The Effect of Job Stress

on

Hierarchy Preferences

by

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An honors thesis submitted in partial fulfillment

of the requirements for the degree of

Bachelor of Science

Undergraduate College

Leonard N. Stern School of Business

New York University

May 2018

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ABSTRACT

Organizational behavior research has shown a number of individual and group behavior patterns emerge under stress, ultimately shifting the collective norm. Yet while existing research has delineated these behaviors, relatively less work has been done to uncover employees' preferences regarding group structures. Given the direct ties between job stress, employee satisfaction, turnover, and performance (Sullivan and Bhagat, 1992), it is important to uncover these preferences and eventually evaluate whether they measure up to enacted behaviors. If there is a disconnect between group members' espoused preferences and enacted behavior, it would be worth investigating the phenomenon as a source of an organization's turnover rate and performance.

In this thesis, I propose that individual preferences for group structure are dependent on several individual characteristics which are in turn moderated by stress: social dominance orientation (SDO), leadership ability, individual self-efficacy, and group-efficacy. Because SDO is a measure of one's preference for inequality between social groups, it presumably translates into a higher preference for hierarchy in the workplace as well. Yet prior studies have demonstrated that leaders may prefer to entrust more responsibilities to their team when under stress (Driskell and Salas, 2017). Therefore we suggest that under stress, the traditionally positive correlation between hierarchy preference and characteristics such as leadership and SDO, are overturned. In addition, I suggest that stress type is a key factor in understanding the relationship between individual characteristic and hierarchy preferences. From Experiments 1,2, and 3, we find that there is a salient interaction effect between Qualitative and No Stress conditions when moderated by SDO. That is, while high-SDO individuals naturally prefer more hierarchy, under qualitative stress they prefer less hierarchy. This result supports existing

literature that qualitative stress causes groups to decentralize in order to maximize more innovation as demanded by the task.

ACKNOWLEDGEMENTS

I'd like to acknowledge my advisor, Professor L. Taylor Phillips, for her invaluable mentorship throughout the past two years. The enthusiasm and astuteness you exude in our oneon-one meetings, as well as in SPUR and MIL labs, never fails to inspire me.

I'd also like to acknowledge Professor Marti Subramanyam for his role as the Honors Program Coordinator. Thank you for giving impetus to such a meaningful research experience for Stern undergraduate students, and for fostering a culture of inquisitiveness and merit.

THEORY AND HYPOTHESIS DEVELOPMENT

INTRODUCTION

In both academic and professional settings, teams often experience stress due to tight deadlines, challenging tasks, or a competitive work culture. In addition to potential work overload, the group must make decisions to allocate responsibility and tasks (Urban, Weaver, Bowers, and Rhodenizer, 1996). If the decision-making process is ineffective, the level of job satisfaction and even group performance may be adversely affected (Sullivan and Bhagat, 1992). A hierarchical structure and an egalitarian structure may yield very different results in terms of performance (Hansen and Wernerfelt, 1989). Depending on endogenous factors such as industry homogeneity, hierarchy within teams could have a significant impact on performance, enjoyment, and time spent on the same task (Edge and Remus, 1984). Creating a team structure that optimizes individuals' specific expertise and opinion even under stressful circumstances is therefore key to maximizing team performance within a company.

Organizational behavior theory posits that for groups of all sizes, established structures are put to the test in crisis situations. Crises are characterized by severe threat, time pressure, and high uncertainty ('t Hart, Rosenthal, Kouzmin, 1993). By nature, stressful situations are a departure from the norm and difficult to reconcile with routine task-completion procedures (Krackhardt and Stern, 1988). In this thesis, we reference crisis management in tandem with occupational stress management literature to define stress as being any stimuli which places nonroutine demands on employees.

Past literature has extensively explored group behaviors that emerge under stress. Yet amongst existing research, opposing findings arise in regards to whether groups gravitate towards centralization or decentralization in stressful circumstances. Contingency theory argues that group structures trend towards decentralization under stress, specifically task uncertainty, because deferring decisions up through the management hierarchy is both time-consuming and reduces flexibility (Prechel, 1994). On the other hand, studies have shown that stressors contribute to petty tyranny and dictatorial managers in the workplace (Ashforth, 1994). Furthermore, stressors characterized by task uncertainty has been shown to lead to increased centralization compared to threat (time pressure) (Argote, Turner, Fichman, 1989).

While existing research primarily tracks group structures under stress through communication matrices or objective performance measures, research addressing individual group members' *preferences* themselves is scarce (Argote, Turner, Fichman, 1989; Lepine, Podsakoff, Lepine, 2005). Behavioral integrity, an alignment between espoused values and enacted behavior, directly drives leadership effectiveness and follower performance (Leroy, Palanski, Simons, 2012). In the same vein, an alignment between individual employees' hierarchy preferences and their group's enacted structure should positively impact both performance and worker-environment fit. Accordingly, our intention is to focus on investigating preferences as opposed to enacted behavior, in the broader context of the relationship between stress and group structure.

EFFECTS OF PRESSURE ON GROUP BEHAVIOR/PERFORMANCE

Past studies have found that under stress, lower-status members place more authority on leaders, while leaders become overburdened and consequently seek to allocate authority to the rest of the group (Driskell and Salas, 1991). Elaborating on these findings in 2017, Driskell and Salas identify that from the perspective of lower-status members, hierarchy may seem more desirable, while the opposite appeals to leaders (Driskell and Salas, 2017). This finding raises the

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question of whether hierarchy preferences can shift due to stressful circumstances, especially amongst leaders.

In addition, most existing research on the relationship between team hierarchy and stress explores the relationship between team structure and stress in a military setting, where subjects' status levels are a significant influence on behavior and attitudes. It is therefore possible that the subjects of Driskell and Salas's experiments, students at a U.S. Navy technical school, were more susceptible to adopting a centralization-of-authority structure under stress. If a group of individuals were given a collective task in a setting where status is less apparent, perhaps different preferences would emerge. As shown from Driskell and Salas's experiments, preferences explain both leaders' and group members' actions in crisis situations, ultimately factoring into group performance.

TYPES OF STRESS

We investigate two categories of stress that have distinct relationships to team hierarchy, as shown in past studies (Drach-Zahavy, Freund, 2006). To account for different types of stress and their effects on individuals, the distinction was made between qualitative pressure, characterized by the complexity of a task, and quantitative/time pressure, defined by task overload or tight deadlines. Because qualitative pressure may demand more innovation and advanced thinking than any one member can cognitively implement, groups under qualitative pressure may prefer a flatter structure (Drach-Zahavy, Freund, 2006).

Under quantitative/time pressure, existing research supports a higher preference for hierarchical structures. This pattern towards centralization of authority could reflect a group's desire to reach consensus more quickly. As a result, only a select few are armed with decision-making power

(Isenberg, 1981). Another explanation for the vertical structure of groups under time pressure is individual differences in goal hierarchies (Isenberg, 1981). Individuals' goal hierarchies were measured using Fiedler's LPC scale, which indicated whether the subject prioritized interpersonal relationships or task accomplishments higher. Because low-LPC individuals were more task-oriented, under time constraints they became more active in the decision-making process. In comparison, high-LPC individuals become more inactive because they observe less opportunity for interpersonal goal fulfillment.

INDEPENDENCE AND INTERDEPENDENCE

In Experiment 1, we explored independence and interdependence as predictors to the relationship between stress and hierarchy preference. Independence can be characterized as a self-construal marked by separation between the individual and the rest of the group. This characteristic has been traditionally affiliated with Western cultures while interdependence, which emphasizes a closeness between the individual and the collective, is associated to non-Western cultures (Singelis, 1994). These variables serve as moderators to the relationship between hierarchy and group performance, since work environments that promote interdependence over independence tend to support increased hierarchy as well (Halevy, Chou, Galinsky, 2011).

SELF-EFFICACY AND GROUP-EFFICACY

In addition to stress type, another predictor for an individual's team hierarchy preferences may be self-efficacy, belief in one's level of task competence. Since self-efficacy is based on self-perceived competence, it has been classified as internal self-esteem while traditional selfesteem is outward-looking, based on acceptance by others (Stets, Burke, 2003). Self-efficacy may affect an individual's preference for hierarchy. Research has shown that working in a hierarchical setting may increase an individual's self-efficacy due to the sense of control it provides compared to egalitarian structures (Friesen, Eibach, Duke, 2014). When this sense of personal control is removed, individual preferences for hierarchy increase, even if the individual is of low status and therefore likely to rank lower on the totem pole (Friesen, Eibach, Duke, 2014).

Meanwhile, group-efficacy is defined as "a group's shared belief in its conjoint capabilities to organize and execute the courses of action required to produce given levels of attainments" (Bandura, 1997). We will investigate group-efficacy as perceived by individual members of the team. Research has also shown that higher perceived group-efficacy can strengthen the group's motivation, resilience, and performance (Bandura, 1997). Charismatic leaders also promote group-efficacy to render collective goals and actions meaningful (Shamir, House, Arthur, 1993). Here, we focus on group-efficacy at the individual level - an individual's confidence in the group's capabilities - rather than at the team level. We expect individual groupefficacy beliefs to shape individual preferences for hierarchy. Although high group-efficacy individuals in a hierarchical team may prefer the existing structure under stress, leaders with high group-efficacy scores will prefer an egalitarian structure, out of faith in the team and in order to alleviate their own burden (Driskell and Salas, 2017).

SOCIAL DOMINANCE ORIENTATION AND LEADERSHIP

By definition, social dominance orientation (SDO) indicates an individual's preference for inequality among social groups (Pratto, Sidanius, Stallworth, Malle, 1994). In fact, high-SDO individuals will pursue occupations that promote hierarchy, while low-SDO individuals will pursue those that accomplish the opposite (Pratto, Sidanius, Stallworth, Malle, 1994). We plan to include SDO in our experiments as a potential moderating variable in the relationship between stress and hierarchy preference.

Leadership, classified as an individual's status or rank within a group, was also referenced in past studies testing the relationship between stress and hierarchy (Driskell and Salas, 1991). Although researchers expected high-status individuals within the group to exhibit more centralized behavior under stress, they found that, contrary to the hypothesis, both leaders and subordinates grew more receptive to task input (Driskell and Salas, 1991).

CURRENT RESEARCH

We plan to test the hypothesis that there is a positive relationship between stress and preference for hierarchy (Gruenfeld and Tiedens, 2010). The relationship is likely positive because hierarchy lends a sense of personal control to the individual, which counteracts the nonroutine nature of stressors. We further suggest that under stress, individuals' group structure preferences are dependent on several moderators that specifically affect the extent to which hierarchy will satisfy individuals' need for personal control: independence/interdependence, SDO, self-efficacy, group-efficacy, and leadership.

We predict that individuals scoring higher in interdependence rather than independence will prefer hierarchical systems under stress. Past literature supports the notion that interdependence goes hand in hand with the benefits of hierarchy: increased coordination and task-oriented relationships (Halevy, Chou, Galinsky, 2011). An individual scoring high in SDO is more likely to prefer hierarchical structures under stress, as they have a natural tendency to support hierarchy. Similarly, we predict that individuals scoring high in Leadership, indicating that they have had extensive leadership experience and prefer leadership roles, would favor hierarchy to maintain a high-status position. An individual with high levels of self-efficacy is more likely to prefer a hierarchical structure so he can assume a leadership position. However, if the individual also scores high on group-efficacy, then the individual will prefer an egalitarian structure as it allows for contribution from more members of the group. Even if an individual has high SDO and self-efficacy, high group-efficacy will counteract their preference for hierarchy because the individual's faith in the group alleviates their own task burden under stress. If an individual has low self-efficacy, they may prefer hierarchy despite losing power in the group. This is because a perceived advantage to hierarchy is the structure it provides when an individual's sense of personal control is threatened (Friesen et al, 2014).

Finally, we hypothesize the type of stress will affect the relationship between stress and group structure preferences. Under quantitative stress, individuals will prefer a more vertical group structure due to desire for quick decision-making, and therefore, centralization of authority. On the other hand, qualitative stress will create more demand for collaboration and advanced thinking, so individuals may prefer a flatter group structure.

H1: As group stress increases, individuals' preference for group hierarchy will increase.

H2: Individuals with higher SDOs will prefer increased hierarchy measures under stress as their desire for personal control is exacerbated.

H3: Individuals with higher self-efficacy will prefer increased hierarchy under stress, unless they also perceive high group-efficacy.

H4: Individuals with higher group-efficacy will prefer increased egalitarianism under stress.

H5: Individuals exposed to quantitative stress will prefer increased hierarchy for the sake of efficiency. However, individuals exposed to qualitative stress will prefer less hierarchy in order to promote synergies.

H6: Individuals who score higher in interdependence will prefer increased hierarchy under stress. Individuals who score higher in independence will prefer less hierarchy under stress.

EXPERIMENT 1

In Experiment 1, we explored the effects of pressure on individual preferences for group structure, i.e. hierarchy versus egalitarian in decision-making processes and distribution of power. We used a two condition (Stress, No Stress) between-participants design. We expect those in the No Stress condition to prefer a more flat group power structure than those in the Stress condition.

METHODS

PARTICIPANTS

One hundred adult volunteers from a national online subject pool (Amazon's Mechanical Turk) were each paid \$0.10 for participating in a two to five minute survey.

PROCEDURE

Before being placed in either a Stress/No Stress condition, all participants completed the Singelis Self-Construal Scale, which measured levels of independence and interdependence. We predict that individuals who display a higher level of independence than interdependence will also demonstrate a preference for hierarchical group structures under stress.

Participants were then randomly assigned to either Stress/No Stress condition. In the No Stress condition, participants were asked to imagine that they were assigned a group class project. The participant is given the following information: the project includes a presentation and paper, each five-person group is randomly assigned, and individuals must evaluate their group after the project is over. Participants are told their group must decide how workload will be divided and how decisions will be made.

In the Stress condition, participants were given the same scenario, with the addition of a class curve - only groups in the top 20% of the class will receive an A.

Preference for either hierarchical or egalitarian group structure was measured with two questions. All participants were asked to look at two images, each demonstrating one type of group structure, and choose the one they liked best. In addition, participants were asked how decision-making power should be allocated - either equally amongst all group members or to the member with the most expertise. The remaining three questions evaluated participants' confidence. "How do you normally perform in group projects compared to the rest of the group?" (Score 0: Not as well as other members; Score 100: The best.) "Based on your self-description, how much influence do you perceive yourself having in group environments?" "Rank your group according to how much power each member should receive."

MEASURES

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Independence and interdependence were both measured with Theodore Singelis's Self-Construal Scale (Singelis, 1994). The 18-item scale was designed to measure participants' willingness to place personal goals over goals of the collective, and vice versa. Participants ranked their agreement to statements representing independence or interdependence on a scale of 1 to 5 (1= None at all, 5= A great deal).

SDO was measured with the 16-item Social Dominance Orientation Scale. Participants rated their agreement with each item (1= very negative; 7 = very positive) (Appendix G).

RESULTS

RELATIONSHIP BETWEEN STRESS AND PREFERENCE FOR HIERARCHY

We hypothesized that those in the Stress condition would prefer more hierarchy than those in the No Stress condition. However, we found no significant difference between the two conditions: p=.58.

Relationship between Interdependence/Independence and preference for Hierarchy

See Appendix E for a table of the binomial regression results examining the relationship between interdependence/independence, and preference for hierarchy. From our regression results, we found no significant relationship between interdependence/independence and preference for hierarchy (Appendix E).

Relationship between SDO and preference for hierarchy under stress



Figure 1: Interaction Plot Hierarchy Preference ~ Stress*SDO (B=0.303; p=0.049)

We conducted a linear regression with hierarchy preference as the dependent variable, stress as the independent variable, and SDO as a continuous moderator (Figure 1).

From our regression results, we found a significant relationship between stress and SDO, as well as between no-stress and SDO. In the no stress condition, participants with higher SDO indicated a higher preference for hierarchy (Appendix H). In the stress condition, however, participants with higher SDO indicated a lower preference for hierarchy.

DISCUSSION

We found no effect of individual levels of independence and interdependence on preference for hierarchy under stress. Altogether, these results suggest that individual difference factors may matter especially for reactions to stress. Therefore, in future experiments, we expand on our individual difference measures to acknowledge the potential influence of self-efficacy, group-efficacy, and SDO.

After reviewing additional job stress literature, we also acknowledge that using a curved grade scenario to represent the stress condition may be ambiguous, as the concept of a class curve introduces inter-group competition, which may serve as a confounding variable.

EXPERIMENT 2

In a second study, we revised the independent variables to be SDO, self-efficacy, groupefficacy, and leadership. In addition, we applied two types of pressure: qualitative and quantitative (Kahn, Wolf, Quinn, Snoek, & Rosenthal, 1964).

We predicted that individuals with a high level of self-efficacy will demonstrate desire to maintain a leadership role given their confidence in their task competency. However, if individuals have high levels of both self and group-efficacy, individuals will prefer an egalitarian group structure that entrusts all members with decision-making and task distribution power.

Another element introduced in the second study is a distinction between quantitative and qualitative stress. Exposing participants to different types of stress accounts for the separate effects of preferences each type of stress create. Quantitative stress is defined to be role overload (Kahn, Wolf, Quinn, Snoek, & Rosenthal, 1964), involving conditions such as accumulating task

demands or time pressure. In contrast, qualitative stress is equivalent to role ambiguity, involving high performance standards or non-routine tasks. Separating these two types of stress in this survey is necessary as the nature of qualitative stress necessitates dependence on different, often more innovative, input from group members. Therefore, participants in the qualitative stress condition may express a greater reliance on the group despite their individual level of groupefficacy.

METHODS

PARTICIPANTS

One hundred and fifty adult volunteers from a national online subject pool (Amazon's Mechanical Turk) were each paid \$0.25 for participating in a 2-5 minute survey.

PROCEDURE

Participants completed a survey that contained three parts. The first measured their self-efficacy, SDO, and group-efficacy. In the second, participants were randomly assigned to read one of three scenarios corresponding to the following conditions: control (no stress), quantitative stress, or qualitative stress. In all three conditions, participants receive the same project scenario that was issued in Experiment 1.

In the No Stress condition, participants were asked to imagine that they were assigned a group class project. The participants are told that they have been placed into a random group of four, and that the group task involves a 20-minute presentation and a 10-page paper. In addition, participants are assured they have plenty of time to work on the project. They are told their group must decide how work will be divided and how decisions will be made. In the Quantitative Stress condition, participants were given the same information about the task and the group as in the No Stress condition. However, they are told that because the project was assigned late in the semester, the group is short on time.

In the Qualitative Stress condition, participants were told their group task is to design a business plan for an original start-up idea. The aim of this customization was to create higher task demands associated with creativity to simulate qualitative stress.

After reading a scenario, participants responded to a series of questions assessing their preferences for hierarchy in the group. Questions evaluated the level of group hierarchy participants preferred, how participants believed decisions should be made, and how work should be split. In addition to measuring hierarchy preferences, the study evaluated participants' leadership. Questions assessed how much power/influence participants typically have in groups, how much participants prefer to be leaders, and how much leadership experience they possess. Finally, participants answered demographic questions and completed a personality assessment.

MEASURES

SDO was measured using the 16-item Social Dominance Orientation Scale (Appendix G), which contained statements such as, "Inferior groups should stay in their place.", and "Group equality should be our ideal" (see Appendix G). Participants rank how much they agree with these statements on a 7-point scale (1 = Strongly Oppose; 7 = Strongly Favor).

Self-efficacy was measured using the 8-item New General Self-Efficacy Scale (NGSE) (Chen, Gully, Eden, 2001) (Appendix B), which contained statements such as, "I

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believe I can succeed at most any endeavor to which I set my mind". Participants rank their responses on a 7-point scale (1 = Strongly Disagree; 7 = Strongly Agree).

Group-efficacy was measured using the Potency Scale (Guzzo et al.) (Appendix C), which is used to measure individual members' perception of their group's capability (e.g., "My group has confidence in itself"). An arithmetic mean of these responses is calculated to determine the group-level construct. Participants rank their responses on a 10-point scale (1 = To no extent; 10 = To a great extent).

Hierarchy preference and leadership scales were created for the sake of this study. Hierarchy preference was measured using a 6-item scale, providing a Chronbach's alpha score of 0.77 (Appendix M). Leadership was measured using a 3-item scale, providing a Chronbach's alpha score of 0.82 (Appendix N).

RESULTS

Relationship between SDO and Preference for Hierarchy



Figure 2: Interaction Plot Hierarchy Preference ~ Stress*SDO (B=0.231; p=1e-05*)

Relationship between Leadership and Preference for Hierarchy



Figure 3: Interaction Plot Hierarchy Preference ~ Stress*Leadership (B=0.194; p=2.81e-06*)



Relationship between NGSE And Preference for Hierarchy

Figure 4: Interaction Plot Hierarchy Preference ~ Stress*Self Efficacy (B = 0.040; p=0.317)

Relationship between GE And Preference for Hierarchy



Figure 5: Interaction Plot Hierarchy Preference ~ Stress*Group-Efficacy (B=-0.009; p=0.84)

DISCUSSION

In the interaction plot between stress and SDO, it is apparent that SDO moderates the relationship between stress and hierarchy preferences. Interestingly, under qualitative stress, higher SDO individuals exhibit preferences for a flatter group structure. Quantitative Stress and No Stress conditions support our hypotheses that preferences generally lean towards steeper hierarchy, and are heightened under time-based pressure.

Although leadership is significantly related to hierarchy preferences, the corresponding plot shows no interaction effect. We observe that this time quantitative stress contains the least severe hierarchy preference as Leadership increases. However, this refutes our hypothesis as we would expect Leadership and SDO to operate the same. A possible explanation for the lack of an interaction effect between stress and leadership is the use of hypothetical scenarios rather than live, in-person simulations of stressful team encounters. To amp up the plausibility of stressors, we replaced scenarios with an interactive group activity in Experiment 3.

Because self-efficacy and group-efficacy variables were not significant predictors of hierarchy preference, we plan to eliminate them from future studies. However, the main effects from Figures 4 and 5 do support our hypotheses that self-efficacy and hierarchy preferences are positively related, while group-efficacy and hierarchy preferences are negatively related.

EXPERIMENT 3

In Experiment 3, we explored the effects of quantitative and qualitative stressors on individual preferences for group structure by conducting an interactive activity in groups of three. We used a three condition (Qualitative Stress, Quantitative Stress, No Stress) between-groups design. Per our hypothesis and Experiment 2 results, we expect those in the Qualitative Stress condition to prefer a more flat group power structure than those in the No Stress and the Quantitative Stress condition. Additionally, we focus on testing individual SDO and leadership variables as moderators to the relationship between stress and hierarchy preferences.

METHODS

PARTICIPANTS

One hundred and fifty-three adult volunteers from a national online subject pool (Amazon's Mechanical Turk) were each paid \$2.00 for participating in a 20 to 30-minute experiment.

PROCEDURE

To create a more convincing simulation of stress for this experiment, we replaced the scenarios with a remote multiplayer group activity for this study. We used oTree, a Python framework designed to support multiplayer games and behavioral experiments (Daniel L. Chen, Martin Schonger and Chris Wickens). oTree allows its builds to be published to Amazon MTurk.

Similar to Experiment 2, participants completed a survey containing three parts. The first measured their SDO. Due to time constraints and the results from the prior study, we chose to remove self-efficacy and general-efficacy scales from this experiment. Before moving on to the second part, participants completed a preliminary hierarchy evaluation to test their baseline preferences. Participants then read instructions indicating that they were about to be randomly placed into an interactive online game with two other anonymous participants. They were instructed to work with their group using a chat function and align on responses before submitting answers to the game.

Groups were randomly assigned to one of three conditions for their task: No Stress, Quantitative Stress, or Qualitative Stress. In the No Stress condition, participants were asked to collaborate on a history trivia game in which they must order ten historical inventions from least to most recent (Appendix O). Participants were told that their group must decide how workload will be divided and how decisions will be made. Finally, participants are assured that they will have as much time as they need to finish the group activity. In the Quantitative Stress condition, participants were given the same instructions about the task and the group as in the No Stress condition. However, groups in this condition are held to a strict time limit of 5 minutes to complete the task.

In the Qualitative Stress condition, participants were told that in addition to placing the historical events in chronological order, they must also provide their best estimate of when each event occurred.

After completing the trivia game in groups, participants responded to a series of questions assessing their preferences for hierarchy/no hierarchy in the group project. Questions concerned various aspects of group behavior, such as how decisions should be made, how work should be distributed, and the level of influence the participant sees himself achieving in the group. This study also included a stress check, so all participants rated how stressed they felt from the group activity.

Measures

SDO, leadership, and hierarchy preferences were measured using the same scales as in Experiment 2.

RESULTS

Experiment 3 shed further light by replicating the interaction effect from Experiments 1 and 2, between hierarchy preference and stress as moderated by SDO (Figure 6). We continue to observe in the qualitative stress condition a negative relationship between SDO and preference for hierarchy, prompting the question: what aspect of the qualitative stressor provokes this self-contradictory response?



Figure 6: Hierarchy Preference vs. Stress. moderated by SDO(B=0.067; p=0.677)

The main effect between leadership and hierarchy preference remained positive and significant, again replicating the relationship exhibited in Experiment 2. However the interaction plot shows a definitive lack of interaction between stress conditions, indicating that stress does not have any noteworthy effect on the relationship between leadership and hierarchy preference.



Figure 7: Hierarchy Preference vs Stress, moderated by Leadership (B=0.433, p=0.00005)

Next, we conducted a one-way ANOVA investigating whether there was a significant difference between final hierarchy preferences after the group activity across conditions (Appendix R). The test did not return a significant p-value (p=0.535) so we accept the null hypothesis that there is no statistically significant difference between final mean hierarchy preference between groups.

DISCUSSION

Experiment 3 results primarily served to replicate Experiment 2 findings regarding the role of SDO and Leadership as moderators. Although SDO was not significant related to hierarchy preferences in the interaction plot (Figure 6), we again observe higher SDO individuals preferring a flatter organizational structure under qualitative stress, while quantitative stress and control conditions are positively correlated to an inclination for hierarchy.

On the other hand, Leadership was once again a significant predictor for hierarchy preferences but offered no interaction effect when coupled with the three stress conditions. Interestingly, the slope of the qualitative stress regression (Figure 7) was the steepest out of the three. While our hypotheses would have predicted that leaders would prefer a flatter structure under task-based stress, the Experiment 3 results indicate otherwise.

Ideally, in future studies we would include a lengthier Leadership scale to better assess and differentiate between levels of leadership. Another potential direction to focus on would be measuring status as a moderator.

GENERAL DISCUSSION

The goal of these three experiments is to shed light on how individual preferences for team structures may emerge under stress, as well as whether the relationship between stress and team hierarchy preferences may be moderated by an individual's SDO, leadership, self-efficacy, or group-efficacy. In our hypothesis, we predicted that the main effect between stress and hierarchy preferences is a positive relationship, and exacerbated by moderators self-efficacy, leadership, and SDO. However, we hypothesized that group-efficacy is the primary moderator for this relationship. Even for high SDO and self-efficacy individuals, a high group-efficacy score would shift their preference towards an egalitarian structure under stress. Our reasoning is that perceived group-efficacy is a powerful crutch in stressful conditions, especially for high-status leaders. For example, research has shown that under stress, leaders will allocate more authority to the rest of the group to avoid being overburdened (Driskell and Salas, 1991).

Consistently across our three studies, we found that SDO was the most apparent moderator to the relationship between stress and hierarchy preferences. In Study 1, high SDO individuals exposed to the Stress/class curve condition preferred significantly less hierarchy than in the No Stress condition. In Study 2, we replicated this pattern after refining categorizing stress to either be quantitative (time-based), or qualitative (task-based). From Figures 1 through 7, we can observe that quantitative and qualitative stressors do have distinct effects on hierarchy preferences, a conclusion that supports past occupational stress literature as well.

Our findings point to an interesting development that should especially be further investigated due to the relative lack of existing studies examining the relationship between individual preferences for hierarchy and occupational stress. Therefore, the prevailing questions for future studies are whether these individual preferences diverge from enacted team behavior, and whether any disconnect may affect individual or group performance. In addition, we must ask ourselves why out of all moderators tested, SDO proved to be the most surprising yet significant one. Is there an underlying explanation to the combination of high-SDO individuals and qualitative stress conditions that begets lesser preferences for hierarchy?

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APPENDICES

A: ROSENBERG SELF-ESTEEM SCALE

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
 I feel that I am a person of worth, at least on an equal plan with others. 				
2. I feel that I have a number of good qualities.				
3. All in all, I am inclined to feel that I am a failure.				
4. I am able to do things as well as most other people				
5. I feel I do not have much to be proud of.				
6. I take a positive attitude toward myself.				
7. On the whole, I am satisfied with myself.				
8. I wish I could have more respect for myself				
9. I certainly feel useless at times.				
10. At times, I think I am no good at all.				

B: NEW GENERAL SELF-EFFICACY SCALE (NGSE)

_	APPENDIX New General Self-Efficacy Scale
	1. I will be able to achieve most of the goals that I have set for myself.
	2. When facing difficult tasks, I am certain that I will accomplish them.
	3. In general, I think that I can obtain outcomes that are important to me.
	4. I believe I can succeed at most any endeavor to which I set my mind.
	5. I will be able to successfully overcome many challenges.
	6. I am confident that I can perform effectively on many different tasks.
	7. Compared to other people, I can do most tasks very well.
	8. Even when things are tough, I can perform quite well.
	Notes
rea	 More specific information with regard to the search we have conducted is available upon quest from the first author.
	2. Participants were told that (a) general self-efficacy relates to "one's estimate of one's over-
all	ability to perform successfully in a wide variety of achievement situations, or to how confi-
de	nt one is that she or he can perform effectively across different tasks and situations," and (b)
se	If-esteem relates to "the overall affective evaluation of one's own worth, value, or importance, to how one <i>feels</i> about oneself as a person."

C: POTENCY SCALE (GROUP-EFFICACY)

APPENDIX Measures Used in the Study	
POTENCY MEASURE	
GROUP NAME	
PARTICIPANT ID	
Please answer the items below using a scale from 1 to 10 on which 1 to a limited extent, $5 = to$ some extent, $7 = to$ a considerable extent, a extent.	= to no extent, $3 =nd 10 = to a great$
1. My group has confidence in itself.	
2. My group believes it can become unusually good at producing high-quality work.	
3. My group expects to be known as a high-performing team.	
4. My group feels it can solve any problem it encounters.	
5. My group believes it can be very productive.	
6. My group can get a lot done when it works hard.	
6. My group can get a lot done when it works hard.7. No task is too tough for my group.	

D: PILOT STUDY CHI-SQUARE TEST CONTINGENCY TABLE

PIC	C (curve)	NC (no curve)
A (egalitarian preference)	31	34
B (hierarchy preference)	24	24
<na></na>	1	0

E: PILOT STUDY REGRESSION RESULTS FOR INDEPENDENCE AND INTERDEPENDENCE

```
Binomial Regression for Hierarchy Preference vs Stress*Independence
_____
> rs3=glm(PickTeamEqual1 ~ Curve1*Ind, data=cath, family="binomial"); summary(rs3)
Call:
glm(formula = PickTeamEqual1 ~ Curve1 * Ind, family = "binomial",
   data = cath)
Deviance Residuals:
   Min
            10
                 Median
                              30
                                     Max
                  0.7816 0.9968
                                   1.6644
-1.5834 -1.2591
Coefficients:
             Estimate Std. Error z value Pr(>|z|)
              1.4347 0.7670 1.870 0.0614 .
1.1614 0.7670 1.514 0.1300
(Intercept)
Curvellin
              -0.4649
                         0.3053 -1.523
Ind
                                         0.1279
                         0.3053 -1.776 0.0757 .
Curvellin:Ind -0.5423
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
(Dispersion parameter for binomial family taken to be 1)
   Null deviance: 134.96 on 98 degrees of freedom
Residual deviance: 129.66 on 95 degrees of freedom
AIC: 137.66
```

```
Binomial Regression for Hierarchy Preference vs Stress*Interdependence
> rs4=glm(PickTeamEqual1 ~ Curve1*Int, data=cath, family="binomial"); summary(rs4)
Call:
glm(formula = PickTeamEqual1 ~ Curve1 * Int, family = "binomial",
   data = cath)
Deviance Residuals:
                Median
   Min
            10
                            3Q
                                   Max
-1.3833 -1.2661
               0.9867 1.0117
                                 1.2230
Coefficients:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)
             0.55967 0.79668 0.702
                                        0.482
Curvellin
             0.14459
                       0.79668 0.181
                                        0.856
            -0.09627
                       0.29510 -0.326
                                        0.744
Int
Curvellin:Int -0.11226
                       0.29510 -0.380
                                        0.704
(Dispersion parameter for binomial family taken to be 1)
   Null deviance: 134.96 on 98 degrees of freedom
Residual deviance: 134.20 on 95 degrees of freedom
AIC: 142.2
```

F: PERFORMANCE MANAGEMENT INDICATOR (PMI) Sample of Likert scale measures

Ple	ease	ndicate the ex	ktent to which you ag	ree or disagree with th	e following statements	i.					
	Ver di	1 y strongly sagree	2 Strongly disagree	3 Disagree	4 Agree	5 Stron agre	gly e		Very	6 strong gree	(
	1.	Assessmen work.	ts of performance d	o not reflect the way	and how hard individ	uals 🕕	2	8	4	6	
	2.	Even though social affairs neither com	h some people try to s or office politics, r prehend nor contro	o control company ev nost of us are subjec I.	ents by taking part in t to influences we car	n O	2	6	4	6	
	3.	Managemer	0	2	8	4	6				
	4.	The things t function of l	0	2	6	4	6				
	5.	Most of us a	0	2	6	4	6				
	6.	I have little i	0	2	ß	4	6				
	7.	I have a lot of discretion in my work.						8	4	6	
	8.	I enjoy the f	0	2	B	4	6				
	9.	I feel uncom	nfortable when I'm r	ot sure what I have t	o do.	0	2	ß	4	6	
	10.	I find it easy	to achieve what I v	vant.		0	2	3	4	6	
	11.	I feel I need	0	2	ß	4	6				
	12.	I like to be t	0	2	8	4	6				
	13.	I think that r	my job gives me a le	ot of influence.		0	2	6	4	6	
	14.	I like other p	people to organise r	ny life for me.		0	0	6	4	6	
	15.	People can	change their circun	istances		0	2	6	4	6	

G: SOCIAL DOMINANCE ORIENTATION SCALE

Appendix C

Items on the 16-Item Social Dominance Orientation Scale

- 1. Some groups of people are simply inferior to other groups.
- 2. In getting what you want, it is sometimes necessary to use force against other groups.
- 3. It's OK if some groups have more of a chance in life than others.
- 4. To get ahead in life, it is sometimes necessary to step on other
- groups. 5. If certain groups stayed in their place, we would have fewer
- problems. 6. It's probably a good thing that certain groups are at the top and
- other groups are at the bottom.
- 7. Inferior groups should stay in their place.
- 8. Sometimes other groups must be kept in their place.
- 9. It would be good if groups could be equal.
- 10. Group equality should be our ideal.

- All groups should be given an equal chance in life.
 We should do what we can to equalize conditions for different
- groups.
- 13. Increased social equality.
- 14. We would have fewer problems if we treated people more equally.
- 15. We should strive to make incomes as equal as possible.
- 16. No one group should dominate in society.

Items 9–16 should be reverse-coded. The response scale was very negative (1) to very positive (7).

> Received July 8, 1993 Revision received May 10, 1994 Accepted May 11, 1994

H: EXPERIMENT 1 - HIERARCHY PREFERENCES ~STRESS*SDO REGRESSION RESULTS

Binomial Regression for Hierarchy Preference vs Stress*SDO _____ Deviance Residuals: Min 30 10 Median Max -1.6201 -1.1929 0.7703 1.0428 1.6741 Coefficients: Estimate Std. Error z value Pr(>|z|) 0.54360 (Intercept) 0.49828 1.091 0.2753 Curvellin -1.032730.49828 -2.073 0.0382 * -0.08144 0.15476 -0.526 0.5987 SD0 Curvellin:SDO 0.30354 0.15476 1.961 0.0498 * Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1 (Dispersion parameter for binomial family taken to be 1) Null deviance: 134.96 on 98 degrees of freedom Residual deviance: 130.22 on 95 degrees of freedom AIC: 138.22 Number of Fisher Scoring iterations: 4

Hierarchy Preference vs Condition*Leadership _____ Residuals: Min 10 Median 30 Max -0.8593 -0.2852 -0.0549 0.2498 1.5545 Coefficients: Estimate Std. Error t value Pr(>|t|) 0.003273 0.033182 0.099 0.9216 (Intercept) Curve_lin 0.032177 0.040800 0.789 0.4316 Curve_quad -0.019548 0.023370 -0.836 0.4043 tot_Lead 0.194233 0.039867 4.872 2.81e-06 *** Curve_lin:tot_Lead -0.107600 0.048934 -2.199 0.0294 * Curve_quad:tot_Lead 0.015475 0.028128 0.550 0.5830 Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1 Residual standard error: 0.411 on 148 degrees of freedom Multiple R-squared: 0.1542, Adjusted R-squared: 0.1256 F-statistic: 5.395 on 5 and 148 DF, p-value: 0.0001377

I: EXPERIMENT 2 - STRESS EFFECTS ON HIERARCHY PREFERENCES FOR LEADERSHIP

Hierarchy Preference vs Condition*NGSE _____ > Residuals: Min 10 Median 30 Max -0.85530 -0.27197 -0.09882 0.24866 1.27060 Coefficients: Estimate Std. Error t value Pr(>|t|) 0.331 (Intercept) -0.24621 0.25221 -0.976 -0.27095 0.28384 -0.955 Curve_lin 0.341 Curve_quad -0.16075 0.19171 -0.839 0.403 0.04056 0.04041 1.004 NGSE 0.317 0.255 Curve_lin:NGSE 0.05227 0.04572 1.143 Curve guad:NGSE 0.02325 0.03060 0.760 0.449 Residual standard error: 0.4401 on 148 degrees of freedom Multiple R-squared: 0.0302, Adjusted R-squared: -0.002562 F-statistic: 0.9218 on 5 and 148 DF, p-value: 0.4687

J: EXPERIMENT 2 - STRESS EFFECTS ON HIERARCHY PREFERENCES FOR NGSE

K: EXPERIMENT 2 - STRESS EFFECTS ON HIERARCHY PREFERENCES FOR GE

Hierarchy Preference vs Condition*GE _____ Residuals: Min 10 Median 30 Max -0.85681 -0.27894 -0.09341 0.23678 1.42315 Coefficients: Estimate Std. Error t value Pr(>|t|) (Intercept) 0.023578 0.127683 0.185 0.854 0.214913 0.158784 1.353 0.178 Curve_lin Curve_quad 0.020259 0.088875 0.228 0.820 -0.009237 0.045599 -0.203 GE 0.840 Curve_lin:GE -0.062781 0.055314 -1.135 0.258 Curve guad:GE -0.015445 0.032549 -0.475 0.636 Residual standard error: 0.442 on 148 degrees of freedom Multiple R-squared: 0.02182, Adjusted R-squared: -0.01122 F-statistic: 0.6604 on 5 and 148 DF, p-value: 0.654

L: EXPERIMENT 2 - STRESS EFFECTS ON HIERARCHY PREFERENCES FOR SDO

Hierarchy Preference vs Condition*SD0 Residuals: Min 10 Median 30 Max -0.88077 -0.26600 -0.08449 0.20115 1.51390 Coefficients: Estimate Std. Error t value Pr(>|t|) -1.265588 0.275765 -4.589 9.42e-06 *** (Intercept) -0.323236 0.341420 -0.947 Curve_lin 0.345 Curve_quad -0.001598 0.192848 -0.008 0.993 SD0 0.231103 0.050524 4.574 1.00e-05 *** Curve lin:SD0 0.062670 0.062809 0.998 0.320 Curve_quad:SDO -0.003420 0.035181 -0.097 0.923 ____ Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1 Residual standard error: 0.4065 on 148 degrees of freedom Multiple R-squared: 0.1723, Adjusted R-squared: 0.1444 F-statistic: 6.164 on 5 and 148 DF, p-value: 3.219e-05

M: EXPERIMENT 2 – CHRONBACH'S ALPHA FOR HIERARCHY PREFERENCE

Reliability	analysis					
Call: alpha($x = s2_{hier}$	_subset,	check.key	/s = TRUE)		
raw_alpha	std.alpha G	6(smc) av	erage_r S	S/N ase mean	sd	
0.77	0.77	0.8	0.4 3	4 0.03 -0.58	0.72	
lower alpha	upper	95% confi	dence boi	undaries		
0.71 0.77 0.	83					
Reliability	ˈif an item	is dropp	ed:			
r	aw_alpha st	d.alpha G	6(smc) av	/erage_r S/N a	lpha se	
prefer_h-	0.74	0.74	0.71	0.42 2.9	0.034	
prefer_e_z	0.74	0.74	0.78	0.41 2.8	0.037	
struc-	0.71	0.71	0.68	0.38 2.5	0.038	
work	0.73	0.73	0.75	0.41 2.8	0.036	
dec	0.72	0.72	0.75	0.39 2.6	0.038	
	0	0=	0110	0.00 2.0	5.050	

N: EXPERIMENT 2 - CHRONBACH'S ALPHA FOR LEADERSHIP

```
Reliability analysis
Call: alpha(x = s2\_lead\_subset, check.keys = TRUE)
  raw_alpha std.alpha G6(smc) average_r S/N
                                             ase
                                                     mean
                                                            sd
                                  0.6 4.5 0.025 -1.3e-16 0.86
               0.82
                       0.76
      0.82
lower alpha upper 95% confidence boundaries
0.77 0.82 0.87
Reliability if an item is dropped:
           raw_alpha std.alpha G6(smc) average_r S/N alpha se
                          0.74
Leadership
                0.74
                                  0.58
                                            0.58 2.8
                                                        0.042
Leadership2
                0.82
                          0.82
                                  0.69
                                            0.69 4.5
                                                        0.029
Leadership3
                0.69
                          0.69
                                  0.53
                                            0.53 2.2
                                                        0.050
```

O: EXPERIMENT 3 – GAME DESCRIPTION (ALL CONDITIONS)

Game Instructions

You will be grouped randomly and anonymously with 2 other participants.

Your group will play a history trivia game. You will be asked to sort ten historical events based on when you think they occurred, from 1 (oldest) to 10 (most recent).

You will be able to discuss with your group before entering your response.

Everyone in your group must enter the same responses.

Please DO NOT CHEAT by referencing outside sources such as the Internet. We are looking to measure you and your teammates' abilities only.

Click "Next" to begin the game and chatting with your group!



P: EXPERIMENT 3 – HIERARCHY PREFERENCES ~STRESS*SDO REGRESSION RESULTS

Hierarchy Preference vs Condition*SD0									
term	estimate	std.error	statistic	p.value					
1 (Intercept) 2 Condition_lin 3 Condition_quad 4 SD0 5 Condition_lin:SD0 6 Condition_quad:SD0	-0.266 -0.115 0.372 0.067 0.017 -0.076	0.664 0.741 0.507 0.161 0.180 0.123	-0.401 -0.155 0.733 0.418 0.097 -0.620	0.689 0.877 0.466 0.677 0.923 0.537					

Q: EXPERIMENT 3 – HIERARCHY PREFERENCES ~STRESS*LEADERSHIP REGRESSION RESULTS

Hierarchy Preference vs Co	ondition*l	eadership		
term	estimate	std.error	statistic	p.value
1 (Intercept) 2 Condition_lin 3 Condition_quad 4 tot_Lead 5 Condition_lin:tot_Lead 6 Condition_quad:tot_Lead * p<0.05	0.021 -0.069 0.079 0.433 -0.116 0.038	0.074 0.093 0.051 0.102 0.131 0.068	0.276 -0.736 1.536 4.248 -0.888 0.557	0.783 0.463 0.128 0.00005* 0.377 0.579

R: ONE-WAY ANOVA - HIERARCHY PREFERENCE VS CONDITION

One-Way ANO	VA fo	or final	Hierarc	hy Prefe	erence vs	Condition
==========	=====					
	Df	Sum Sq	Mean Sq	F value	Pr(>F)	
Condition Residuals	2 101	0.79 63.40	0.3955 0.6277	0.63	0.535	