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ABSTRACT

This paper introduces the study of group work pressure (GWP) in information technology (IT) task groups. We theorize that GWP arises from demands and resources in group work and that high levels of GWP inhibit group performance. To identify the constructs of a new group task demands-resources (GTD-R) model, we solicit subjects' descriptions of factors associated with high and low pressure group work situations they have experienced. We find that GWP is composed of characteristics of the task, group, environment, and individuals in the environment. Group characteristics include expertise of the group, group history, and degree of interpersonal conflicts. Individual characteristics include task motivation, personal expertise, and positive/negative consequences. Task complexity, time pressure, and external resources available to the group complete the model tasks. The findings extend prior demands-resources research, suggesting a research model for future study and practical mechanisms for reducing undesirable effects of GWP.

Keywords

Group work pressure (GWP), group task demand-resources (GTD-R) model, task difficulty, task complexity, time pressure, interpersonal conflict, motivation, consequences.

INTRODUCTION

Organizational researchers identify work pressure as a primary cause of individual workers' tendencies to "cut corners" in their jobs (Oliva, 2001) and an important contributor to workers' feelings of dissatisfaction (Carayon & Zijlstra, 1999; Weiss, 1983), fatigue (Macdonald, 2003), and job burnout (Bakker et al., 2004). The information technology (IT) field is characterized by high workloads and numerous stressors (Sethi et al., 2004). Consequently, it is not surprising that work pressure and related factors have been found to decrease IT workers' performance, reducing output quality and job satisfaction (Ahituv et al., 1998; Austin, 2001) while increasing exhaustion and turnover intentions (Guimaraes & Igbaria, 1992; Moore, 2000).

A large literature addresses the topic of work pressure, but most studies focus on individuals working within some stable overarching organizational context, e.g., loan officers working at a retail bank's branch offices (Oliva, 2001). IT work tends to be performed by groups rather than individuals (Jurison, 1999), and work pressures in task groups can produce outcomes that are quite different from individual settings. For example, Klein (1996a & b) reports that work pressure disrupted cohesiveness and increased competitiveness within the task groups he studied, contrasting with prior findings that individual workers band together in the face of pressure (Lott & Lott, 1965). In addition, a great amount of IT work is conducted by project teams that are formed to produce or modify a system (Jurison, 1999). These project teams typically produce a one-time output, have short time horizons, and are reorganized frequently to meet project requirements (Mankin et al., 1996). In addition, IT work is characterized by dynamic organizational settings that entail conditions of extreme time pressure (Austin, 2001), task complexity (Abdel-Hamid & Madnick, 1989), and environmental change (Jurison, 1999). The dynamic aspects of these factors cause us to anticipate that IT project work will emphasize different sources of work pressure than are reported in static organizational contexts. These characteristics of IT work suggest there is need to augment the work pressure literature with studies of group work pressure (GWP), which we define as perceived pressures relating to working in a group to perform a shared task.

Numerous factors have been associated with the perception of pressure in IT projects, including characteristics associated with the task, e.g., task complexity (Brown & Miller, 2000), the overall group, e.g., group conflict (Robey, Farrow, & Franz., 1989), the individual group members, e.g., gender (Sethi et al., 2004), and the surrounding environment, e.g., time pressure imposed by external schedules (Brown & Miller, 2000). Thus, our first approach to the design of GWP research is to derive factors from the existing literature. This approach is straightforward to apply, but it has drawbacks.

First, most studies have addressed only one or a few relationships between work pressure and its sources, and there has been little continuity in development of constructs across studies. Accumulating constructs and relationships in this manner may not be sufficiently encompassing to describe the full range of factors and relationships that actually exist in practice (Fletcher & Jones, 1993). In addition, it is difficult to know whether factors identified across diverse studies align comprehensively with the factors that individuals perceive to be causing pressure in their own circumstances.

Second, relatively few studies focus on work pressure in group tasks, and only a small number of studies specifically address IT task groups. Factors that are important to group work will not necessarily be noted in studies conducted among individuals (Bacharach & Bamberger, 1992), thus, it cannot be assumed that all major factors associated with GWP have been identified.

These observations suggest we should augment findings from the work pressure literature with new research that can simultaneously assess the broad range of factors that influence the perception of pressure in group work. We begin this process by assessing individuals' open-ended statements regarding sources of pressure they have experienced while working in a wide range of task groups. This approach provides greater assurance that all major antecedents to GWP are identified and that these antecedents align comprehensively with individual perceptions of pressure sources in group work, thereby enhancing content validity of the constructs in a GWP model.

RESEARCH METHOD AND RESULTS

The research utilizes a multi-stage process to develop a GWP model following procedures recommended by Gable and Wolf (1993). The two major stages of the process are summarized in Table 1. The objective of Stage 1 was to identify the universe of content (Chronbach, 1971) that contributes to perception of GWP. For this purpose, participants in the first study generated and defined factors from their experiences that caused them to feel pressure when working on group tasks. In Stage 2 the contributing factors identified from the participants' responses were organized into categories. In Stage 3, we compared the factors derived from the responses of the participants to the factors common in prior research, then used relationships from prior work to build the GWP model.

Stage	Data Source	Analysis
1. Describe content of GWP and its sources in task groups	84 participants list factors they associate with high and low pressure in task groups	Distinct phrases were identified from open-ended responses
2. Develop content categories and operational definitions	581 phrases from Stage 1	Q-sort method (Kerlinger, 1973) was used to categorize phrases; operational definitions were created for GWP and 11 source factors
3. Derive model relationships from existing literature and logical argument.	Literature on Work Pressure	Identification of relationships among similar constructs and extrapolation to current model

Table 1. Research method.

Participants

Our research plan is to evaluate and apply the GWP model within professional IT project teams. However, we recognized the needed instrument development approach to identify, validate, and test initial factors would require a large number of participants. Furthermore, approximately one hour of time would be required for each individual participant. For these pragmatic reasons, we conducted our initial development of the GWP model in the context of academic IT task groups, with student participants. We intend to refine and validate the instrument in future research for application to professional IT project teams.

Participants were undergraduate and graduate students enrolled in IT classes in which groups performed semester-long IT project tasks, e.g., database design and implementation or developing systems analysis and design documents. Participants were recruited from two large U.S. universities, one located in the Midwest and one in the East. Participation was rewarded by course credit, and comparable alternative methods for earning course credit were available to all participants.

The first phases of model development reported here consisted of 84 participants identifying issues they encountered in different types of low and high stress group work situations. The average age was 24, gender distribution was 43% female and 57% male, and participants reported average full-time work experience of 4.1 years and prior participation in an average of 12 task groups. Approximately two-thirds were upper-class undergraduate IT students and one-third were graduate IT students.

Stage 1 Procedure

In Stage 1, 84 participants were asked to recall and describe two specific task groups in which they had previously worked. In an online questionnaire, participants were given instructions to select one task group in which they felt themselves to be under a relatively high amount of pressure and to identify factors they perceived as causing or contributing to their perception of "high-pressure" in this situation. Many of these participants selected an academic IT project experience as their "high-pressure task." They then selected a second group task situation in which they felt themselves to be under a relatively low amount of pressure. For this activity they were given instructions to identify factors they perceived as mitigating perception of pressure in this "low pressure" situation. Many of the participants identified a task of preparing a group presentation on a research topic for a class as their "low-pressure" group task. Their open-ended responses were collected and unitized following procedures presented by Krippendorff (1980). From these responses, 581 distinct phrases were identified.

Stage 2 Procedure

In Stage 2, the two researchers used Q-sort methods to categorize the 581 factor phrases by similarity, with the objective of organizing similar beliefs, comments, ideas, or issues into a reduced set of categories. Both researchers had previously reviewed the work pressure literature, paying special attention to studies that address IT task groups. The researchers independently evaluated the complete lists of phrases from Stage 1 for both high- and low-pressure tasks, producing four initial category sets (high and low for each researcher). Researcher 1 identified 20 categories of high-pressure factors and 17 categories of low-pressure factors. Researcher 2 identified 14 categories of high-pressure factors and 14 categories of low-pressure factors. These category sets were then merged across high- and low-pressure levels and across researchers, based upon the common phrases assigned to the categories. In this approach when a category from researcher 1 contains the same phrases as a category from researcher 2, those categories are considered to capture similar concepts (Krippendorff, 1980). Naming of the final categories was guided by content of the phrases, conforming where applicable with factors that are commonly identified in the individual work pressure literature (e.g., time pressure and task complexity). Columns 1 and 2 in Table 2 show the categories resulting from the Q-sorting and merging process (denoted as source factors), with their operational definitions of the factors.

Stage 3 Procedure

In Stage 3, we compared the resulting categories to the factors reported in prior research on individual work pressure to identify similar constructs and suggest causal relationships between the constructs and the group work pressure constructs. Columns 3 and 4 in Table 2 show the hypothesized relationships of these factors with GWP and studies supporting the constructs and relationships from the work pressure literature.

The source factors presented in Table 2 represent group task demands and group task resources which are hypothesized to influence GWP. We further hypothesize that GWP mediates effects of these source factors on group performance, similar to the mediating effects of exhaustion and disengagement that have been reported by Bakker et al. (2004). Figure 1 shows the resulting GWP model in which demands are shown to increase group work pressure and resources to reduce group work pressure. Some of the source factors that emerged from the Stage 2 procedure are unique to group work, including equity of work, interpersonal conflict, group expertise, and group history. Other factors are well-documented in work pressure studies conducted among individual workers, including positive and negative consequences, personal expertise, external resources, task complexity, and time pressure.

Source Factor	Operational Definition	Hypothesized Relationship	Supporting Studies
Interpersonal Conflict	Level of conflict, respect, and openness in interpersonal interactions among group members	**Contributes to group task demands; indirectly increases GWP**	Aladwani, 2002; Sethi et al., 2004; Weiss, 1983
Negative Consequences	Expectation that a reprimand, punishment, or other negative impact would occur if task performance was unsuccessful		*Indirectly supported:* Lack of contingent rewards reduces perceptions of accomplishment (Cordes et al., 1997)
Task Complexity	Task size, number of distinct components, and amount of detailed work entailed in completing the task		Abdel-Hamid & Madnick, 1989; Brown & Miller, 2000
Time Pressure	Length of time allowed for task completion and flexibility of task deadlines		Abdel-Hamid & Madnick, 1989; Ahituv et al., 1998; Austin, 2001; Gogan et al., 1999; Sethi et al., 2004
Equity of Work	Effort of group members toward completing their fair portion of the task and communicating regarding their task activities	**Contributes to group task resources; indirectly reduces GWP**	*Indirectly supported:* Research in social loafing suggests low equity of work reduces group performance (Karau & Williams, 1993)
External Resources	Availability of help from outside the group, including human experts and information resources		Bakker et al., 2004; Cohen et al., 1996; Demerouti et al., 2001
Group Expertise	Experience, knowledge, and skills of group members in performing task activities		*Indirectly supported:* group expertise increases group performance (Guinan et al., 1998; White & Leifer, 1986)
Group History	Prior experience of group members working together and expectation of future collaboration		*Indirectly supported:* Group history decreases turnover intention (Lee, 2004) and increases group performance (Harrison et al., 2003)
Personal Expertise	Experience, knowledge, and skills of the individual in performing task activities		*Indirectly supported:* Personal expertise increases group performance (Jurison, 1999; White & Leifer, 1986)
Positive Consequences	Expectation that a reward, praise, or other positive impact would occur if task performance was successful		*Indirectly supported:* Rewards increase perceived quality of work life (Cohen et al., 1996)
Task Motivation	Level of interest, fun, and other intrinsic aspects of the task that are motivating to group members		*Indirectly supported:* Motivational tasks improve attitude in IT settings (Byrd, 1992; Gill, 1996)
Group Work Pressure	Perception of pressure and stress related to the overall group task	**Mediates effects of demands and resources on performance**	Bakker et al., 2004; Carayon & Zijlstra, 1999; Klein, 1996a & b; Macdonald, 2003; Moore, 2000; Oliva, 2001; Weiss, 1983

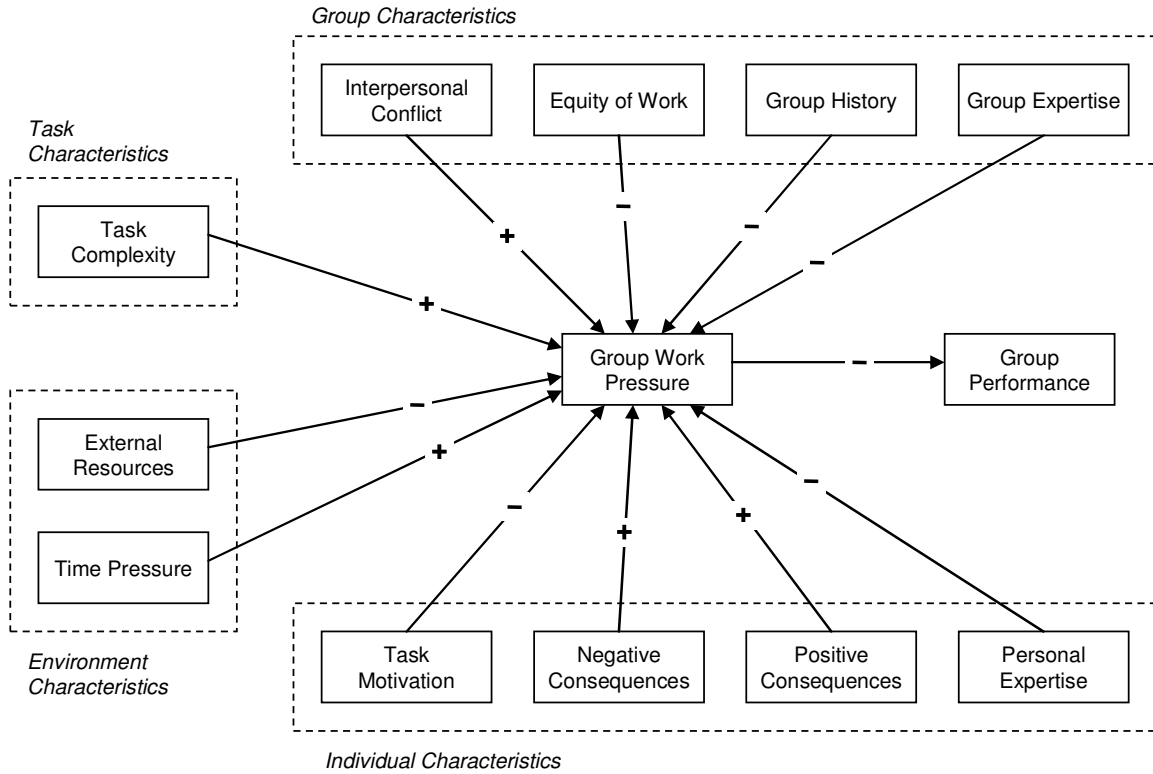**Table 2. Categories and definitions emerging from Q-sort.**

Figure 1. Theorized group work pressure model.

DISCUSSION

Our findings diverge substantially from prior demands-resources research in the nature of source factors in our model. Of the nine factors that emerged from our model development process, only two (time pressure and positive consequences) are present among the eleven factors tested by Demerouti et al. (2001) and none are present among the six factors tested by Bakker et al. (2004). The remaining factors identified in our findings constitute an important new inventory of antecedents on which to base future demands-resources studies.

Although our research design differs in several ways from prior studies, the overall findings support key premises of demands-resources research. We anticipate that group task demands strongly influence GWP and that this effect can be mitigated to some extent by group task resources. This corroborates processes that have been identified by prior demands-resources researchers. Bakker et al. write:

> Generally speaking, there seem to be two main processes that take place in the working environment. The first process is a stress process that initiates from job demands and results in exhaustion. The second process is motivational in nature and is driven by the availability of resources and resulting feelings of dedication. When resources are lacking, individuals experience cynicism toward their jobs. (2004, p. 98)

Our goals in developing a GWP theory are to be able to explain the phenomena underlying development of GWP and to predict the effects of GWP and its source factors on group performance. The resulting model presents three propositions which encompass the essence of a GWP theory.

1.   GWP is increased by group task demands and is reduced by group task resources.
2.   Group task demands and group task resources encompass multiple source factors that are independently accessible to management intervention.
3.   GWP mediates effects of group task demands and group task resources on group performance beyond any direct relationships that exist among these factors.

Bacharach (1989) summarizes the essential requirements of a theory as validity, utility, ability to falsify constructs and relationships, and parsimony. In the following sections we argue that our conceptualization of theoretical constructs and relationships within the GWP model fulfill each of these requirements.

Validity refers to the relevance of the constructs of the theory to the phenomenon under study. We conceptualize this relevance as being primarily determined by content validity, referring to the ability of measures to represent the universe of relevant content, and construct validity, referring to the ability of measures to represent the unique, central meaning of each construct under study. The factors that we identified through the content analysis process have strong content validity, as they were derived from actual phrases found in participants' descriptions of experiences in both high- and low-pressure group tasks and are consistent with the existing literature.

Utility refers to the ability of a theory to predict and explain phenomena in practical contexts and to be useful for guiding decisions related to the constructs of the theory. GWP theory suggests several ways to mitigate these pressures in practical settings. For example, demands associated with time pressure can be actively managed through such actions as increasing team participation in the project estimation, scheduling, and scope management activities. Managers also have the ability to control resources that mitigate GWP by increasing personal expertise through training and professional development activities or by offering motivational incentives aligned with quality or schedule goals. GWP theory further suggests that managers can reduce GWP by promoting perceptions of work equity and fairness and by actively intervening to alleviate interpersonal conflicts among group members.

In academic settings, GWP theory suggests a number of approaches to mitigate GWP beyond obvious tactics that may run counter to instructors' teaching objectives, such as lowering task complexity or reducing time pressures. These approaches include actively supervising groups to ensure that workloads are equitable, keeping groups together long enough to develop a shared history, reducing negative consequences associated with group work, increasing motivational aspects of tasks, and assigning tasks that more closely match group members' level of personal expertise.

Falsification refers to the potential that a construct can be shown to be false by example or by stating the conditions that, if they were to exist, logically refute the existence of the construct. Throughout the development of the GWP model, care was taken to define constructs and state the relationships among constructs in a manner that could be subjected to falsification. For example, time pressure can be falsified by demonstrating that perceptions of GWP are not different for similar projects with different deadlines, assuming other factors are controlled. Relationships between constructs are falsified when the direction of their effect is in the opposite of the proposed direction. For the relationship of time pressure on GWP, this would be exemplified by finding that GWP decreases as time pressure increases. Similar arguments exist for falsifying all other factors within the GWP model, supporting our contention that the model is falsifiable.

Parsimony is the degree to which a theory contains all of the constructs and only the constructs that are necessary to explain the phenomena. The constructs identified from our model development approach meet the first criterion by representing the complete set of content identified by individuals describing their own experiences. The second criterion may be satisfied in future tests by identifying a significant contribution that each factor in the GWP model makes to overall predictiveness.

Performance against the criteria outlined by Bacharach (1989) suggests that our findings can underpin a foundational GWP theory that is capable of guiding future research. The key contributions of these findings to future research center on our conceptualization of theoretical constructs and relationships within the GWP model. The essential next step is to create a mechanism to measure these constructs and relationships in the form of a comprehensive GWP instrument. This will enable a complete test of the posited GWP model.

LIMITATIONS

This research represents an initial step in studying GWP in IT task groups. Thus, it is not surprising that the findings raise some issues that will only be resolved by future research. Because our participant population consists of students, it would be premature to generalize our findings beyond this population, e.g., to senior IT professionals, project leaders, and IT managers, without further testing among IT practitioners.

CONCLUSION

Relatively little attention has been paid to the effects of work pressure in IT task groups. Yet results of this study suggest that GWP exists and that it can potentially be explained and predicted by recognizing sources of GWP within a theoretical model. The model we have identified in this paper implies several straightforward steps to reduce demands or increase resources and thereby improve group performance. Our findings recommend further study of GWP model as a promising avenue for gaining new insights into understanding and improving work processes within the context of IT task groups.

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