbyshire & Wright, 2014).

Given the sometimes conflicting and ambiguous reports in scenario planning research, continued inquiry is needed. This study seeks to consider a possible relationship between scenario planning and the perceived establishment of a creative organizational climate. For the purposes of this study, there are important distinctions between organizational climate and organizational culture. Thus, this article will establish the differences and describe the theoretical basis for how scenario planning can affect organizational creative climate.

Ekvall (1991)

defined climate as the observed and recurring patterns of behavior, attitudes, and feelings that characterize creative life in the organization. Culture reflects the deeper foundations of the organization and includes values, beliefs, deeply held assumptions, history, traditions, symbols and rituals. (as cited in Isaksen & Akkermans, 2011, p. 165)

The key to Ekvall’s distinction between climate and culture is that climate reflects the *recurring patterns of behavior*. These recurring patterns of behavior are critically important to a variety of organizational activities, such as strategic

planning, innovation, research and development and other functions (Schoemaker, Day, & Snyder, 2012; Shirahada & Hamazaki, 2013). To clarify, the climate of an organization (meaning the patterns of behavior) may stifle or support innovation, may prefer financial planning to learning about the industry, or may mandate particular approaches to research and development.

The problem quickly becomes evident when considering that the climate of an organization does not always match the culture of the organization. A mismatch may create barriers or cause difficulties in moving forward with important organizational initiatives such as innovation programs, mergers and acquisitions, or strategic planning (Isaksen & Aerts, 2011). Extensive evidence exists of organizations that may exhibit beliefs and assumptions that make one statement along with patterns of behaviors that make another (Argyris, 1999a, 1999b; Argyris & Schon, 1995).

Furthermore, climate is repeatedly seen as a key factor in organizational innovation (Isaksen & Akkermans, 2011; Shirahada & Hamazaki, 2013). For example, the concept of organizational slack (is a function of organizational climate and has been shown to contribute to product innovation (Natividad, 2012). However, innovation remains an ambiguous phenomenon in organizations, and particularly, the mechanisms of innovation are poorly understood (McLean, 2011).

### Definition of Key Terms

Because of the ambiguity associated with many of the key terms involved in this research, it is important to define the use of these terms. This section provides some definitions of terms, followed by explanation of the use of these terms in the context of this research study:

Climate—“The prevailing influence or environmental conditions characterizing a group or period” (Oxford English Dictionary, p. 349).

Organizational Creative Climate—“The observed and recurring patterns of behavior, attitudes, and feelings that characterize creative life in the organization” (Isaksen & Akkermans, 2011, p. 165).

Innovation—“A process of developing and implementing a new idea” (Van de Ven & Angle, 1989, p. 12).

These terms require some definition because they frame an important distinction underlying the research study. Differentiating climate, organizational creative climate, and culture is important to the foundation of the study. Climate, as broadly defined above suggests the general environmental conditions. In our case, these conditions would apply to and be indicative of the work environment. By further specifying the climate as the organizational creative climate, we introduce the idea of judging the extent to which the climate

supports creative behaviors, attitudes, and feelings. Primarily, this is because our study attempts to determine if scenario planning activities tend to enhance a climate that generally supports creativity. Innovation is important to clarify because creative climate and innovation have already been connected in previous research (Isaksen & Akkermans, 2011; Marcy & Mumford, 2007; McLean, 2011; Van de Ven & Angle, 1989). As McLean (2011) pointed out, innovation is defined in a variety of ways. For the purposes of our study, we mean for the term *innovation* to indicate the processes of both developing and implementing a new idea. Essentially, a creative climate may be required for both.

However, the current study seeks only to examine a general hypothesis that scenario planning supports a creative organizational climate. Further studies will examine extended connections (perhaps to innovation, specific organizational culture, or other outcome variables).

### **Purpose of the Article and Problem Statement**

It seems that a logical argument exists for linking creative climate to innovation (Isaksen & Akkermans, 2011). Efforts to understand how to develop and foster creative climates in organizations may lead to a pathway to innovation and market success. The problem that frames the need for this research is

The factors that comprise creative climate are relatively well understood, but practices that support these factors and ultimately help to foster creative climate are not.

If creative climate is a key to innovation in organizations, then understanding how to create and build creative climates would be exceedingly valuable. Given that previous research has established the contribution of scenario planning to a culture of learning in organizations (Chermack et al., 2005; Haeffner et al., 2012), it seems a natural extension to consider the effects of scenario planning on creative climates in organizations. Scenario planning is a creative process by definition as participants are asked to participate in a series of activities aimed at generating a variety of futures in which to consider strategic alternatives. If organizations can successfully adopt scenario planning practices, they promote behaviors relevant to considering the future. Such behaviors are arguably reflective of a creative climate. Thus, scenario planning could be seen as an activity to encourage and cultivate a creative climate.

### **Research Question**

The problem that has been described leads to a natural question for further attention. The research question framing this study is

1. What are the effects of scenario planning on participant perceptions of creative organizational climate?

### **Scenario Planning**

Scenario planning is an approach to strategic planning that abandons the need for a single predictable future on which decision makers base their concrete plans. Instead, scenario planners explore a variety of possible futures based on the assumption that the future is unpredictable, and a more flexible approach to strategy is created by identifying and exploring the critical uncertainties in the industry (Chermack 2004a, 2005; Walsh, 2005). By pressing on the critical uncertainties and identifying the signals of major potential shifts in the external environment, scenario planners create an organizational radar that allows decision makers to receive feedback from the external environment and adjust before major discontinuities arise (Chermack, 2004b; Schoemaker, 1995).

Scenario planning requires a strong combination of both analytical and creative thinking (Wade, 2012). Open and creative minds are needed to challenge the conventional wisdom in the organization and to explore a variety of unexpected possibilities (Schoemaker et al., 2012). Furthermore, detailed analysis is required to take illustrate the plausibility of events that may seem unlikely. It is the creative aspect of scenario planning that drives this research study in that it is easy to see how ongoing scenario planning could help develop a climate that supports creative thinking. However, the connection has only seen speculation in the scenario planning literature (Meissner & Wulf, 2012) and there has been no serious inquiry into the possible relationship.

While some research shows scenario planning in a positive light, other recent research has reported a variety of negative aspects of scenario planning (Derbyshire & Wright, 2014; Goodwin & Wright, 2010; Marcy & Mumford, 2007; Wright & Goodwin, 2009). Relevant studies are cited and discussed as they relate to each aspect of scenario planning and creative climate in the following sections. The theoretical framework that supports this research is built by examining how the nine dimensions of the Situational Outlook Questionnaire (SOQ) are conceptually supported through scenario planning literature. The next section theorizes the connection between scenario planning and each of the nine SOQ dimensions (Weick, 2004). Although statistical data for the SOQ are presented in the "Method" section, its nine dimensions are described in detail here. They are (1) challenge and involvement, (2) freedom, (3) trust and openness, (4) idea-time, (5) playfulness and humor, (6) conflict, (7) idea-support, (8) debate, and (9) risk-taking. Research hypotheses are also provided.

### **Challenge and Involvement**

The concept of challenge and involvement refers to the extent to which people have opportunities to be involved in

the direction of the organization (Korte, 2008). Research has shown that when employees have increased opportunities to engage in activities like strategy and innovation, they have a greater sense of motivation and engagement (Meissner & Wulf, 2012). Maslow's, Herzberg's and Knowles's theories establish that individuals naturally seek challenges to expand their skills and expertise. Employees naturally seek to be productive and develop a sense of belonging in the organization (Lundkvist & Yakhlef, 2004).

**Scenario Planning, Creativity, and Challenge and Involvement.** Scenario planning is an approach to strategy built on involvement and the inclusion of a wide variety of perspectives (Schwartz, 1996; van der Heijden, 1996). Scenario planners assemble teams of diverse thinkers, usually representing multiple levels of the organization. This approach gives managers the ability to have input in the strategy and strategic conversation of the organization (van der Heijden, 1996, 2004). Such an inclusive approach connects well with creativity inquiry. Creativity studies often attempt to understand how divergent thinking supports creativity (A. Cropley, 2006; Marcy & Mumford, 2007). In the group setting of scenario planning workshops, where participants are encouraged to create multiple options and a variety of critical issues, thinking is necessarily divergent, requiring the integration of a range of potentially startling combinations. More recent creativity research suggests that for maximum creativity, it is beneficial to move between divergent thinking—where answers are less certain and multiple possibilities exist—and convergent thinking—where answers are more precise and logic prevails (A. Cropley, 2006). Because scenario planning ultimately seeks to drive toward consensus and more completely shared mental models, convergent thinking also fits within the scope of the work. Moreover, significant evidence exists to suggest that challenging tasks are the likeliest to spark innovative thinking, closely linked to creativity (Bledow, Frese, Anderson, Erez, & Farr, 2009).

**Hypothesis 1:** Perceptions of challenge and involvement in the organization will increase for scenario planning participants.

### Freedom

In the context of organizational climate, freedom refers to the degree to which individuals have perceived autonomy and independence (Tan & Peng, 2003). Freedom has been a key characteristic of highly innovative companies like Apple, Inc., Zappos, and Amazon. In these companies, employees are given “slack time” to work on their own creative ideas (Tan & Peng, 2003). Freedom is generally seen as a driver of innovation and creative thinking: “In a climate with much freedom, people are given autonomy to define much of their own work. People are able to exercise discretion in their day-to-day activities” (Isaksen, 2007, p. 457).

**Scenario Planning, Creativity, and Freedom.** Scenario planning is generally a group activity, so it does not directly support individual autonomy. However, the creativity generated in scenario planning workshops and from the overall outputs of scenario planning may promote individual creativity and a desire for more autonomy in day-to-day activities. Scenario planning has been shown to change participant mental models (Chermack, 2004a, 2004b; M. B. Glick, Chermack, Luckel, & Gauck, 2012) and provoke a longer term view (Schwartz, 1996). Participants may sense an increased attention to and awareness of the future of their organizations and the actions they may take to influence it (Wade, 2012).

Similarly, creativity is closely linked to the concept of freedom. Creativity is encouraged when workers experience greater autonomy, especially when they feel ownership over the products of their work (Amabile, Conti, Coon, Lazenby, & Herron, 1996; Bailyn, 1985; King & West, 1985). In Amabile's (1988) componential model of creativity and innovation in organizations, one of the proposed factors is *management practices*, which relates directly to the sense of autonomy or freedom people feel in their work. This concept also connects directly back to challenge in the previous section, because autonomous work is linked to challenging and engaging types of projects (Amabile et al., 1996). The process of scenario planning provides an opportunity for freedom of discussion, freedom to push the boundaries of dialogue.

It is important to acknowledge that scenario planning has also been shown to limit and sometimes narrow participant perspectives by causing overconfidence in the scenarios and their use (Wright & Goodwin, 2009). While we expect to find that scenario planning will increase participant perceptions of freedom, it is likely that a time delay will exist for this result. Nevertheless, we hypothesize the increase.

**Hypothesis 2:** Perceptions of freedom in the organization will increase for scenario planning participants.

### Trust and Openness

The trust and openness dimension refers to the support for honesty in the work environment: “When there is high trust, individuals can be genuinely open and frank with one another” (Isaksen, 2007, p. 457). Many organizations feature a climate that favors hierarchies, top-down management styles and suppresses employee contributions. Creative climates that foster innovation in products, thinking, or strategies recognize that contributions can come from a variety of places, sometimes unexpectedly (Mintzberg, 2007).

**Scenario Planning, Creativity, and Trust and Openness.** Scenario planning is built on a process that requires trust and openness (Chermack, 2011; Schwartz, 1996; Selin, 2006; van

der Heijden, 1996, 2004; Wade, 2012). Some authors have suggested that trust and openness are prerequisites for successful scenario planning (Schoemaker, 1995, others) and that without them, the effectiveness of scenario planning is drastically reduced (van der Heijden, 2004). Anecdotal evidence suggests that even in low-trust organizations, if a willingness to try scenario planning is carefully cultivated, there exists the possibility for building trust throughout the scenario planning process (Haefner et al., 2012).

Trust and openness are also core components of creativity. Free and open communication among team members encourages creativity (Amabile et al., 1996), and groups in which members trust and help each other are likelier to foster creativity (Amabile et al., 1996). Research suggests that, especially when work projects are challenging—which is another key feature of work that provokes creativity—individuals are better able to be creative when they feel trust and openness from their organizations (Ismail, 2005).

**Hypothesis 3:** Perceptions of trust and openness in the organization will increase for scenario planning participants.

### *Idea-Time*

The concept of “Idea-Time refers to the amount of time people can use (and do use) for elaborating new ideas” (Isaksen, 2007, p. 457). Organizations known for their innovation and creative products specifically allocate time for employees to explore new ideas (Herold, Jayaraman, & Narayanaswamy, 2006). While there are no guarantees that time dedicated to new ideas will bring significant innovation, research has shown that the trend holds true in many organizations (Herold et al., 2006). The reverse situation can be characterized by extreme accounting for all employee time, and schedules that are constantly booked with meeting after meeting (Isaksen, 2007).

*Scenario Planning, Creativity, and Idea-Time.* Scenario planning, once adopted on a long-term, ongoing basis would logically lead to more time dedicated to ideas. First, the specific scenario planning workshops can be considered idea-time. Most scenario planning approaches involve some sort of brainstorming, ranking, and identification of critical variables related to a foundational issue (Chermack, 2011; Ringland & Schwartz, 2008; Schwartz, 1996; van der Heijden, 1996). These workshops are intended to explore a variety of perspectives, open up communications, and examine new ideas among colleagues. Idea-time is a core construct in creativity studies, included in instruments like the Creative Climate Questionnaire (Amabile et al., 1996). Linked closely to the notions of freedom and autonomy, idea-time offers organization members the opportunity to direct their own work, as well as to explore challenges in different and less structured ways (Ekvall, 1997, 2002).

While there is a logical connection between scenario planning and idea-time, it is debatable whether employees would consider the organization to have increased its support for idea-time based on an initial scenario planning effort. We anticipate an increase in participant perceptions of idea-time. However, it should be noted that logically, it might take a significant period of time to shape the climate of the organization to the extent that a noticeable result would be found.

**Hypothesis 4:** Perceptions of idea-time in the organization will increase for scenario planning participants.

### *Playfulness and Humor*

Playfulness and humor are critical aspects of an innovative climate because they indicate the passion, fun, and enjoyment employees put into and get out of their work: “A relaxed atmosphere where good-natured jokes and laughter occur often is indicative of this dimension” (Isaksen, 2007, p. 457). Workplace humor has been shown to promote and reinforce social networks in organizations and can be viewed as a valuable aspect of communication and innovation in organizations (Romero & Cruthirds, 2006). Humor may also play a role in establishing trust and openness, and thus may influence other dimensions of a creative workplace climate (Isaksen, 2007).

*Scenario Planning, Creativity, and Playfulness and Humor.* Scenario planners use metaphors and imagery to communicate the essence of the scenarios. The themes and metaphors are chosen and developed with participants and the process is often humorous and fun (Chermack, 2011; Kahane, 1992). One example is the use of Beatles’ song titles to convey the essences of scenarios in a set. Ogilvy and Schwartz’s (2004) one-scenario project settled on song titles A Hard Day’s Night, Help, Magical Mystery Tour, and Imagine as the scenario images, titles, and basic structures. They described the process as fun and engaging characterized by laughter and interest. In short, scenario planning sets the stage for dynamic, creative and fun conversations that become crystallized in the scenario titles, imagery, and content. These are balanced by deep research and data-driven assertions about what could happen in the external environment.

While many studies explore the connection between playfulness in children and their creativity, scholarship is also increasingly interested in the ways in which playfulness and humor influence creativity in adults and organizations as well (Bateson & Nettle, 2014; Magnuson & Barnett, 2013). Playfulness is linked to a more relaxed and free-form behavior that is suspected to reduce obstacles to thinking and creativity (Bateson & Nettle, 2014). Furthermore, humor—and the sense of trust that must exist between individuals in order for it to be acceptable—supports creativity through the same form of relaxation and openness (Lang & Lee, 2010).

**Hypothesis 5:** Perceptions of playfulness and humor in the organization will increase for scenario planning participants.

### Conflict

Conflict “refers to the presence of personal and emotional tensions in the organization. When the level of conflict is high, groups and individuals dislike and may even hate each other” (Isaksen, 2007, p. 458). Different perspectives can become limiting factors when they blind people from the ability to consider other viewpoints. While relatively common in organizations, conflict can be overcome with a genuine interest in resolution. A willingness to engage in rational conversation and dialogue is a necessary prerequisite and can be challenging to cultivate, however it pays off.

*Scenario Planning, Creativity, and Conflict.* Scenario planning relies on diverse perspectives, which sometimes provoke conflict (Peterson, Cumming, & Carpenter, 2003). Because scenario planning essentially asks participants to consider where their thinking and assumptions may not fit with reality, it can be a humbling experience. The tendency to provoke conflict also may heighten the role of the facilitator to one of conflict management and mediation. Scenario planning can effectively function as a conflict management tool, but participant willingness to work toward resolution, and expert facilitation are critical elements.

In the study of creativity, conflict plays an interesting role. While it can, at times, threaten the creative climate or erode the sense of openness and freedom individuals experience, it can also be a driver of creativity as individuals and teams work toward resolution (Friis, 2015). Through the tensions of conflict, people must work to come to resolution, and that effort can produce a space in which creativity flourishes (Sheldon, 2010). In particular, conflict is often associated with creativity because individuals who are able to overcome such stressors maintain a sense that they will be able to handle them again in the future; they develop a confidence about their ability to manage challenges (D. Cropley & Cropley, 2012; Friis, 2015) as well as show evidence of increased propensity for problem solving (Marcy & Mumford, 2007).

**Hypothesis 6:** Perceptions of conflict in the organization will increase for scenario planning participants.

### Idea-Support

Idea-support indicates the extent to which new ideas receive consideration inside the organization. It is one thing to give people time to work on their ideas, and quite another to give them open consideration: “In the supportive climate, ideas and suggestions are received in an attentive and professional

way by bosses, peers, and subordinates” (Isaksen, 2007, p. 458). The opposite climate can be characterized by restrictions, public stifling of new ideas, and a simple absence of any forum in which to present or try them.

*Scenario Planning, Creativity, and Idea-Support.* The scenario planning workshops essentially become the forum for trying out new ideas. While they do not necessarily get implemented in the scenario planning exercise, it is common for the scenario planning exercise to generate new initiatives, strategies, and actions that are then implemented over time (Wulf, Meissner, & Stubner, 2010). This is the intersection of scenario planning and strategic planning. In a supportive climate, scenario planning can be used as a testing ground for new ideas, to explore their implications and potentially engage in new strategies.

Idea-support is another element of the Creative Climate Questionnaire, and it is a common feature of discussions about creativity. Environments that foster creativity are typically those in which team members feel their ideas are valued, and they are unafraid to share them (Amabile, Conti, Coon, Lazenby, and Herron, 1996; Ekvall, 1996). Linked back to the concepts of trust and openness, idea-support is a characteristic of encouraging and empathetic settings where thoughts are welcomed and individuals are encouraged to share (Ekvall, 1996).

**Hypothesis 7:** Perceptions of idea-support in the organization will increase for scenario planning participants.

### Debate

Similar to conflict, debate refers to the capacity to deal with numerous varying viewpoints in the organization: “In the debating organization many voices are heard, and people are keen on putting forward their ideas for consideration and review” (Isaksen, 2007, p. 459). Debate differs from conflict in the sense that it focuses on the inclusion of multiple perspectives and the ability to integrate them, rather than the emotional liking or disliking of colleagues.

*Scenario Planning, Creativity, and Debate.* Scenario planning depends on debate. Without debate, new insights are not found (Goodwin & Wright, 2001; Goodwin & Wright, 2009). Scenario planners work hard to search out multiple contributors and stakeholders. Sometimes experts in completely different industries are brought in to provide a wildly different point of view. Wack (1984a) called these “remarkable people.” The debate of new ideas in an open and honest forum provides the basis for the strategic conversation (van der Heijden, 1996). A matching concept is found in creativity studies, where debates signal the open exchange of ideas and a spirit of dialogue exists to support communication among organization members (Amabile et al., 1996).

Connected to openness and trust, but also to challenge and conflict, debates encourage creativity by fostering team learning (Amabile et al., 1996).

**Hypothesis 8:** Perceptions of debate in the organization will increase for scenario planning participants.

### *Risk-Taking*

“The risk-taking dimension addresses the tolerance of uncertainty and ambiguity exposed in the workplace. In the high risk-taking case, bold new initiatives can be taken even when the outcomes are unknown” (Isaksen, 2007, p. 459). Risk-taking needs to be carefully balanced, however, as recklessness is sure to have consequences. Seminal research has shown a relationship between risk taking and high-return investments, suggesting a connection to innovation (Singh, 1986). Additionally, research has shown that risk-taking and uncertainty are quite different things (Knight, 1921).

*Scenario Planning and Risk-Taking.* One of the key alleged purposes of scenario planning is the ability to manage uncertainty and build it into organizational planning (Georgantzis & Acar, 1995; Schoemaker, 1993). While participants do not seem to become genuinely comfortable with uncertainty, scenario planning gives them a set of processes that decrease the odds of being blindsided by an unforeseen event. In short, scenario planning may increase participant comfort with risk-taking, but does not completely alleviate the anxiety associated with large-scale, critical decisions or uncertainty (Knight, 1921). By considering the potential challenges, risks, and rewards of decisions in multiple futures, rather than a single future, scenarios provoke robustness, which can reduce discomfort with risk-taking.

Similarly, risk-taking is a component of creativity. Some research suggests that in the absence of risks, creativity cannot flourish (D. Cropley & Cropley, 2012). Risks require the same type of confidence that conflict does (Amabile et al., 1996). Furthermore, the challenge of risks encourages a more creative approach to problem solving (Ismail, 2005).

There are studies that show, however, scenario planning is not a complete solution to the problem of uncertainty (Goodwin & Wright, 2010; Wright et al., 2013; Wright & Goodwin, 2009). These research efforts have found that scenario planning can diminish the perceptions of uncertainty by oversimplifying the external environment. Derbyshire and Wright (2014) have also shown that scenario planning can make the future appear more predetermined than it actually is.

When focused on risk-taking, it is nonetheless a worthwhile activity to assess the effects of scenario planning on perceptions of risk-taking tendencies in the context of creative organizational climates.

**Hypothesis 9:** Perceptions of risk-taking in the organization will increase for scenario planning participants.

### **Method**

The following sections describe the sample, research design, instrument, prior reports of instrument score reliability and validity, data collection and data analysis. Each is described in detail.

### *Research Design*

The research design for this study was a quasi-experimental, pretest–posttest design with treatment and control groups. While the study did not use random assignment to treatment and control groups, it did emphasize similarities between those groups. To the extent possible, organizations in similar industries, with similar demographics were approached.

### *Sample*

The sample for this study was a convenience sample of 48 participants from four organizations for the intervention group, and 44 participants from four other organizations for the comparison group. Organizations were selected based on a willingness to participate in scenario planning in exchange for the benefits of scenario planning and a full reporting of applied research results. In other words, organization leaders agreed to participate in the study based on receiving the benefits of the scenario planning experience plus the results of our applied research. Individual participants were selected within each organization based on two criteria, namely (1) knowledge of the organization as a whole and (2) all levels of the organization were represented.

Researchers took great care to ensure that the purpose of our study was never revealed. At no time did researchers disclose to participants that they were studying the effects of scenario planning on perceptions of creative climate. Researchers did indicate that the study was related to alleged benefits of scenario planning, and was deliberately kept vague. This ensured minimal potential influence on the survey responses, and the social desirability of responses is discussed in the limitations section.

It is possible that decision makers who supported their employee involvement in the scenario work might have been expecting some benefits at the organizational level. However, it is not likely that individual participants were expecting a benefit and we did not incentivize the study.

A comparison group was sought, consisting of four additional voluntary organizations that did not receive the scenario planning intervention, or engage in scenario planning outside the research project. Leaders in the control group organizations were interested in receiving the results of the climate survey, but understood their role as a control group

in that they would not benefit from any intervention by the research team.

### Data Collection

Pretest data were collected at initial meetings with all participants to launch the scenario planning projects. On conclusion of the series of scenario development and implementation exercises and workshops, participants were asked to complete the posttest surveys.

Control group data were collected via online surveys. On agreement to participate in the research study, a project coordinator was identified in each of the four control group organizations. Those individuals were sent a link to the online survey administered by Qualtrics, an online survey and data capture website/software. Participants were sent a link to the survey from the project coordinators and asked to complete it in 1 week, approximately around the same time period as the treatment groups. The same process was followed for the posttest.

### Instrument

The instrument used to measure organizational creative climate was the SOQ: “The SOQ is an online questionnaire consisting of 53 closed-ended questions on a four point Likert scale . . . [analyzing] . . . the creation of an organizational climate that supports innovation” (Isaksen & Akkermans, 2011, p. 170). While there are a variety of surveys and questionnaires that measure a creative organizational climate, the SOQ is the “result of over 50 years of research and development started by Goran Ekvall in the 1950’s” (Isaksen & Akkermans, 2011, p. 168). The SOQ consists of nine factors or dimensions. They are (1) challenge/involvement, (2) freedom, (3) trust/openness, (4) idea-time, (5) playfulness/humor, (6) conflict, (7) idea-support, (8) debate, and (9) risk-taking. These dimensions are briefly summarized in Table 1, adapted from Isaksen and Akkermans (2011).

The SOQ has been used in a variety of previous studies (Isaksen & Aerts, 2011; Isaksen & Akkermans, 2011; Isaksen & Ekvall, 2007; Isaksen & Ekvall, 2010) and makes a clear contribution with a track record of prior score reliability. The SOQ has been used in several research studies that span different contexts. Prior reports of score reliability range from .71 to .93 (Isaksen & Ekvall, 2007; Isaksen & Ekvall, 2010; Isaksen & Aerts, 2011; Isaksen & Akkermans, 2011) supporting the conclusion that the SOQ is an instrument that has shown consistency in its measurement scores.

### Results

This section presents our data analytic approach, results of our statistical analyses as well as the tests for the associated statistical assumptions.

**Table 1.** Dimensions of the Situational Outlook Questionnaire.

Dimension	Definition
Challenge and involvement	The degree to which people are involved in daily operations, long-term goals, and visions. High challenge/involvement implies better level of engagement, commitment, and motivation.
Freedom	The degree of independence shown by the people in the organization. High levels of freedom imply more perceived autonomy and ability for individual discretion.
Trust and openness	The emotional safety in relationships. In high trust/openness situations people feel more comfortable sharing ideas and being frank and honest with each other.
Idea-time	The amount of time people can, and do, use for elaborating new ideas. When idea-time is high people can explore and develop new ideas that may not have been included in the original task.
Playfulness and humor	The spontaneity and ease displayed within the workplace. Good natured joking and laughter and a relaxed atmosphere (lower stress) are indicators of higher levels of playfulness and humor.
Conflict	The presence of personal and emotional tensions (a negative dimension—in contrast to the debate dimension). When conflict is high people engage in interpersonal warfare, slander, and gossip, and even plot against each other.
Idea-support	The ways new ideas are treated. In a high idea-support situation people receive ideas and suggestions in an attentive and professional manner. People listen generously to each other.
Debate	The occurrence of encounters and disagreement between viewpoints, ideas, experiences, and knowledge. In the debating situation many different voices and points of view are exchanged and encouraged.
Risk-taking	The tolerance of uncertainty and ambiguity. In a high risk-taking climate people can make decisions even when they do not have certainty and all the information desired. People can and do “go out on a limb” to put new ideas forward.

### Data Analysis

We used multiple linear regression as the means for our substantive analyses over other analyses, including repeated-measures analysis of variance, analysis of covariance, and analyses of gain scores for a variety of reasons. As noted by Huck and McLean (1975) among others, the main effects from the repeated-measures analysis of variance are of little



**Table 2.** Descriptive Statistics on Study Variables.

Variable	Control				Intervention			
	<i>n</i>	$\alpha$	<i>M</i>	<i>SD</i>	<i>n</i>	<i>A</i>	<i>M</i>	<i>SD</i>
ChalPre	43	.85	2.92	0.52	47	.78	3.15	0.44
ChalPost	43	.91	2.90	0.64	47	.80	3.11	0.50
FreedomPre	42	.82	2.54	0.49	48	.65	2.74	0.44
FreedomPost	42	.84	2.60	0.54	48	.66	2.94	0.44
TrustPre	43	.66	2.59	0.54	48	.59	2.56	0.49
TrustPost	43	.70	2.39	0.62	48	.60	2.70	0.52
IdeaTimePre	42	.89	2.43	0.58	48	.78	2.56	0.51
IdeaTimePost	42	.90	2.48	0.65	48	.76	2.77	0.52
PlayHumorPre	42	.82	2.55	0.51	48	.85	3.02	0.60
PlayHumorPost	42	.90	2.56	0.66	48	.83	3.06	0.63
ConflictsPre	42	.84	1.80	0.63	47	.85	2.26	0.72
ConflictsPost	42	.90	1.94	0.85	47	.91	2.41	0.85
IdeaSupPre	41	.87	2.65	0.55	48	.81	2.72	0.57
IdeaSupPost	41	.93	2.74	0.76	48	.77	2.88	0.52
DebatesPre	43	.84	2.77	0.53	47	.81	2.91	0.51
DebatesPost	43	.92	2.76	0.72	47	.85	3.00	0.58
RiskPre	43	.76	2.41	0.52	48	.74	2.55	0.48
RiskPost	43	.73	2.37	0.59	48	.74	2.75	0.57

utility leaving only the test of the interaction effect of potential interest in a pretest–posttest control group design. However, the latter offers no advantage over analyzing gain scores as they are mathematically equivalent. Presuming no pretest differences between the control and intervention groups, analysis of gain scores or analysis of covariance if pretest differences do occur may be considered as an analytic strategy presuming the data meet the necessary assumptions including homogeneity of regression slopes (cf. Edwards, 1960). However, in our data there were statistically ( $ps < .05$ ) and practically ( $ds = .44-.83$ ) significant differences in a number of pretest scores (i.e., challenge, freedom, play/humor, conflicts) and our data did not meet the assumption of homogeneity of regression for a number of the study variables (i.e., trust, play/humor, conflicts, debates, risk). As can be seen in Table 2, for example, the relationship between pretest and posttest debate scores varied by group ( $r_{Ct} = -0.21$  vs.  $r_{Int} = 0.52$ ).

Therefore, we followed the recommendation of Linn and Slinde (1977) and choose multiple linear regression as our data analytic strategy and included the group, pretest, and the interaction between the pretest and group as our predictors. Including pretest as a predictor allowed us to examine group differences independent of pretest difference and the interaction between pretest and group allowed us to model the lack of homogeneity of regression, both which were evident in the data. A power analysis using G\* Power (Cohen, 1998; Faul, Erdfelder, Lang, & Buchner, 2007) showed that our sample was sufficient to achieve a power of .88 assuming an alpha level of .05 and an effect size  $f = .25$ . In interpreting the results of the multiple linear regression,

**Table 3.** Intervention Group Interclass Correlation Coefficients for the Nine Dimensions of Creative Climate.

Dimension	Interclass correlation coefficient—pretest		Interclass correlation coefficient—posttest	
	Percentage	Percentage	Percentage	Percentage
Challenge and involvement	.05	5	.04	4
Freedom	.06	6	.01	1
Trust and openness	.07	7	.06	6
Idea-time	.05	5	.03	3
Playfulness and humor	.05	5	.00	0
Conflict	.00	0	.00	0
Idea-support	.05	5	.00	0
Debate	.05	5	.06	6
Risk-taking	.06	6	.05	5

we following Nimon and Reio (2011) and reported B weights,  $\beta$  weights, structure coefficients ( $r_s$ ), and commonality coefficients.

### Assumptions for Statistical Tests

There are four assumptions that underlie the statistical tests used to answer the study's research question. These are (1) independence of observations, (2) reliability, (3) normality, and (4) homoscedasticity of residuals.

**Independence of Observations.** In this study, individuals from four different organizations participated in the research. Participant data were therefore nested within the four organizations. To ensure data met the assumption of independence of observations, researchers analyzed the data using the interclass correlation coefficients (ICCs). The ICC score indicates the amount of variance accounted for among multiple groups, taking into account the nestedness of the data. The ICC scores for the nine creative climate dimensions (pretests and posttests) are displayed in Table 3. The ICC scores for all nine dimensions (pretests and posttests) were .07 (7%) or lower, well within the accepted limits. Any ICC value exceeding 11% would require closer examination (Lee, 2000). In other words, there was insignificant score variability among the groups to warrant further analysis. An insignificant result satisfies the assumption of independence of observations. It is noted that the sample size and distribution of participants per organization were not optimal for HLM analysis, but our approach to perform and report HLM results anyway is consistent with recommended practices (Garson, 2013; Thompson, 1984).

**Reliability.** To assess reliability for the study variables, coefficient alpha was computed for each of the nine factors for

each group and measurement occasion in keeping with recommendation of Onwuegbuzie, Roberts, and Daniel (2004). Coefficients alphas are reported in Table 3 along with *M*s and *SD*s. All but of a few of the estimates are above Nunnally's (1978) recommendation of .70.

**Data Normality.** This assumption was tested by examining QQ plot of studentized residuals for each of the full regression models. Across each of the nine regression models, we found no large deviations from normality.

**Homoscedasticity of Residuals.** This assumption was tested by conducting the test for nonconstant error variance (cf. Fox & Weisberg, 2011). For each of the nine regression models, the nonconstant variance score test produced a *p* value greater than .05 indicating that the data met the assumption of homoscedasticity of residuals.

### Multiple Linear Regression Results

For each of the nine posttest scores, we conducted a multiple linear regression regressing the grouping variable, associated pretest score, and the interaction between group and pretest (Table 4). Across all nine multiple linear regression, the results were statistically ( $ps < .05$ ) and practically (multiple  $R^2 = 0.07-0.24$ ) significant (see Table 6). As depicted in Table 5, after controlling for all other predictors in the model, group was a statistically and practically significant predictor of posttest scores for *freedom*, *trust*, *idea-time*, *play/humor*, *conflicts*, and *risk*.

For *freedom*, group made the highest contribution to the regression equation ( $\beta = .29$ ) and had the highest correlation with predicted posttest scores ( $r_s = .84$ ). Of the 15% of explained variance in posttest scores, 51% was uniquely associated with the grouping variable. Estimated posttest mean for the control group was 2.62 as compared with 2.91 for the intervention group, assuming mean pretest scores. Although pretest and the interaction between pretest and group were strongly related to predicted posttest scores ( $r_s = .68$  and  $.60$ , respectively), they were neither statistically significant predictors of posttest scores in terms of regression weights nor did they contribute a substantive amount of unique variance to posttest scores.

For *trust*, group made the second highest contribution to the regression equation ( $\beta = .26$ ) and had the highest correlation with predicted posttest scores ( $r_s = .75$ ). Of the 12% of explained variance in posttest scores, 56% was uniquely associated with the grouping variable. Estimated posttest mean for the control group was 2.39 as compared with 2.70 for the intervention group, assuming mean pretest scores. The interaction between group and pretest made the highest contribution to the regression equation ( $\beta = .32$ ) and had the second highest correlation with predicted posttest scores ( $r_s = .50$ ). Of the 12% of explained variance in posttest scores,

44% was uniquely associated with the interaction term. The estimated change in posttest scores for every point increase in pretest scores was  $-.24$  for the control group and  $.29$  for the intervention group.

For *idea-time*, group made the highest contribution to the regression equation ( $\beta = .23$ ) and had the highest correlation with predicted posttest scores ( $r_s = .73$ ). Of the 12% of explained variance in posttest scores, 43% was uniquely associated with the grouping variable. Estimated posttest mean for the control group was 2.48 as compared with 2.75 for the intervention group, assuming mean pretest scores. Although pretest and the interaction between pretest and group were strongly related to predicted posttest scores ( $r_s = .69$ ,  $.70$ , respectively), they were neither statistically significant predictors of posttest scores in terms of regression weights nor did they contribute a substantive amount of unique variance to posttest scores.

For *play/humor*, group made the second highest contribution to the regression equation ( $\beta = .37$ ) and had the highest correlation with predicted posttest scores ( $r_s = .74$ ). Of the 24% of explained variance in posttest scores, 46% was uniquely associated with the grouping variable. Estimated posttest mean scores for the control group was 2.46 as compared with 2.96 for the intervention group, assuming mean pretest scores. The interaction between group and pretest made the highest contribution to the regression equation ( $\beta = .52$ ) and had the second highest correlation with predicted posttest scores ( $r_s = .72$ ). Of the 24% of explained variance in posttest scores, 41% was uniquely associated with the interaction term. The estimated change in posttest scores for every point increase in pretest scores was  $-.37$  for the control group and  $.42$  for the intervention group.

For *conflicts*, group made the second highest contribution to the regression equation ( $\beta = .24$ ) and had the second highest correlation with predicted posttest scores ( $r_s = .69$ ). Of the 15% of explained variance in posttest scores, 33% was uniquely associated with the grouping variable. Estimated posttest mean for the control group was 1.89 as compared with 2.31 for the intervention group, assuming mean pretest scores. The interaction between group and pretest made the highest contribution to the regression equation ( $\beta = .39$ ) and had the highest correlation with predicted posttest scores ( $r_s = .81$ ). Of the 15% of explained variance in posttest scores, 39% was uniquely associated with the interaction term. The estimated change in posttest scores for every point increase in pretest scores was  $-.19$  for the control group and  $.46$  for the intervention group.

For *risk*, group made the second highest contribution to the regression equation ( $\beta = .30$ ) and had the highest correlation with predicted posttest scores ( $r_s = .80$ ). Of the 16% of explained variance in posttest scores, 56% was uniquely associated with the grouping variable. Estimated posttest mean for the control group was 2.37 as compared with 2.73 for the intervention group, assuming mean pretest scores.

**Table 4.** Correlations Among Study Variables.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. ChalPre		0.09	0.58	0.02	0.25	-0.12	0.54	-0.02	0.40	-0.03	-0.50	-0.28	0.55	0.12	0.46	0.05	0.52	0.13
2. ChalPost	-0.22		0.19	0.57	0.12	0.32	0.03	0.49	0.14	0.35	0.13	-0.11	0.18	0.62	0.36	0.71	0.10	0.48
3. FreedomPre	0.54	-0.06		0.30	0.22	-0.03	0.56	0.12	0.51	0.21	-0.20	-0.15	0.49	0.12	0.31	0.13	0.59	0.19
4. FreedomPost	0.10	0.62	0.13		-0.05	0.43	0.16	0.63	0.30	0.62	0.10	0.27	0.13	0.63	0.26	0.59	-0.02	0.58
5. TrustPre	0.70	-0.15	0.34	0.05		0.28	0.19	0.18	0.14	0.06	-0.31	0.02	0.44	0.20	0.12	-0.06	0.31	0.22
6. TrustPost	-0.11	0.62	0.02	0.43	-0.21		0.09	0.60	0.08	0.56	-0.03	0.34	0.33	0.60	0.11	0.42	0.16	0.48
7. IdeaTimePre	0.66	0.07	0.47	0.29	0.51	0.01		0.35	0.60	0.15	-0.25	-0.19	0.68	0.17	0.59	0.15	0.72	0.37
8. IdeaTimePost	-0.16	0.73	-0.09	0.63	-0.14	0.60	0.10		0.31	0.66	0.05	0.35	0.30	0.69	0.39	0.64	0.20	0.64
9. PlayHumorPre	0.49	-0.12	0.49	0.01	0.41	-0.06	0.61	-0.18		0.41	-0.20	-0.17	0.40	0.26	0.39	0.20	0.38	0.29
10. PlayHumorPost	-0.31	0.52	-0.21	0.34	-0.35	0.66	-0.12	0.58	-0.29		-0.07	0.13	0.21	0.56	0.11	0.42	-0.04	0.41
11. ConflictsPre	-0.54	0.13	-0.19	-0.16	-0.61	0.17	-0.34	0.16	-0.25	0.29		0.38	-0.36	-0.06	-0.10	0.11	-0.06	0.10
12. ConflictsPost	0.13	-0.73	-0.09	-0.41	0.10	-0.59	-0.24	-0.49	-0.08	-0.58	-0.14		-0.15	0.21	-0.10	0.18	-0.08	0.40
13. IdeaSupPre	0.69	-0.12	0.55	0.16	0.60	-0.06	0.75	-0.19	0.57	-0.38	-0.52	-0.06		0.33	0.64	0.23	0.70	0.48
14. IdeaSupPost	-0.03	0.77	0.01	0.55	-0.12	0.66	0.17	0.80	0.01	0.62	0.16	-0.62	-0.02		0.32	0.69	0.13	0.66
15. DebatesPre	0.70	-0.10	0.63	0.21	0.46	-0.05	0.62	-0.20	0.51	-0.21	-0.30	-0.17	0.77	-0.02		0.52	0.55	0.49
16. DebatesPost	-0.24	0.64	-0.18	0.44	-0.17	0.52	0.15	0.69	-0.03	0.50	0.13	-0.47	-0.04	0.80	-0.21		0.14	0.66
17. RiskPre	0.50	-0.14	0.51	-0.02	0.63	-0.17	0.64	-0.07	0.46	-0.20	-0.08	-0.03	0.65	0.00	0.58	-0.05		0.35
18. RiskPost	-0.10	0.51	0.00	0.59	-0.23	0.66	0.12	0.77	-0.12	0.59	0.20	-0.35	-0.04	0.72	-0.05	0.69	-0.05	

Note. Control group below the diagonal. Intervention group above the diagonal.

**Table 5.** Predictor Metrics for Posttest Variables.

	Challenge				Freedom				Trust			
	B	p	$\beta$	$r_s$	B	p	$\beta$	$r_s$	B	p	$\beta$	$r_s$
Intercept	2.86	<.01			2.62	<.01			2.39	<.01		
Group	0.24	0.06	0.21	0.73	0.30	0.01	0.29	0.84	0.31	0.01	0.26	0.75
Pretest	-0.27	0.11	-0.23	-0.15	0.15	0.35	0.13	0.68	-0.24	0.14	-0.21	0.03
Group $\times$ Pretest	0.38	0.14	0.21	0.35	0.16	0.47	0.10	0.60	0.53	0.02	0.32	0.50
	Idea-time				Play/humor				Conflicts			
	B	p	$\beta$	$r_s$	B	p	$\beta$	$r_s$	B	p	$\beta$	$r_s$
Intercept	2.48	<.01			2.46	<.01			1.89	<.01		
Group	0.27	0.03	0.23	0.73	0.50	<.01	0.37	0.74	0.42	0.03	0.24	0.69
Pretest	0.12	0.45	0.11	0.69	-0.37	0.05	-0.32	0.47	-0.19	0.35	-0.16	0.58
Group $\times$ Pretest	0.23	0.30	0.15	0.70	0.79	<.01	0.52	0.72	0.65	0.02	0.39	0.81
	Idea-support				Debates				Risk			
	B	p	$\beta$	$r_s$	B	p	$\beta$	$r_s$	B	p	$\beta$	$r_s$
Intercept	2.74	<.01			2.74	<.01			2.37	<.01		
Group	0.13	0.34	0.10	0.49	0.22	0.09	0.17	0.46	0.36	<.01	0.30	0.80
Pretest	-0.03	0.87	-0.03	0.63	-0.28	0.12	-0.22	0.36	-0.06	0.71	-0.05	0.46
Group $\times$ Pretest	0.33	0.18	0.21	0.89	0.87	<.01	0.49	0.84	0.47	0.05	0.27	0.67

Note. Control group is coded as 0. Pretest is centered.

The interaction between group and pretest made the highest contribution to the regression equation ( $\beta = .27$ ) and had the second highest correlation with predicted posttest scores ( $r_s = .67$ ). Of the 16% of explained variance in posttest scores,

24% was uniquely associated with the interaction term. The estimated change in posttest scores for every point increase in pretest scores was  $-.06$  for the control group and  $.41$  for the intervention group.

**Table 6.** Commonality Coefficients for Posttest Variables.

Coefficient	Challenge	Freedom	Trust	Idea-time	Play	Conflicts	Idea-support	Debates	Risk
Unique to Group	0.04	0.08	0.07	0.05	0.11	0.05	0.01	0.03	0.09
Unique to Pretest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unique to Group:Pretest	0.02	0.01	0.05	0.01	0.10	0.06	0.02	0.12	0.04
Common to Group, and Pretest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Common to Group, and Group:Pretest	0.00	0.00	0.00	0.00	-0.02	-0.01	0.00	0.00	0.00
Common to RiskPrec, and Group:Pretest	0.01	0.04	0.00	0.04	0.01	0.02	0.02	0.01	0.02
Common to Group, Pretest, and Group:Pretest	-0.01	0.03	0.00	0.01	0.04	0.03	0.00	0.01	0.01
Total (multiple $R^2$ )	0.07	0.15	0.12	0.12	0.24	0.15	0.05	0.17	0.16

Note. Negative commonalities reflect substantive pretest/posttest correlation differences among the control and intervention groups.

### Significant Interactions in the Linear Regression Model

Data analysis further showed significant interaction terms (Group  $\times$  Pretest) for five of the nine dependent variables (*trust*, *play/humor*, *conflicts* and *risk*). Using line plots to display pretest to posttest trends graphically showed that for these cases, the treatment and control groups moved in opposite directions.

The estimated change in posttest scores for every point increase in pretest scores was  $-.24$  for the control group and  $.29$  for the intervention group. The estimated change in posttest scores for every point increase in pretest scores was  $-.37$  for the control group and  $.42$  for the intervention group. The estimated change in posttest scores for every point increase in pretest scores was  $-.19$  for the control group and  $.46$  for the intervention group. The estimated change in posttest scores for every point increase in pretest scores was  $-.06$  for the control group and  $.41$  for the intervention group.

There are many possible reasons for these unexpected and uncommon results. Because the pretest to posttest timeline was approximately 3 months, the attempted explanation is speculation. The circumstances that may have resulted in a decrease in perception of creative climate for control group organizations (specifically related to *trust*, *play/humor*, *conflicts* and *risk*) are likely to involve actions and decisions that would have made participants feel unable to share their views, a lack of fun and humor in the workplace, decreased debates, and decreased comfort with risk.

Layoffs, merger and acquisition activity, changes in leadership, and changes in organizational structure could all account for the interaction results. In addition, a variety of other interventions (nonscenario planning) may have been going on in the control group organizations that could have contributed to the results. In other words, any of these events may have occurred in any of the control group organizations, could have significantly damaged the workplace climate and would potentially account for negative correlations in the control group data. However, there is no ability

to confirm whether any of these were actually the case in control group organizations, and the best strategy here is to report the finding, without overstating the potential explanation because it cannot be confirmed.

### Discussion

Results show support for six of the nine hypotheses suggesting an overall change in perceptions of climate based on the scenario planning intervention. While our earlier review and hypotheses make the theoretical arguments clear for increases in *freedom*, *trust*, *idea-time*, *play/humor*, *conflicts* and *risk*, it is more interesting to consider why we did not see significant changes in perceptions of *challenge and involvement*, *idea-support* and *debates*.

*Challenge and involvement* may not have shown changes because of several possible dynamics during the scenario planning intervention. Certainly, different organizations have different capacities and tolerance for engaging in challenging conversations and enabling spaces for participants to challenge each other. Undoubtedly, this is never an easy prospect—to challenge a manager or boss for fear of consequences, or to challenge a direct report for fear of reinforcing a perceived hierarchy. Scenario facilitation requires expertise in drawing out the interpersonal dynamics at play and establishing a project in which it is genuinely appropriate to respectfully challenge others' ideas. In addition, with any group exercise there are some who are simply more outgoing in leading conversations and other who naturally watch and observe before making a contribution. Personality traits are a strong possible driver of these behaviors and have not been explored in the context of scenario planning interventions. This area is ripe for future investigation.

Nonsignificant findings for *idea-support* could be strongly linked to the results seen in the results for *challenge and involvement*. In other words, if some participants did not feel it was appropriate to challenge their peers, direct reports, or superiors, it is a logical possibility that they did not feel their ideas would be supported in the

conversation. These elements seem to reinforce each other and are conceptually related. Our results suggest that a climate in which there is any hesitation about the true openness and acceptability to engage in challenging conversations may be a critical consideration for the appropriateness of scenario planning.

Finally, a lack of significant findings for *debates* may logically follow the lack of significant findings for *challenge and involvement* and *idea-support*. To clarify, these three factors seem to hang together in the sense that if participants do not feel it is appropriate to challenge others, it may be due to a perception that their ideas will not be accepted or supported, which may naturally discourage them from engaging in debates. While all the factors of the SOQ are related, it is unclear if there could be a submodel that begs for further investigation. Previous research using the SOQ has not delved deeply into smaller subsets of the model and how they may group, which constitutes another area for potential further investigation.

### **Limitations and Recommendations for Future Research**

There are five clear limitations to this research study. They are (1) the use of perception-based measures, (2) the potential for social desirability of responses, (3) potential pretest influence, (4) lack of random assignment, and (5) the assumption that individuals and organizations where scenario planning is accepted may already have a tendency toward creativity and a creative climate. Each limitation is described in detail with potential strategies for improvement in future research. Following the discussion of research limitations, further research opportunities are presented.

**Perception-Based Measures.** Perception-based measures are the foundation of the study and can be problematic because they are not always an accurate assessment of reality. The individual perceptions here do not constitute actual organizational climate, but the participant perceptions of it. As with many phenomena in organization sciences, it is difficult to find concrete and objective indicators of organizational climate. The track record of the SOQ lends some credibility to the research, but does not overcome the clear limitation that participant perceptions are not objective.

**Social Desirability of Responses.** Self-report measures are often susceptible to bias and the tendency to want to answer in a specific way. Questions on the SOQ are composed in a way that may prompt participants to answer in a way they think they may be expected to answer. The social pressure to give a positive view of the organization can invalidate many self-report surveys. Even across groups, the anxiety about providing certain types of feedback for an organization may compel participants to slant their scoring. In some

cases, there are analysis strategies that assess the susceptibility to faking and these are usually specific to each instrument. No such assessment of the SOQ was found, so it is possible that social pressures played a role in the results. In other words, participants may, through their desire to rate their organization favorably, have provided answers that were more positive.

**Potential Pretest Influence.** Because participants took the same test twice, it is possible that the first exposure to the SOQ may have influenced responses to the second exposure to the SOQ. This sensitization to the pretest can trigger the socially desirable response patterns in the posttest. Much in the same way that Social Desirability can influence scoring, seeing and remembering the test from the pre- to the postexperience can sometimes cause participants to alter their responses. Put another way, one potential limitation of a study like ours is the nature of pre- and posttest data collection in that participants' exposure to the instrument questions on the pretest may have influenced their responses on the posttest. In addition, because the intervention and comparison groups came from different organizations, it is highly unlikely that there was communication between the groups minimizing the possible introduction of error from intervention and comparison groups sharing information. Overall, it seems unlikely that pretest exposure influenced the study because the control group did not show any significance, but it is a possibility we cannot entirely rule out.

**Lack of Random Sampling and Assignment.** The cornerstone of true experimental research is the use of random sampling and random assignment to the treatment and control groups. This study did not use random sampling or random assignment, classifying it as a quasi-experimental study. Instances of true experimental research in organizations are rare because of the difficulties in obtaining randomness in the complex political systems that constitute social organizations.

**Assumptions About Creative Individuals and Organizations.** It is possible to assume that individuals and organizations willing to participate in scenario planning workshops may already hold creative tendencies. Scenario planning itself is described as a creative exploration of plausible futures of the organization, and such activity suggests creativity is already in place. This study, however, has indicated that it is possible that participation in scenario planning workshops may result in an increase in individual perceptions about the creative climate of an organization. So while these individuals and organizations may already hold creative tendencies, scenario planning workshops may alter the way in which the individual views the organization's climate, specifically in the dimensions of freedom, trust, idea-time, and debates. The purpose of this research was to examine the

effects of scenario planning on perceptions of organizational creative climate.

**Future Research Recommendations.** Because of the limitations of this research, there are clear implications and suggestions for improving future related research studies. These include additional studies of the effects of scenario planning on perceptions of climate, linking to innovation research and longitudinal studies that attempt to track changing organizational climate over time.

First, one study does not constitute proof of an effect or confirm a theory or hypothesis (Swanson & Chermack, 2013). Further studies should replicate the design of this study to establish that the effects are achievable in different contexts and other organizations. Continued use of the SOQ to examine creative climate characteristics and the effects that scenario planning may have on them needs further support and establishes an important line of inquiry.

The relationships among climate, creative climate, and culture are worthy of closer examination outside the scenario planning context. These concepts are so close and must overlap to some degree. Further clarification on how they are different and where the boundaries among them might lie are important and can clarify how we understand organizations more broadly.

A clear and logical next step would extend this study to involve innovation. Theory exists to support the positioning of creative climate as a mediating variable between scenario planning and innovation. This kind of design positions climate as a driver of another outcome variable and may well be a more accurate representation for the function of organizational creative climate.

Given the perception-based measures used in this study, another path would involve the use of more objective measures. Observations of behaviors that constitute creative climate could be made in combination with the administration of the SOQ to get a more objective, concrete set of descriptions and examples of creative climate characteristics.

Finally, continued administration of the SOQ and multiple time intervals after the scenario planning intervention is complete would indicate the extent to which the amplification of creative climate is sustainable. In other words, longitudinal studies would give a better sense of how long the effects of scenario planning that we found might last in an organization.

## Conclusions

While this study has found partial support for the hypothesis that scenario planning has an effect on creative organizational climate, specific expected dimensions of creative organizational climate did not show significant changes. Further inquiry is necessary to make a more full determination of the effects of scenario planning on creative organizational climate as measured by the SOQ. However, this

research represents a contribution to both the scenario planning and creative organizational climate literatures in that it has identified an intervention that contributes to some key dimensions of creative organizational climate. In other words, based on research results, scenario planning can support some dimensions of creative organizational climate, which represents a step forward in identifying interventions that can actually promote and develop creative organizational climate characteristics.

Although our results might seem somewhat self-evident, this is the first study of the relationship between scenario planning and creative climates in organizations. While it may reveal what consultants have suspected for years, it provides documented evidence of cases in which scenario planning has influenced a creative climate, lending increased credibility to any such claims. It is clear that scenario planning, as an applied and practiced process, will require ongoing study to isolate and document its benefits. This study represents an instance in which research has confirmed a suspected observation from practice, and it must be considered in the context of ongoing assessment and development of knowledge about scenario planning.

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