

**Situational Constraints: Their Measurement and Role
in a Dynamic Model of Performance**

by

Peter Danial Villanova

Dissertation submitted to the Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of
Doctor of Philosophy
in
Psychology

APPROVED:

Dr. Stephen J. Zaccaro,
Chairperson

Dr. Christopher Peterson

Dr. H. John Bernardin

Dr. Roseanne J. Foti

Dr. Ann H. Baumgardner

Dr. William E. Snizek

June, 1987

Blacksburg, Virginia

10-1887
H623

**Situational Constraints: Their Measurement and Role
in a Dynamic Model of Performance**

by

Peter Danial Villanova

Dr. Stephen J. Zaccaro, Chairperson

Psychology

(ABSTRACT)

Research on situational constraints has overlooked a number of important issues relevant to the generalizability of current findings, including the construct validity of current constraint measures, and an account of the role coping might play in mitigating the effects of constraints. Data from a two-wave panel design with college students as participants was used to investigate the above issues. The data indicated that the current conceptualization and measurement of constraints seems suitable to the task of testing substantive hypotheses. Furthermore, constraints measured with reference to a specific performance domain had greater predictive validity than those representing a general performance domain. The data did not support the contention that problem-focused coping and the perceived controllability of constraints would interact in the prediction of constraints, satisfaction, and performance. Several alternative explanations for the latter findings are offered. Finally, a number of suggestions for the conduct of future research using constraint, controllability, and coping constructs are outlined.

ACKNOWLEDGEMENTS

I wish to thank a number of persons whom I hold in high esteem for their assistance in this project and others of great importance to me.

I extend thanks to my committee members for the problem-focused manner with which they guided the execution of this project. My dissertation has benefited from the many insightful and often critical comments of Drs. Ann Baumgardner, H. John Bernardin, Roseanne Foti, Christopher Peterson, William Snizek, and Stephen Zaccaro.

Dr. Stephen Zaccaro served as the chairman of this dissertation and deserves many thanks for his guidance and support throughout this project. Steve, I am grateful for the professional supervision you provided me during these trying times. I leave Virginia Tech with many fond memories of you as a colleague and friend. Other students should be as fortunate to have you chair their dissertations; undoubtedly you will serve in this capacity again, and these students will be fortunate to have you as a mentor.

Dr. Christopher Peterson and Dr. H. John Bernardin have been my mentors since I began my graduate studies. Their example has influenced me as a person and as a student of psychology. Chris and John, I hope to honor you by following your example of compassion, sincerity, and wisdom. I carry many important lessons with me from both of you. I only hope that I have learned them well enough so that I may enrich my students' lives as you have mine.

Dr. Dennis Hinkle does not appear as a committee member on my title page but certainly does in my own unofficial version of the manuscript. Dennis, your service on behalf of my dissertation began well before I started writing my prospectus. Through your instruction I gained the necessary prerequisites to turn my ideas into reality. Thank you also for assisting me when my dissertation approached the eleventh hour.

I thank Dr. Philip Bobko and Joseph Franchina for their professional advice and support through my graduate education. I also wish to thank the students who have been doing research with me while I completed this project. James Kyger, Missy Leary, Sallie Pearson, and Kim Gardner have been very understanding of delays in our own research agenda as I wrestled with my dissertation. Thank you for being so motivated, yet understanding.

Life projects such as this one do not become successful through the efforts of but one person or a committee. Rather, other persons also play important roles. Jim Austin has been my friend through good times and bad. He's also been my colleague on research projects, good and bad. JTA, I wish you health and prosperity.

BZ was there to pick me up when I was down. BZ, you have been a constant source of support for me. I hope that I can be of supportive of your own efforts as you have been mine. I love you.

My parents, _____, are very dear to me. They have gone out of their way to facilitate my educational and career objectives. Perhaps more than myself, _____ are relieved and ecstatic. Relieved in that 24 years of formal education have come to an end. Ecstatic in that this accomplishment is as much

theirs as mine. Mom and Dad, thanks for coping with me under the most
constraining of circumstances.

TABLE OF CONTENTS

Introduction	1
Measurement and Design Issues	3
Contending with Constraints	8
Cognitive Appraisal	9
Coping Strategies	11
Method	17
Overview of Study Design	17
Sample	18
Measures and Procedures	18
Results	25
Analysis of Research Questions	25
Research Question Summary	29
Analysis of Study Hypotheses	30
Tests of Hypotheses: Summary	35
Discussion	36
Discussion of Coping Hypotheses	36
Potential Boundaries of the Coping-Outcome Relationship	37
Discussion of Research Question Findings	40

Effects of Constraints on Outcomes	40
Construct Validity Implications	41
Methodological Contributions	43
Future Research Directions	44
Generalizability Issues	45
Summary	46
References	48
Tables	55
Appendix	68
Vita	84

LIST OF TABLES

1. Resource Variables Identified by Peters and O'Connor (1980) ...	56
2. Resource Variables Identified for Use With a College Student Sample	57
3. Situational Constraint Test-retest Coefficients	58
4. Correlations Among Different Indicators of Constraints	59
5. Correlations Between Constraints, Ability, Satisfaction, and Performance	60
6. Canonical Analysis of Constraints and Outcomes	61
7. Correlations Between Perceived Situational Constraints, Appraisals of Threat and Opportunity, and Coping Strategies ...	62
8. Multiple Regression Estimates of the Independent Effects of Appraisal and PSC Scores on Coping Strategy Use	63
9. Analysis of the Effects of Controllability and Problem-Focused Coping on Constraints at Time Two	64

10. Analysis of the Effects of Controllability and Problem-Focused Coping on Satisfaction at Time Two	65
11. Analysis of the Effects of Emotion-Focused and Problem-Focused Coping on Threat Appraisals at Time Two	66
12. Analysis of the Effects of Controllability and Coping Style on Fall Quarter Grades	67

INTRODUCTION

In their work performance models, human factors psychologists and motivation theorists typically include an account of events that might be beyond the worker's control (e.g., Blumberg & Pringle, 1982; Campbell & Pritchard, 1976; Chapanis, 1976; Lawler, 1973). Moreover, they tend to construe situational conditions as direct facilitators or inhibitors of performance (cf. Campbell & Pritchard, 1976, p. 65). More recently, Peters and O'Connor (1980) have provided a conceptual framework to study situational features that influence work performance. In a retrospective account of the ideas which occurred to them early in their research, they stated:

"...examples of constraining work factors came easily to mind. Factors such as broken or improper machinery and inadequate supplies quickly suggested themselves as types of situational factors we had in mind. To be sure, persons who were both able and motivated should not produce as much output as their ability and motivation levels suggested..." (Peters, O'Connor, & Eulberg, 1985, pp. 80-81).

To identify constraints in the work environment, Peters and O'Connor (1980) asked persons to provide accounts of bad performance caused by situational factors. Data from these critical incidents were then content analyzed, and eight resource variables necessary for task accomplishment were identified (see Table 1). Further, these resource

variables were thought to vary along the three dimensions of 1) availability, 2) quantity, and 3) quality.

This taxonomy has guided current laboratory and field research on situational constraints. Laboratory studies typically involve the manipulation of three or four of these resource variables. For example, job-related information, required materials, and work environment might be manipulated so that they are more or less available, of more or less sufficient quantity, and of more or less sufficient quality (cf. Peters, Chassie, Lindholm, O'Connor, & Kline, 1982a; Peters, Fisher, & O'Connor, 1982b; Peters, O'Connor, & Rudolph, 1980). These variables would be manipulated simultaneously to test main effect hypotheses from this framework (e.g., situational constraints impede performance and reduce satisfaction).

However, such tests are not very interesting from a theoretical viewpoint because situations which impede performance can be engineered easily and provide no account of mediating processes otherwise responsible for observed performance and satisfaction differences. Moreover, these contrived situations merely affirm a tautology. Laboratory research, if it is to contribute theoretically impactful results, must be geared toward the study of the process of contending with situational constraints.

While field research on situational constraints provides a more fair test of the propositions stemming from the Peters and O'Connor (1980) conceptual framework, other problems are frequently encountered. These include method bias, single panel designs, heterogeneity of

stimulus situations, and the confounding of perceiver and situational variance in constraint scores. Other factors that could also attenuate predicted relationships between constraints and outcome variables are motivational differences among respondents and differences in the relevance of situational constraints for different tasks.

These measurement and design issues aside, the conceptual framework is inaccurate in that it contains no account of individual responses to situational constraints. Therefore, the present study sought to 1) investigate these measurement and design issues, and 2) contribute to the expansion of the situational constraints conceptual domain by including behaviors individuals might perform to mitigate the deleterious effects of constraints. Each of these matters is discussed in more detail below.

Measurement and Design Issues

Four published field studies of the situational constraints framework have been conducted to date (O'Connor, Peters, Rudolf, & Pooyan, 1982; O'Connor, Peters, Pooyan, Weekly, Frank, & Erenkrantz, 1984; Phillips & Freedman, 1984; Steel & Mento, 1986). O'Connor, Peters, Rudolf, and Pooyan (1982) surveyed college students' perceptions of constraints they faced on their off-campus job situation. Participants were asked to indicate the relevance of each of the eight resource variables to successful job performance. One week later, participants returned and responded to questionnaire measures of sat-

isfaction and frustration. Half of the original sample also completed the measure of situational constraints during the second session. O'Connor et al. (1982) found that constraints correlated negatively with satisfaction and positively with frustration and that test-retest reliabilities for availability and quality scales ranged from .62 to .87. Correlations between constraints and affective dependent measures ranged from -.26 for pay satisfaction and .49 for frustration. This is the only study which employed a time interval between the observance of situational constraints and a particular outcome.

The results of the O'Connor et al. (1982) field study correspond with those found in laboratory settings (e.g., Peters et al. 1980; 1982a; 1982b) where a common method variance explanation of those results was not tenable (Peters, et al., 1985). O'Connor et al (1982) also conducted a principal components factor analysis on the situational constraint scores. This analysis indicated that only resource variable availability and quality emerged as separate dimensions. Items assessing resource variable quantity loaded on the same factor as those representing resource variable quality. These authors concluded that the two dimensions availability and quality, are sufficient to describe independent sources of variance among constraint item responses.

The O'Connor et al. (1982) study stands as the most complete investigation of Peters and O'Connor's (1980) conceptualization of this construct. Unfortunately, this study and others (see Peters et al., 1985 for a review) have not conclusively established that self-report

measures of constraints are construct valid. Some of these issues bearing on the construct validity of the current instrument used to measure constraints are detailed below.

Constraints are defined as characteristics of a situation that "occur repeatedly in essentially the same form" (Peters et al., 1985, p. 81) so that any tests of hypotheses from this framework require the measurement of constraints across reasonable time intervals, perhaps more than the one week period employed in the O'Connor et al. (1982) study. Also related to the issue of concurrent measurement is the potential for common method variance to create artifactual inflation of correlations between constraint scores and dependent variables. This problem is particularly acute in self-reports of satisfaction and frustration. Such reports might be influenced by earlier responses to situational constraint questions. In this case, respondents might strive to keep their constraint-affective self-reports consistent and consequently inflate the relationship among these data (cf. Salancik & Pfeffer, 1977). To what extent these relationships are inflated is not currently known. However, it is likely that questionnaire measures of both constraints and dependent variables administered concurrently are likely to produce some artifactual covariation. Data from a single study showing that measurement operations of constraints converge would add substantially to the argument that common method variance is not responsible for observed relationships between constraints and relevant dependent variables.

Second, alternative strategies of measuring constraints are needed (Peters, et al., 1985). Reliance on a single measurement operation, albeit reliable, does not enhance our understanding of the situational constraint construct, nor does it ensure the validity of the measure. Moreover, mono-operation bias attenuates the generalizability of findings across settings and samples for which different indicators might be more suited (Cook & Campbell, 1979, p. 65). To contend with these limitations, multiple method-independent indicators of the same construct need to be developed. Evidence supporting the construct validity of situational constraint measures would come in the form of 1) consistent and at least moderate correlations among alternative indices of constraints, and 2) relationships with other variables such as ability, satisfaction, and performance which comprise the situational constraint nomological network.

Third, the use of transparent constraint measures, such as semantic differential scales, may inflate observed relationships between constraint scores and scores on affective measures such as satisfaction. This can occur for two reasons. First, transparent scales are more prone to socially desirable responding and defensive attributions since scale anchors reveal what a positive or negative response to an item is. Second, because they are so susceptible to these biases, scores are apt to confound person and situation variance. Ideally of course, constraints would be measured independently of person characteristics, such as when they are manipulated in a laboratory study. However, manipulation of constraints in a field setting involving

real-world consequences for participants poses both ethical and logistical problems (Ethical Principles of Psychologists, 1981). One solution would be to devise a different strategy that would satisfy both ethical and pragmatic concerns, yet simultaneously reduce the confounding of person and situation variance. For instance, less transparent questionnaire measures of constraints could be developed. These can take the form of a forced-choice scale or of a checklist that asks for specific information regarding the presence or absence of specific resources required to perform a task. Such measures do not "clue" the respondent as to what response would be more or less appropriate under different circumstances.

Finally, having individuals respond to a questionnaire measure of constraints when they are describing different situations might be responsible for the weak relationships found between constraints and performance in field studies. This could occur because jobs differ with respect to the amount of work behavior that is left to the discretion of the incumbent. Such discretionary behaviors are especially curtailed when individuals are part of interdependent groups or work on an assembly-line job. In a meta-analysis of the situational constraint literature, Villanova (1986) found that the relationship between constraint scores and performance measures was smaller when field studies used respondent data consisting of constraint ratings across a variety of jobs versus when they described a single position. Thus, the homogeneity of the performance domain may significantly moderate correlations between constraints and performance measures.

Each of the aforementioned measurement and design issues is considered in the following investigation. To summarize, several research characteristics may act as boundaries to generalizing current findings in this area. One purpose of this investigation was to estimate to what extent and in what manner these potential boundary variables (Fromkin & Streufert, 1976) curtail generalizations from this research.

In view of the issues discussed above, the following research questions were posed. Note that each is concerned with the construct validity of current constraint measures.

- Question 1: Do situational constraints scores correlate across an extended time period?
- Question 2: Do different operational measures of situational constraints correlate?
- Question 3: Do different constraint measures correlate in a consistent and logical manner with ability, satisfaction, and performance measures?
- Question 4: Do measures of constraints and performance germane to a specific situation correlate more than parallel measures used in a more general situation?

Contending with Constraints

Constraints are considered external stressors (Lazarus & Launier, 1978). As such, they should be susceptible to change efforts by individuals. However, while the effects of constraints on individual per-

formance and satisfaction have been articulated at length, no attention has been given to the effects of individual responses on constraints. Responses to constraints other than accomodation may introduce variance in performance scores; such variance cannot be explained by the current framework.

A more dynamic conceptualization of the real-world system in which situational constraints are found is important because it can explain why constraints are more or less a problem for different people. The cognitive theory of stress and coping represented in the work of Lazarus and his colleagues suggests that cognitive appraisal and coping mediate successful adjustment to situational demands (Folkman, 1984; Folkman, Schaeffer, & Lazarus, 1979; Lazarus, 1981; Lazarus & Launier, 1978).

Cognitive Appraisal

Cognitive appraisal takes two forms. Primary appraisal involves a judgment on the part of the individual as to whether a situational constraint is irrelevant, benign-positive, or stressful. Secondary appraisal involves the evaluation of what physical, social, psychological, and material resources can be marshalled to meet demands posed by a constraint. Both of these can occur simultaneously, can influence each other, or can affect each other in a bidirectional manner through cognitive reappraisal.

Primary appraisals fall into three broad categories (Lazarus, 1981). An irrelevant situational constraint is one that is perceived

as having no bearing on personal well-being. A benign/positive appraisal means that the constraint is not perceived as exceeding the person's resources. A benign/positive appraisal also serves to signal only positive consequences. Finally, stressful appraisals occur when an encounter is perceived to involve harm/loss, threat, or challenge to well-being. These can take three forms: 1) Harm/loss stress appraisals are accounts of damage already done and are characterized by negative emotions, such as resentment, fear, remorse, and anger; 2) similar emotional responses characterize threat appraisals which refer to the perceived potential of harm or loss; 3) challenge appraisals involve perceptions of opportunity and are characterized by such emotions as excitement and eagerness. Both challenge and threat appraisals are anticipatory; they are prospective evaluations of harm or benefit.

Secondary appraisal, as noted above, involves the evaluation of what resources can be marshalled to resolve constraints. In a sense, the person takes an inventory of what potential actions s/he might take to cope with demands. Situation appraisals of control also occur during secondary appraisal. These appraisals refer to the perceived controllability of events in a specific encounter. Situation appraisals of control are largely influenced by the meshing of situational demands and perceived coping resources (Folkman, 1984). Therefore, they correspond to Bandura's (1977) concepts of "outcome expectancy," referring to how confident one is that the use of a particular coping strategy will result in a particular outcome, and "efficacy expect-

ancy," referring to the belief that the coping strategy can be carried out successfully.

Coping Strategies

According to Lazarus and Launier (1978, p. 293), coping refers to "efforts, both action-oriented and intrapsychic, to manage environmental and internal demands and conflicts among them which tax or exceed a person's resources." Coping involves contending, in one form or another, with a situation. Because situational constraints limit the availability of resources that facilitate successful performance, they may hinder performance. As a result, people must enact coping strategies to mitigate the effects of these constraints or consequently their performance suffers.

Coping strategies can take many forms (Lazarus, 1981; Pearlin & Schooler, 1978). Two readily distinguishable forms are emotion-focused coping and problem-focused coping. Emotion-focused or passive coping refers to cognitive strategies that affect emotional distress stemming from demands (e.g., ignoring the problem, wishful thinking, appraising the situation more optimistically than is warranted). Problem-focused or active coping involves more direct strategies intended to alter the current circumstances. These may include talking to someone to find out more about the problem, making a plan of action and following it, and analyzing the problem in order to understand it better. Coping serves two major functions: 1) the management of emotional distress,

as in passive coping, and 2) taking some action to change the situation, presumably for the better. Coping can proceed at both levels simultaneously, at only one level, or not at all.

Primary appraisals of threat and opportunity, because of their anticipatory nature, are postulated to be precursors to coping (Folkman, 1984). Theoretically, cognitive appraisals of threat and opportunity are influenced by various personal and situational factors. Among these factors are: 1) commitments, or what people perceive is at stake in an encounter, 2) situational appraisals of control, or to what extent people believe they can execute behaviors which will mitigate the demands they face, and 3) the perceived demands themselves, or the extent to which people perceive the situation as constraining. Threat appraisals may give rise to more emotion-focused coping strategies so as to reduce the psychological discomfort associated with feelings of anxiety, fear, and worry (Folkman, 1984). Opportunity appraisals signal that constraints can be resolved successfully. Thus, opportunity appraisals may act as precursors to problem-focused coping strategies (Lazarus, Kanner, & Folkman, 1980). This model of perceived constraints, cognitive appraisals, and coping is useful for understanding how situational demands and their interpretation lead to different coping responses.

Note that the appraisal of threat and use of emotion-focused coping does not preclude problem-solving strategies. Likewise, responses to opportunity appraisals may also include emotion-focused coping (Lazarus, 1981). Nevertheless, when a situational constraint is ap-

praised as threatening, emotion-focused coping is often a necessity; problem-focused coping is not. Similarly, opportunistic constraints will more often result in problem-focused coping rather than emotion-focused coping. Therefore, the following hypotheses were tested.

Hypothesis 1: Threat appraisals mediate the relationship between perceived constraints and the use of emotion-focused coping strategies.

Hypothesis 2: Opportunity appraisals mediate the relationship between perceived constraints and problem-focused coping strategies.

The choice of a particular coping strategy does not always mean successful resolution of constraints. The effectiveness of coping strategies probably depends on the controllability of the demands taxing peoples' resources. Studies in naturalistic settings have shown that the perception of control has a positive effect on psychological functioning and performance (Langer & Rodin, 1976). Conversely, perceiving a lack of control has adverse effects on these same outcomes. Studies have shown that diminished control can lead to the experience of stress and anxiety that might interfere with enacting responses that are perceived to be appropriate for situational contingencies (Brehm & Brehm, 1981; Seligman, 1975).

Thus, if demands are controllable, then problem-focused coping strategies are likely to be more successful. Emotion-focused coping strategies, in these instances, would be less effective since emotional palliatives do not reduce or remove the demands. In this case,

emotion-focused coping under controllable situations bears some similarity to the maladaptive passivity observed in studies of learned helplessness. Alternatively, there are cases in which problem-focused coping would not be advantageous. If demands are uncontrollable, then problem-focused coping may lead to frustration. This is because problem-focused coping efforts are directed at removing or reducing demands, which if low in controllability, cannot be changed. Conversely, emotion-focused coping deals with managing the psychological distress associated with the perception of demands. If these demands are low in controllability, then emotional palliatives may well reduce the psychological discomfort stemming from them, by for example, minimizing the importance of the demand or distracting individuals from attending to the negative consequences of demands. Collins, Baum, and Singer (1983) studied people's reactions to the mishap at Three-Mile Island. They found that people who engaged in problem-focused coping in response to chronic, uncontrollable conditions associated with the nuclear accident reported more psychological symptoms than did people who used less problem-focused coping. In addition, those who used emotion-focused coping reported fewer psychological symptoms.

The validity of these arguments rests on the assumption that control perceptions are largely veridical. Research on perceptions of control indicate that this assumption is generally correct. For example, Alloy and Abramson (1979) found that depressed subjects were somewhat more accurate in their perceptions of response-outcome contingencies than nondepressed subjects. Nevertheless, these authors

concluded that the control perceptions of both samples were remarkably accurate. These findings were recently replicated in a series of experiments by Vasquez (1987).

These ideas are consistent with Latack's (1986) recent findings regarding coping strategies and role stress. Latack found that active, problem-solving coping strategies were reported by subjects to be used with greater frequency when they were confronted with a role conflict or role overload situation. In a situation describing role ambiguity, where perceived control was lower, subjects reported using cognitive reappraisal strategies more often than active coping strategies characterized by behavioral actions. Her findings suggest that different coping strategies emerge in light of different demands people encounter.

Emotion-focused and problem-focused coping often occur simultaneously (Lazarus & Launier, 1978). Emotion-focused coping can facilitate problem-focused coping by regulating the negative emotions that accompany threat appraisal. Emotional distress can interfere with problem-focused coping efforts by distracting individuals from pursuing active coping strategies or reducing the effectiveness of the problem-focused coping strategies used (Folkman, 1984). When used together, emotion-focused coping is directed toward reducing emotional distress stemming from constraints while problem-focused coping can be applied to changing the immediate circumstances without distraction. The use of both emotion-focused coping strategies and problem-focused coping strategies

should increase the likelihood of reducing perceived threats stemming from demands.

To summarize, primary appraisals are viewed as precursors to coping. They are viewed as mediators of the relationship between perceived constraints and the extent to which people adopt particular coping strategies. Secondary appraisals can, and often do, act as precursors to coping. However, secondary appraisals are also evaluations of personal efficacy. And, in this respect, secondary appraisals of control might moderate the relationship between coping and important outcomes. Finally, coping involves contending with demands and can take numerous forms. In the study reported below, each of these components of the stress and coping model are applied to the study of situational constraints and performance.

- Hypothesis 3: Constraints perceived as controllable at Time 1 and which are dealt with through problem-focused coping strategies will reduce Time 2 constraints.
- Hypothesis 4: Problem-focused coping with Time 1 constraints perceived as uncontrollable will reduce satisfaction at Time 2.
- Hypothesis 5: The use of problem-focused coping strategies in tandem with emotion-focused coping strategies will reduce threat appraisals at Time 2.
- Hypothesis 6: Problem-focused coping style will interact with the perceived controllability of constraints in the prediction of performance. Specifically, coping is predicted to be more positively correlated with performance when constraints are perceived as controllable.

METHOD

Overview of Study Design

Introductory psychology students participated in two data collection sessions separated by six weeks. Students provided situational constraint data relevant to both a specific situation (a calculus and matrices class in which they were enrolled) and a more general situation (all classes in which they were enrolled for that quarter). At Time One, students completed the following forms and questionnaire measures: 1) informed consent form, 2) three measures of situational constraints, 3) threat/opportunity appraisals for each of seven resource variables identified as potential constraints, 4) measures of satisfaction with their current standing in all courses and specifically with respect to the calculus and matrices course, and 5) a modified version of Taber and Hackman's (1976) College Criteria Questionnaire. The latter served to index self-perceptions of successful execution of the college student role. Students granted consent to record ability and performance data from their academic records. These data were recorded following completion of the fall quarter.

At Time Two, students completed the same situational constraints measures as at Time One. These measures also included items to assess threat/opportunity appraisals and the perceived controllability of the constraints posed by each resource variable. Also, participants com-

pleted Coping Questionnaires which asked to what extent each of fifteen different coping responses was used to deal with their resource variable circumstance. Finally, students also indicated their current level of satisfaction and responded to a modified version of the College Criteria Questionnaire.

Sample

One hundred seventy-three college students participated in this two-wave panel study for extra course credit. One hundred forty-three of these students were concurrently enrolled in the same mathematics course (Calculus and Matrices; MATH 1521). Females outnumbered males by approximately two to one. Approximately 85% of the respondents were first quarter college freshmen.

Measures and Procedures

Questionnaire responses serve as the primary data source of this study. Participants arrived in groups of approximately 15 in a classroom reserved for questionnaire administration. At Time One, 173 participants were administered the following set of questionnaires.

1) Informed Consent Form: This consent form conformed to the requirements outlined in the Ethical Principles in the Conduct of Research with Human Participants (APA, 1984). The consent form included a request for access to participants' official school record for the purpose

of gathering ability (Scholastic Aptitude Test scores) and performance data (fall quarter QCA; MATH 1521 grade). Also, the number of previous college credit hours completed and the number of quarter hours enrolled in during the fall quarter were recorded. Finally, student enrollment in MATH 1521 was ascertained at this time. Copies of the materials used in this study appear in Appendix A.

2) Situational Constraint Measures: Three different operations were used to represent situational constraints in this study. They are each discussed below.

2a) Perceived Situational Constraints (PSC): This measure of constraints was adopted from the conceptual work of Peters and O'Connor (1980). Participants rated the availability and quality of seven resource variables (student role-related information, budgetary support, materials and supplies, required services and help from others, instruction, time availability, and work environment) along 7-point semantic differential scales (e.g., 1=available, 7=unavailable; 1=useless, 7=useful). Both availability and quality were measured with two items each; yielding four items per resource variable. One form of the PSC measure asked participants to consider their academic environment in general (i.e., all courses for which they were enrolled) while a second form asked them to rate the availability and quality of the resource variables as they pertained to the calculus and matrices class (MATH 1521). For both versions, respondent scores were determined by summing the 28 unit-weighted items and dividing this score by seven.

Refer to Table 2 for a description of the seven resource variables and see Appendix A for a copy of the questionnaires used.

2b) Perceived Effects of Situational Constraints (PESC): Using a 7-point scale, participants rated the intensity (i.e. that problems with a particular resource variable has a 1=weak or 7=strong effect on their performance), stability (i.e., problems with a specific resource variable were 1=short-lived or 7=long-lasting), and generality (i.e., affected performance 1=in few situations or 7=in many situations) of situational constraints on their performance. Each of the three PESC dimensions was represented by a single item for each resource variable. Like the PSC measure, respondents evaluated the effects of situational constraints on both their general academic performance and more specifically with respect to their performance in the Calculus and Matrices course. The 21 items appearing in each version were summed and divided by three to yield a composite index of constraint effect on performance. This measure appeared with the PSC measure of constraints on the same questionnaire.

Less Transparent Situational Constraints (LTSC): the LTSC measure consisted of a list of resources requisite for student performance. These less transparent items served to measure situational constraints in a manner designed to reduce response bias. These 10 items asked respondents to report their current status with respect to specific resources. For example, respondents were asked to indicate whether they had a copy of the undergraduate student manual, whether they had a place of their own to do school work, whether they were missing any required

textbooks, and how many hours per week they worked. The items were written to represent the content domain of five of the seven resource variables considered in the PSC and PESC measures. Two resource variables were omitted (i.e., instruction, budgetary support) because no items could be generated to represent these resources without including substantial judgment on the part of respondents. Items were coded 0-1 in a manner that construed them as more constraining. For example, if a participant was employed, then the item concerned with employment was coded a 1, if unemployed, a 0. If a participant reported having a copy of the undergraduate student manual, then this item was coded a 0, if without a manual, a 1. Items that offered more than one alternative response were dichotomized and a composite measure of LTSCs was formed by summing across the 0-1 coded items.

3) Appraisal of Threat/Opportunity Posed by Resource Variable Circumstance: Participants rated how worried, anxious, fearful, eager, confident, and hopeful they felt with respect to their current circumstance on each of the seven resource variables. The former three emotions were used to infer threat appraisals and the latter three emotions opportunity appraisals. Participants rated these items on seven-point scales (1=not at all, 7=a great deal).

4) Satisfaction: Ten items asked how satisfied or frustrated participants felt with respect to their academic experience. Six items dealt with general academic satisfaction and four items reflected satisfaction with their current calculus and matrices course standing. Respondents rated to what extent they agreed to each statement along a

four-point scale (1=strongly disagree, 4=strongly agree). Examples of some of the general satisfaction items which appeared on this scale are "Trying to do well in all of my classes is very frustrating", "I am disappointed with my overall academic performance this quarter", and "All in all, I'm satisfied with my overall academic performance this quarter." Examples of some of the items that measured satisfaction with the calculus and matrices class (MATH 1521) are "My performance in MATH 1521 gives me a feeling of satisfaction and accomplishment", and "Trying to do well in MATH 1521 is a very frustrating experience."

5) College Student Self-Perception Questionnaire: This was a graphic rating scale version of Taber and Hackman's (1976) College Criteria Questionnaire. Fifteen items appeared in this questionnaire which asked students to rate themselves on a seven-point scale (1=not at all as I see myself, 7=very much as I see myself) in terms of academic and nonacademic achievement indices. For example, some of the items asked "To what extent do you see yourself as a high academic achiever?", "To what extent do you see yourself as having made specific career plans?", and "To what extent do you see yourself as being dependable in your interpersonal affairs?"

At the end of the first session, participants signed up for the second questionnaire administration (Time Two). At this time, they were also provided with a PSC measure and Coping Style Questionnaire to take home. They were instructed to have a friend who knows them well describe their situation on the PSC questionnaire within one week of leaving the first session. They were also asked to have a friend de-

scribe their characteristic manner of dealing with demands on the 15-item Coping Style Questionnaire. These coping items reflected a mix of problem-solving style (Heppner & Petersen, 1982) and behavioral or pro-active coping strategies. Study participants returned these questionnaires upon their arrival to the Time Two session. The following questionnaires were administered at Time Two to 159 of the original 173 participants (92%).

1) Situational Constraint Measures: The PSC and PESC measures of situational constraints, addressing both the general academic setting and the specific calculus and matrices class were administered in the same form as they appeared during the first session. Also appearing on this questionnaire with the PSC and PESC measures were items tapping threat/opportunity appraisals and the perceived controllability of participant circumstances on each resource variable. In a separate questionnaire there appeared the Less Transparent Situational Constraint Measure (LTSC). Again, this measure consisted of 10 items which asked the same questions that appeared at Time One.

2) Coping Index: Participants were asked to rate on a four-point scale (1=not applicable or not used, 4=used very frequently) how frequently they used each of 15 coping responses to deal with their circumstance on each of the seven resource variables. This yielded 105 coping ratings, 15 for each resource variable. Items were selected to represent active and emotion-focused coping strategies. Problem-focused strategies largely reflected pro-active behaviors (e.g., "Devoted more time and energy to solve the problem", "I tried to get

additional people involved in the situation", "Spoke to someone who could do something concrete about the problem"), whereas emotion-focused coping items reflected the use of emotional palliatives (e.g., "Tried not to get too concerned about it", "I reminded myself that life shouldn't revolve around this problem"). Items which appeared on this scale reflected the conceptual work of Folkman and Lazarus (1980; Ways of Coping Inventory) and Latack (1986).

3) College Student Self-Perception Questionnaire: This questionnaire of self-perceptions was administered a second time at Time Two.

At the conclusion of the fall quarter, ability, performance and other data were collected from student files. Specifically, ability data appeared in the form of Scholastic Aptitude Test scores, performance data was in the form of a grade point average earned during the fall quarter and the grade for the calculus and matrices class. The number of credit hours for which students were enrolled in the fall quarter was also recorded and served as one of the Less Transparent Situational Constraint indicators.

RESULTS

Descriptive statistics, reliabilities, and correlations among variables involved in the analysis of each research question and hypothesis test are presented separately to facilitate interpretation. Sample sizes vary for each statistic calculated. Differences in sample size between statistics calculated with variables germane to the specific performance domain ($N = 143$; calculus and matrices) and the general performance domain ($N = 173$; all classes) are attributable to course enrollment differences in the total study sample of respondents. That is, approximately 17% of the total sample was not concurrently enrolled in MATH 1521. Other sample size differences stem from incomplete questionnaires and missing observations from the second questionnaire administration.

Analysis of Research Questions

Table 3 includes data bearing on the question of whether situational constraints are stable across time. In only two cases do the test-retest coefficients in Table 5 not exceed .70. The composite measures of constraints do appear to be stable across time. Test-retest coefficients were also computed at the resource variable level for both the PSC and PESC measure of constraints across both general and specific performance domains. Test-retest coefficients computed at the resource

variable level for both the PSC and PESC measures of constraints in the general performance domain ranged from .13 to .64. For these same measures, but pertaining to the specific performance domain, the range was .23 to .61. There was more variance among the test-retest estimates of the constraint measures of the general performance domain.

These differences in test-retest coefficients indicate that individuals' status on some resource variables, relative to others, do change over time. Also, this indicates that some resource variables may be less stable than the test-retest coefficients of the composite indices of constraints suggest.

The data reported in Table 4 are relevant to the issue of whether different operations of constraints converge. Note that with the exception of the PSC measure fo Time One, all coefficient alpha estimates of internal consistency exceed .70, indicating their suitability for research purposes (Nunnally, 1978, p. 245). Items of the LTSC measure are different indicators of constraints that bear no necessary relationship to each other. Since this measure of constraints is not conceptualized as unidimensional, an internal consistency estimate is an inappropriate index of reliability.

The correlations appearing in Table 4 were computed using list-wise deletion of missing cases; they include cases for which observations were available on variables from both the general and specific performance domains. The pattern of correlations in Table 4 suggests that constraints measured through similar operations tend to correlate more than constraints measured through different methods. The average

convergent validity coefficient among measures of constraints based on the same conceptual framework and measured with identical formats but across different domains averages .75, whereas convergent validity coefficients among different measures of constraints never exceed .59. Finally, the peer ratings of constraints and the less transparent measures of constraints do not converge with the constraints measured through self-report, semantic differential scales.

Principal components analysis (PCA) with varimax rotation was used to investigate the structure of the multiple indices of constraints (Harris, 1985). Separate PCAs were conducted on Time 1 and Time 2 coefficients. The two PCA solutions were virtually identical. Constraints measured through self-report and using a semantic-differential format formed the first factor in each analysis. In both analyses, this factor accounted for almost half of the variance in these constraint measures, 46% and 45% respectively. The second factor consisted of peer ratings and less transparent self-report measures of constraints. This factor accounted for 18% and 21% of the total variance, respectively. These data suggest that differences in how constraints are measured are largely responsible for the low convergence between different indicators of this construct.

The third research question asked whether different measures of constraints predict satisfaction and performance equally well while at the same time retaining no relationship to ability. Correlations in Table 5 were computed using pair-wise deletion of missing cases in order to preserve the power of significance tests conducted on the predictive

validity coefficients in the matrix. Table 5 reports data indicating that while the magnitude of relationships between constraints and system variables vary as a function of constraint measurement, by and large, a similar pattern of relationships does emerge. Scores on each constraint measure bear virtually no relationship to SAT math or total scores, as expected. The less transparent measure of constraints and the peer ratings of constraints are unrelated to the dependent variables in this matrix. On the other hand, the specific performance domain PESC measure of constraints is a good predictor of performance and satisfaction, regardless of whether the dependent measure refers to the general or specific performance domain.

The fourth research question asked whether there would be more covariation among situational constraints and dependent variables measured with reference to a specific performance domain versus a more general performance domain. Table 6 reports the canonical loadings estimated from a canonical correlation analysis (Thompson, 1984) of the situational constraint measures at Time One and dependent variables measured at Time Two.

The set of predictor variables was comprised of Time One constraint measures. The set of criterion variables consisted of satisfaction and self perception measures taken at Time Two, and performance in the form of Fall QCA and grade in the math class. Only one of the five canonical correlation functions accounted for a statistically significant percentage of the variance among these sets of variables. Variables representing constructs of the more specific domain clearly dominate the

first canonical variate. Dependent variables from both the specific and general domain, with the exception of self-perceptions, are negatively related to Variate 1. Constraints pertaining to the specific performance domain correlate positively with the first variate.

Variate 1 seems to be largely a function of the relationship between questionnaire measures of constraints and the criterion variables, excepting self-perception. Closer examination of the canonical loadings indicates that the general constraint measures load on both variates to a moderate degree. Whereas, the specific constraint measures are closely related to Variate 1, they share little variance in common with Variate 2. The underlying structure of relationships most clearly emerging from this analysis is that between specific constraint and criterion indices which define Variate 1. The second canonical variate is less interpretable. It is largely defined by the negative relationships between self-perceptions and constraints of the general performance domain.

Research Question Summary

The data reported here indicated that: 1) constraints were stable across time when measured in a variety of fashions, 2) convergent validity between constraint measures was attenuated across different methods, 3) transparent questionnaire measures of constraints were more strongly related to outcome variables than the LTSC and peer ratings of constraints, and 4) relationships among constraints and outcome

variables germane to a more specific situation correlate more than those representing a more general situation.

Analysis of Study Hypotheses

Hypotheses 1 and 2 postulate that appraisals mediate the constraint-coping relationship. A separate principal components analysis rotated to a varimax criterion was conducted on the coping items pertaining to each resource variable. The coping items were analyzed with the stipulation that each solution yield only two factors. This analysis yielded 2 factors. The first factor was characterized by problem-focused coping items whereas the second factor consistently correlated with the emotion-focused coping items. Items with loadings greater than .40 on the same factor for at least five of the seven resource variables were summed to form composite active and emotion-focused coping measures. With this criterion, each item was subsequently included in the coping composites. Each resource variable contributed the same eight items to make up the 56-item problem-focused coping scale. The 49-item emotion-focused coping scale was made up of the remaining set of seven items across the seven resource variables. The estimated internal consistency of these two scales were .95 and .92, respectively. A composite measure of threat appraisals was formed by summing scores on each threat emotion appearing across each of the seven resource variables and then dividing this total by seven. The identical procedure was followed with respect to opportunity appraisals. The two

21-item appraisal scales had reliabilities of .90 and .89, respectively.

Zero-order correlations between the variables involved in the two tests for mediation are shown in Table 7. Note that the correlation between PSC scores and both active and emotion-focused coping are small and nonsignificant. Since PSC scores are not related to the use of coping strategies, appraisals cannot be regarded as pure mediators of the effect of perceived situational constraints on coping. Yet, perceived situational constraints were moderately correlated with both threat and opportunity appraisals. Therefore, the three regression equations that such a test for mediation requires were computed (Baron & Kenny, 1986).

Regression results are presented in Table 8. These results suggest that threat appraisals do mediate the PSC-problem-focused coping relationship. The analysis predicting problem-focused coping from opportunity appraisal and PSC, indicated that opportunity appraisal functioned as a weak suppressor of the PSC-problem-focused coping relationship. In the latter case, the relationship between PSC scores and problem-focused coping increased when opportunity appraisals were controlled statistically. However, neither the zero-order nor the semi-partial coefficient for PSC scores was significant. These results support hypotheses 1 and 2.

The third hypothesis stated that the controllability of constraints and the use of problem-focused coping strategies would interact to predict constraints at Time 2. To control for initial standing

on constraints and to simultaneously test the predicted interaction, these data were analyzed through an analysis of covariance and moderated regression framework. This procedure requires that the covariate, in this case constraints at Time One, be entered at the first step. Second, the two main effect terms for each independent variable, problem-focused coping and controllability, are entered. At the third step, the cross-product term of problem-focused coping and controllability of constraints (i.e., the interaction term) was entered into the equation. Finally, the cross-product terms between the covariate and the two main effect terms were entered to test for violation of the homogeneity of regression slopes assumption. In this study, alpha was set at .15 for all tests of this assumption (cf. Keppel, 1982; Kirk, 1968).

The tests for violation of the assumption of homogenous regression slopes were not significant. Table 9 presents estimates from the equation used to test Hypothesis 3. Note that the covariate, Time One constraints, accounts for approximately 42% of the variance in Time Two constraint scores. This analysis indicated that neither constraint controllability nor problem-focused coping was related to constraints at Time Two when controlling for constraints at Time One. Finally, the interaction of problem-focused coping and controllability was not statistically significant. In sum, no support was found for the posited interaction.

A separate series of regressions, using perceived controllability at Time One as the subgrouping variable was conducted to explore the

efficacy of problem-focused coping strategies in reducing Time Two resource variable constraints when controlling for Time One resource variable constraints. In each case the homogeneity of slopes assumption was supported. Significant effects were found only for problem-focused coping under conditions perceived as controllable when considering the student role-related information resource variable ($\beta = -.37$, $t = -2.95$, $p = .005$). Similar regressions on the remaining six PSC resource variables of the general performance domain were not statistically significant.

The fourth hypothesis of this study predicted that problem-focused coping would interact with controllability in the prediction of Time Two satisfaction scores when Time One satisfaction scores are statistically controlled. Again, an analysis of covariance-moderated regression framework was used to test this hypothesis. The results of this analysis are reported in Table 10. Once again, the covariate accounted for a sizable portion of the variance in the dependent variable (approximately 48%). No effects attributable to main effect or interaction terms were found. The predicted interaction between problem-focused coping and controllability was not supported.

Hypothesis 5 stated that the use of problem-focused coping strategies in tandem with emotion-focused coping strategies would reduce Time Two threat appraisals. The analysis of covariance-moderated regression results of the test for this hypothesis are reported in Table 11. Tests of the two main effects were not statistically significant.

Likewise, the expected interaction between active and emotion-focused coping was not significant.

Prior to testing Hypothesis 6, a principal components analysis was conducted on the peer ratings of coping style. The varimax rotated solution yielded five factors. However, only the first factor was clearly interpretable. The items which loaded positively on this factor reflected active coping or proactive problem-solving strategies. This factor reproduced approximately 26% of the original total item variance. Appropriate items were reverse-coded and a nine-item composite index of coping style was formed by summing these items. The internal consistency estimate for this scale was .69.

Moderated regression was used to test the hypothesis that problem-focused coping style interacts with perceived controllability to predict performance (fall QCA). No covariate was used in this analysis. Therefore, the analysis consisted of two steps: 1) regressing performance on the main effects terms of both problem-focused coping style and controllability, and 2) entering the cross-product term of problem-focused coping style and controllability. The main effect terms and interaction term exhibited extremely high multicollinearity. As a result, standardized scores were used in the analysis.

Table 12 reports the standardized regression coefficients, t-values, and probability levels for each predictor entered in the equation. The coping style main effect was the only significant predictor of fall QCA. A more problem-focused coping style was positively

related to performance. No support was found for the coping style X controllability interaction.

Tests of Hypotheses: Summary

As predicted, no direct effect of constraints on coping strategies was found. Rather, as anticipated, constraints had an indirect effect on emotion-focused coping strategies transmitted through threat appraisals (indirect effect = .07). Also, constraints had an indirect effect on problem-focused coping strategies transmitted through opportunity appraisals (indirect effect = .06). These small effects suggest that coping strategies are largely a function of cognitive appraisals of the demands encountered and independent of the perceived demands.

None of the interaction hypotheses received support. For hypothesis 6, the main effect of coping style was significant, indicating that a coping style characterized by pro-active and problem-solving strategies is associated with improved performance. However, the prediction that a pro-active style under controllable conditions would better predict performance than such a style under uncontrollable conditions was not supported.

DISCUSSION

Discussion of Coping Hypotheses

The data reported here were consistent with the prediction that the effect of situational constraints on coping would be transmitted through cognitive appraisals of threat and opportunity. This supports one of the basic predictions stemming from Lazarus' stress and coping theory (Folkman, 1984).

The predicted problem-focused coping X controllability interaction was not found for both constraints at Time Two and Satisfaction scores at Time Two. The failure to find support for the the predicted moderating effects of controllability on the coping-outcome variable relationships could be due to several reasons. One ready explanation for the failure to find the posited effects is that the statistical tests were under-powered. A post-hoc power calculation based on the mean r-squared associated with these interactions was less than .10. Detecting such a small effect would require a prohibitively large sample size. Furthermore, an r-squared of .002, even if statistically significant, would have no practical significance whatsoever.

Potential Boundaries of the Coping-Outcome Relationship

Rather than persevere over the low power associated with this small effect size, it might be more instrumental to explain why such a small effect was observed in the first place. A common observation in the situational constraint literature is that mean responses to situational constraint measures rarely exceed scale mid-points (Peters, et al., 1985). Low scores on situational constraints were also found in this sample of respondents. The mean constraint responses were consistently below the scale mid-point at the composite and resource variable level. Since constraints were apparently weak, problem-focused coping would affect their levels only modestly. Problem-focused coping and controllability effects on constraints would be more apparent under more demanding conditions. Perhaps constraint severity acts as a boundary variable of the coping-performance/satisfaction relationship.

Yet another boundary variable of the coping-performance/satisfaction relationship might be the desire to exercise control. In some cases, individuals might not want to exercise control over constraining conditions (Folkman, 1984). Behaviors required to reduce constraints, such as complaining to a supervisor or coworker about work conditions, might be aversive to individuals. The decision not to exercise control could also be influenced by a desire to engage in self-handicapping (Berglas & Jones, 1978). According to this explanation, the presence of constraints provides an excuse for potential

failure that avoids self-esteem implications (Jones & Berglas, 1978). In either case, the result is an absence of control-directed behavior and no change in the status of resource variables. Future research might want to investigate whether the desire for control proves to be an important variable in work performance and decisions to enact control-directed behavior (cf. Burger, 1985).

Perhaps coping has a minimal effect on achievement-related outcomes. For example, in a comprehensive study of coping strategies and their efficacy in reducing emotional strain induced by marriage, parenting, household economics, and occupational stressors, Pearlin and Schooler (1978) found that coping strategies were not effective in buffering the effect of work stressors on work strain (all r-squared increments for coping were approximately .00). On the other hand, strains due to marriage, parenting, and household economic stressors were significantly reduced as a function of specific coping strategies. Pearlin and Schooler concluded that occupational stressors are less manageable by individuals. More specifically, they state "Many of the problems stemming from arrangements deeply rooted in social and economic organization may exert a powerful effect on personal life but be impervious to personal efforts to change them" (1978, p. 18). In such cases, persons will likely endure the stressful situation by changing their goals and values. For example, individuals might devalue intrinsic work rewards and concentrate on more extrinsic characteristics such as pay and benefits.

It could be that this sample of respondents had poor knowledge as to what or when different coping strategies might be more efficacious. Perhaps their problem-focused efforts were misapplied to the problems they encountered. Shalit (1977), for example, conducted a scalogram analysis of 75 situations appearing in the human performance literature and found that as the structural ambiguity of the situation increased, subject performance in these situations declined. Likewise, Schuler's (1982) organizational stress and coping model conceptualizes uncertainty as part of the primary appraisal process which acts as a precursor to implementing coping strategies. Enacting appropriate (i. e., effective) coping strategies might entail considerable familiarity with the context in which they are to be used. College freshmen, and for that matter, any new organizational member might be at a significant disadvantage in this respect.

Moreover, because new organizational members may be naive to the context in which they find themselves, they may misperceive the controllability of the situation. To what extent the illusion of control (Langer, 1975) may have biased participants control perceptions is unknown. Any bias of control estimates, be they over or underestimated, would produce results which deviate from those expected.

Alternatively, a more micro-analytic approach to the study of person and situation interactions, as championed by Bandura (1977) might be more sensitive to the effects of problem-focused coping and the controllability of constraints. Use of this approach would entail investigating constraints, coping, and the controllability of con-

straints relevant to a specific person- environment transaction. For example, a single encounter such as a college examination or a work task clearly bounded by time could be used as the context of investigating the efficacy of different coping strategies. In the study reported here however, several transactions between respondents and their situations occurred and this may have introduced noise in the design.

Also worth consideration is the problem associated with coping measures themselves. Coping measures currently available to researchers are plagued by poor psychometric characteristics, imprecise and unclear items, and a focus on negative, problem-oriented events (Kaus, 1986). On this point, the current study fared no better than previous attempts to measure the coping construct. Perhaps a first step toward developing better constraint coping indices would be to survey individuals as to what coping strategies they would enact in light of different constraints. This would be an important first step toward developing a taxonomy of coping responses that could be mapped onto specific situational constraints.

Discussion of Research Question Findings

Effects of Constraints on Outcomes

This study showed that constraints could predict performance eight weeks later and that satisfaction could be predicted six weeks later. Thus, the basic postulate of the Peters and O'Connor (1980) framework,

that constraints negatively affect performance, was supported. This was the first study to provide data relevant to the predictive validity of this hypothesis. Furthermore, these relationships generalized from a more general performance domain to a more specific one. Clearly, constraints is a useful construct for further research on both organizational behavior and personnel-human-resource problems.

Construct Validity Implications

The results of this study support the continued use of transparent questionnaire measures of constraints. The absence of convergence between questionnaire self-ratings of constraints and constraints measured through peer ratings or through a less transparent device, does not threaten the construct validity of current constraint measurement operations when considered in the light of other findings germane to the issue of construct validity. Specifically, this contention is supported by two pieces of evidence.

First, it was essential to find temporal stability among constraint scores since the construct is defined, in part, by this property. These data are consistent with this assumption. In whatever manner they were measured, composite constraint scores remained stable across time. However, this finding at the composite level did not readily generalize to the specific resource variable level. In this instance considerable variance in test-retest reliabilities was found. This points to the need to study temporal characteristics of constraints

in more detail. It could be that people's status on certain resource variables change as a function of organizational socialization, such as student role-related information did in this context (test-retest = .31 for the PSC measure in the general performance domain). People's status on other resource variables are less susceptible to change, such as instruction was in this context (test-retest = .64).

Second, transparent questionnaire measures of constraints were more successful in predicting relevant dependent variables than were the two alternative operations. This was evident through both bivariate correlations and the multivariate canonical analysis. Since performance in the form of grades was not measured by the same means as constraints, a common method variance interpretation of these relationships is less plausible. And, even though convergence between constraint scores was low, each measure of constraints exhibited a similar pattern of relationships with other variables that comprise the nomological network.

The data also show that constraint measures tailored to a more specific performance domain are better predictors of important outcomes such as satisfaction and performance. The canonical analysis results supported this contention and also suggested that the two alternative operations to measure constraints shared little covariation with the set of outcome measures; further supporting the argument that transparent questionnaire measures are valid.

The failure to find convergence between constraint indices might also be a function of the items included in the less transparent measure

of constraints. Recall that resource variables represented in this measure were not isomorphic with those appearing on the less transparent constraint measures. To what extent domain sampling differences might have attenuated any observed relationship is unknown.

Methodological Contributions

This study made several methodological contributions to this research literature. Peters et al. (1985) noted the need for a longitudinal study of constraints that could examine differences in the stability of specific constraining conditions. This study found that constraints do differ in terms of both their 1) stability, and 2) their susceptibility to coping efforts. This study also examined differences in the relationship between constraints and outcomes as a function of performance domain specificity. The data reported here suggests that the modest correlations between constraints and outcomes observed in field settings may have been attenuated by the generality of the performance domain (cf. Villanova, 1986). Several different measures of constraints were used in this study to examine whether the extent to which they would correspond. It was found that constraints measured through different methods did not correspond. However, as noted above, this problem does not threaten the validity of inferences drawn by previous research on constraints.

Future Research Directions

The results of this study suggest that future research on constraints should focus on the following questions. First, what is the role of commitments or stakes in the formulation of responses to constraints? According to the stress and coping paradigm, commitments should add to the prediction of primary appraisals. As shown here and elsewhere (Folkman & Lazarus, 1985) appraisals are predictive of coping responses enacted to contend with constraints. A more complete account of factors which influence these cognitive appraisals is needed.

Second, constraints need to be studied in greater detail so that those which bear a significant impact on performance can be identified. An account of why constraints differ in their impact on outcomes would contribute greatly to our understanding of poor work performance. This study did show that some of these constraints appear more conducive to coping efforts than others. What makes some constraints more manageable than others was not investigated here but would be a significant contribution in itself.

Third, what individual differences contribute to more effective use of the resources at a person's disposal? Assuming that some constraints cannot be easily manipulated by human efforts, what individual differences predict the use of behavioral strategies that yield the greatest advantage? Some likely candidates in this regard might be self-esteem (Cooper, 1967), locus of control (Rotter, 1966), and hardiness (Kobasa, 1979). Note that each of these is in some way re-

lated to a positive self-concept. Perhaps the ability to deal with adverse circumstances and still maintain a feeling of competence and control contributes to functional, adaptive strategies of resource use.

Finally, to what extent can this construct generalize to other contexts, such as organizational-level outcomes? Research on strategic management has just begun to investigate the responsiveness of different corporate environments to organizational management. Recently, Hrebiniak & Joyce (1985) have developed a typology of organizational adaptation to environmental demands. The two main variables comprising their typology are strategic choice and environmental determinism. When combined, these two factors yield four circumstances that lend themselves to different corporate strategies. This work suggests that constraints might be applied to the performance of social organizations as well as individual job performance.

Generalizability Issues

As with any study, there is the possibility that the findings do not generalize beyond the specific sample used (Greenberg, 1987). However, the use of a college student sample facilitated the investigation of important substantive questions that are not easily looked at when using other samples. Also, because this study was concerned with an actual achievement situation, behaviors and outcomes were psychologically involving for the participants (Berkowitz & Donnerstein, 1982). Therefore, psychological realism characterized

this study as much as could be expected with any alternative applied sample of respondents.

These data indicate that situational constraints, as a construct, can be extended to other achievement settings. In this case, data from a sample of college students operating in an academic performance setting successfully replicated findings generated in more "applied" settings. Furthermore, like studies conducted within everyday work settings, constraints were found to be relatively weak - nuisance variables rather than formidable obstacles (cf. Peters, et al., 1985).

Summary

This study sought to answer important questions related to the construct validity of situational constraint measurement. This purpose was largely satisfied and the results indicated that the use of questionnaire measures of this construct to test substantive hypotheses is appropriate. The second purpose, that of testing propositions deduced from the stress and coping literature within the situational constraint paradigm, suffered from a number of contextual and measurement factors. The hypothesized mediating role of appraisals in the PSC-coping relationship was supported. This indicates that responses to constraints are a function of cognitive appraisal as well as constraint severity. The data relevant to tests of the interaction hypotheses suggest that the study of coping effectiveness may be more fruitful when involving

discrete events that are not only psychologically involving, but also pose more than modest demands on persons' resources.

REFERENCES

- Alloy, L. B. , & Abramson, L. Y. (1979). Judgment of contingency in depressed and nondepressed students: Sadder but wiser? Journal of Experimental Psychology: General, 108, 441-485.
- American Psychological Association. (1982). Ethical principles in the conduct of research with human participants. Washington, DC: APA.
- Bandura, W. (1977). Social learning theory. Englewood Cliffs, NJ: Prentice-Hall.
- Baron, R. M. , & Kenney, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. Journal of Personality and Social Psychology, 51, 1173-1182.
- Berglas, S. , & Jones, E. E. (1978). Drug choice as a self-handicapping strategy in response to non-contingent success. Journal of Personality and Social Psychology, 36, 405-417.
- Berkowitz, L. , & Donnerstein, E. (1982). External validity is more than skin deep. American Psychologist, 37, 245-257.
- Blumberg, M. , & Pringle, C. D. (1982). The missing opportunity in organizational research: Some implications for a theory of work performance. Academy of Management Review, 7, 560-569.
- Brehm, S. & Brehm, J. W. (1981). Psychological reactance: A theory of freedom and control. New York: Academic Press.

- Burger, J.M. (1985). Desire for control and achievement-related behaviors. Journal of Personality and Social Psychology, 48, 1520-1533.
- Campbell, J.P., & Pritchard, R.D. (1976). Motivation theory in industrial and organizational psychology. In M.D. Dunnette (Ed.), Handbook of industrial and organizational psychology (pp. 63-130). Chicago: Rand McNally.
- Chapanis, A. (1976). Engineering psychology. In M.D. Dunnette (Ed.), Handbook of industrial and organizational psychology (pp. 697-744). Chicago: Rand McNally.
- Cohen, J., & Cohen, P. (1983). Applied multiple regression/correlation analysis for the behavioral sciences. Hillsdale, NJ: LEA.
- Collins, D.L., Baum, A., & Singer, J.E. (1983). Coping with chronic stress at Three Mile Island: Psychological and biochemical evidence. Journal of Abnormal Psychology, 90, 439-447.
- Cook, T.D., & Campbell, D.T. (1979). Quasi-experimentation: Design and analysis issues for field settings. Boston: Houghton Mifflin.
- Coopersmith, S. (1967). The antecedents of self-esteem. San Francisco: W.H. Freeman.
- Cronbach, L.J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16, 297-334.
- Folkman, S. (1984). Personal control and stress and coping processes: A theoretical analysis. Journal of Personality and Social Psychology, 46, 839-852.

- Folkman, S., & Lazarus, R.S. (1980). An analysis of coping in a middle-aged community sample. Journal of Health and Social Behavior, 21, 219-239.
- Folkman, S., & Lazarus, R.S. (1985). If it changes it must be a process: Study of emotion and coping during three stages of a college examination. Journal of Personality and Social Psychology, 48, 150-170.
- Folkman, S., Schaeffer, C., & Lazarus, R.S. (1979). Cognitive processes as mediators of stress and coping. In V. Hamilton & D.M. Warburton (Eds.), Human stress and cognition: An information processing approach. (pp. 265-298). London: Wiley.
- Fromkin, H.L., & Streufert, S. (1976). Laboratory experimentation. In M.D. Dunnette (Ed.), Handbook of industrial and organizational psychology (pp. 415-465). Chicago: Rand McNally.
- Greenberg, J. (1987). The college sophomore as guinea pig: Setting the record straight. Academy of Management review, 12, 157-159.
- Harris, R.J. (1985). A primer of multivariate statistics. Orlando, FL: Academic Press.
- Heppner, P.P., & Petersen, C.H. (1982). The development and implications of a personal problem-solving inventory. Journal of Counseling Psychology, 29, 66-75.
- Hrebiniak, L.G., & Joyce, W.F. (1985). Organizational adaptation: Strategic choice and environmental determinism. Administrative Science Quarterly, 30, 336-349.

- Kaus, C.R. (1986). The measurement of coping: A cross-validation of factor invariance. Paper presented at the Annual Meeting of the American Psychological Association, Washington, D.C..
- Keppel, G. (1982). Design and analysis: A researcher's handbook, 2nd edition. Englewood Cliffs, NJ: Prentice-Hall.
- Kirk, R.E. (1968). Experimental design: procedures for the behavioral sciences. Belmont, CA: Brooks Cole.
- Kobasa, S.C. (1979). Stressful life events, personality, and health: An inquiry into hardiness. Journal of Personality and Social Psychology, 37, 1-11.
- Langer, E.J., & Rodin, J. (1976). The effects of choice and enhanced personal responsibility for the aged: A field experiment in an institutional setting. Journal of Personality and Social Psychology, 34, 191-198.
- Latack, J.C. (1986). Coping with job stress: Measures and future directions for scale development. Journal of Applied Psychology, 71, 377-385.
- Lawler E.E. (1973). Motivation in work organizations. Belmont, CA: Brooks Cole.
- Lazarus, R.S. (1981). The stress and coping paradigm. In C. Eisdorfer, D. Cohen, A. Kleinman, & P. Maxim (Eds.), Models for clinical psychopathology (pp. 174-214). New York: Spectrum.
- Lazarus, R.S., Kanner, A., & folkman, S. (1980). Emotions: A cognitive-phenomenological analysis. In R. Plutchik & H. Kellerman (Eds.), Theories of emotion (pp. 189-217). New York: Academic Press.

- Lazarus, R.S., & Launier, R. (1978). Stress-related transactions between person and environment. In L. Pervin & M. Lewis (Eds.), Perspectives in interactional psychology (pp. 287-327). New York: Plenum.
- Leary, M.R., & Shepperd, J.A. (1986). Behavioral self-handicaps versus self-reported self-handicaps: A conceptual note. Journal of Personality and Social Psychology, 51, 1265-1268.
- Nunnally, J.C. (1978). Psychometric theory, 2nd edition. New York: McGraw-Hill.
- O'Connor, E.J., Peters, L.H., Pooyan, A., Weekly, J., Frank, B., & Erenkrantz, B. (1984). Situational constraint effects on performance, affective reactions, and turnover: A field replication and extension. Journal of Applied Psychology, 69, 663-672.
- O'Connor, E.J., Peters, L.H., Rudolph, C.J., & Pooyan, A. (1982). Situational constraints and employee affective reactions: A field replication. Group and Organization Studies, 7, 418-428.
- Pearlin, K.I., & Schooler, C. (1978). The structure of coping. Journal of Health and Social Behavior, 19, 1-21.
- Peters, L.H., Chassie, M.B., Lindholm, H.R., O'Connor, E.J., & Kline, C.R. (1982). The joint influence of situational constraint and goal setting on performance and affective outcomes. Journal of Management, 8, 7-20.
- Peters, L.H., Fisher, C.D., & O'Connor, E.J. (1982). The moderating effect of situational control of performance variance on the re-

- relationship between individual differences and performance. Personnel Psychology, 35, 609-621.
- Peters, L.H., & O'Connor, E.J. (1980). Situational constraints and work outcomes: The influences of a frequently overlooked construct. Academy of Management review, 5, 391-397.
- Peters, L.H., O'Connor, E.J., & Eulberg, J.R. (1985). Situational constraints: Sources, consequences and future considerations. In K. Rowland & G. Ferris (Eds.), Research in personnel and human resources management (pp.79-113). Connecticut: JAI Press.
- Peters, L.H., O'Connor, E.J., & Rudolph, C.J. (1980). The behavioral and affective consequences of performance-relevant situational variables. Organizational Behavior and Human Performance, 25, 79-96.
- Phillips, J.S., & freedman, S.M. (1984). Situational performance constraints and task characteristics: Their relationship to motivation and satisfaction. Journal of Management, 10, 321-331.
- Rotter, J.B. (1966). Generalized expectancies for internal versus external control of reinforcements. Psychological Monographs, vol. 80, no. 1.
- Salancik, G.R., & Pfeffer, J. (1977). An examination of need-satisfaction models of job attitudes. Administrative Science quarterly, 22, 427-456.
- Schuler, R.S. (1982). An integrative transactional model of stress in organizations. Journal of Occupational Behavior, 3, 5-19.
- Seligman, M.E.P. (1975). Helplessness. San Francisco: W.H. Freeman.

- Shalit, B. (1977). Structural ambiguity and limits to coping. Journal of Human Stress, December 32-45.
- Steel, R.P., & Mento, A.J. (1986). Impact of situational constraints on subjective and objective criteria of managerial performance. Organizational Behavior and Human Decision Processes, 37, 254-265.
- Taber, T.D., & Hackman, J.D. (1976). Dimensions of undergraduate college performance. Journal of Applied Psychology, 61, 546-558.
- Thompson, B. (1984). Canonical correlation analysis: Uses and interpretation. Beverly Hills, CA: Sage.
- Vasquez, C. (1987). Judgment of contingency: Cognitive biases in depressed and nondepressed subjects. Journal of Personality and Social Psychology, 52, 419-431.
- Villanova, P. (1986). Situational constraints research: A quantitative review. Working paper, Virginia Polytechnic Institute and State University, Blacksburg, VA.

TABLES

Table 1. Resource Variables Identified by Peters and O'Connor (1980).

Job-Related Information: The information (from supervisors, peers, subordinates, company rules, etc.) needed to do the job assigned.

Tools and Equipment: The specific tools, equipment and machinery needed to do the job assigned.

Materials and Supplies: The materials and supplies needed to do the job assigned.

Budgetary Support: The financial resources and budgetary support needed to do the job assigned.

Required Services and Help from Others: The services and help from others needed to do the job assigned.

Task Preparation: The personal preparation, through previous education, formal company training, and relevant job experience, needed to do the job assigned.

Time Availability: The availability of the time needed to do the job assigned, taking into consideration both the time limits imposed and the interruptions, unnecessary meetings, non-job related distractions, etc.

Work Environment: The physical aspects of the immediate work environment needed to do the job assigned - characteristics that facilitate rather than interfere with doing the job assigned.

Note. Adapted from Peters and O'Connor (1980, p. 396).

Table 2. Resource Variables Identified for Use With a College Student Sample.

Student Role-Related Information: Refers to information that helps students prepare for, guide, or clarify college student requirements. Included in this category is information about college life on campus that students may receive from others who had previously attended the university. Also, information from peers regarding what courses are more interesting or worthwhile, and information from official school publications that clarify requirements, add/drop deadlines, etc. would come under this title also.

Materials and Supplies: This refers to such things as pencils, paper, textbooks, handouts from classes, and computer diskettes that are needed to perform required activities.

Budgetary Support: Financial resources from parents, student loans, grants, etc. that are needed to perform required student activities fall under this category.

Required Services and Help From Others: Refers to the cooperation you need from others in order to master the requirements of your courses. Help from GTA's instructors, and fellow students fall under this category.

Instruction: Refers to the formal instruction received from class lectures, assignments, and tutorials.

Time Availability: The amount and suitability of the time you have to perform course requirements. The suitability of the time and the time limits, interruptions, unnecessary meetings, and distractions that you must deal with to get your coursework done properly.

Work Environment: The physical aspects of your study area or class lecture hall that influence your performance of coursework. Consider such things as noise, temperature, workspace, and lighting as falling under this category.

Note. A similar description of these resource variables appeared with questionnaires administered to participants at both sessions of the study.

Table 3. Situational Constraint Test-retest Coefficients.

	Test-retest Coefficient
<u>GENERAL PERFORMANCE DOMAIN</u>	
Perceived Situational Constraints (PSC)	.64 (154)
Perceived Effects of Situational Constraints (PESC)	.72 (153)
Less Transparent Situational Constraints (LTSC)	.64 (154)
<u>SPECIFIC PERFORMANCE DOMAIN</u>	
Perceived Situational Constraints (PSC)	.74 (130)
Perceived Effects of Situational Constraints (PESC)	.76 (127)

Note. Approximately six weeks separated Time 1 and Time 2 questionnaire administrations. Sample sizes for separate test-retest coefficients appear in parentheses.

Table 4. Correlations Among Different Indicators of Constraints.

	1	2	3	4	5	6
<u>GENERAL PERFORMANCE DOMAIN</u>						
(1) PSC		.59	.18	.19	.71	.48
(2) PESC	.47		.21	.10	.50	.71
(3) LTSC	.24	.16		.10	.09	.13
(4) Peer Rating of Constraints	.30	.19	.15		.19	.07
<u>SPECIFIC PERFORMANCE DOMAIN</u>						
(5) PSC	.78	.45	.22	.12		.54
(6) PESC	.38	.81	.14	.03	.48	

Mean (sd) Time One	9.9 (2.8)	11.6 (2.0)	3.0 (1.1)	10.2 (3.3)	9.5 (3.4)	10.9 (2.8)
Mean (sd) Time Two	9.8 (3.0)	11.7 (2.3)	2.8 (1.2)	-	10.0 (3.7)	10.9 (2.8)
Alpha at Time One	.90	.77	.07	.93	.93	.88
Alpha at Time Two	.92	.84	.06	-	.94	.89

Note. Correlations above the diagonal represent relationships between Time One measures of constraints. Correlations below the diagonal include only those variables measured at Time Two. Due to incomplete responses, sample sizes vary from 122 to 139. All coefficients above $|.17|$ are statistically significant at the .05 level (two-tailed). Participants were asked to obtain peer ratings of constraints before one week had passed since the first session.

Table 5. Correlations Between Constraints, Ability, Satisfaction, and Performance.

	Ability		Satisfaction		Performance	
	1	2	3	4	5	6
<u>GENERAL PERFORMANCE DOMAIN</u>						
PSC (Time 1)	.04	.04	-.28	-.17	-.18	-.16
PESC (Time 1)	-.04	-.06	-.19	-.19	-.19	-.17
LTSC (Time 1)	.07	-.01	-.09	-.02	-.06	-.07
Peer Rating of Constraints (Time 1)	.02	-.01	.04	-.03	-.15	.07
<u>SPECIFIC PERFORMANCE DOMAIN</u>						
PSC (Time 1)	.00	.02	-.22	-.30	-.23	-.34
PESC (Time 1)	-.14	-.15	-.34	-.52	-.32	-.40

Mean	1057.9	568.5	14.5	10.0	2.6	2.6
(sd)	(100.6)	(63.2)	(2.9)	(3.5)	(.7)	(1.2)
Alpha at Time Two	-	-	.66	.90	-	-

Note. Due to incomplete responses, sample sizes vary from 122 to 169. All coefficients above $|.14|$ are statistically significant at the .05 level (one-tailed). 1=total SAT score; 2=math SAT score; 3=general satisfaction; 4=satisfaction with math; 5=fall qca; 6=math grade. Table 4 contains descriptive statistics for the constraint measures.

Table 6. Canonical Analysis of Constraints and Outcomes

	Structural Coefficients	
	Canonical Variate 1	Canonical Variate 2
<u>PREDICTORS</u>		
PSC (General)	.57	.59
PESC (General)	.61	.35
LTSC (General)	.26	.64
Peer Rating of Constraints (General)	-.08	.46
PSC (Specific)	.69	.15
PESC (Specific)	.95	-.07
<u>CRITERIA</u>		
General Satisfaction	-.70	-.40
Fall QCA	-.63	.02
Self-Perceptions	-.33	-.72
Specific Satisfaction	-.88	.31
Math Grade	-.79	.34

Note. List-wise deletion resulted in a total of 116 observations for this analysis. The canonical correlations and redundancy statistics are: for Root number 1, $R = .47$, $F(30, 422) = 1.89$, $p = .004$; for Root number 2, $R = .40$, $F(20, 352) = 1.42$, $p = .110$. Canonical loadings (structure coefficients) are the correlations between the individual variables and their associated canonical variates.

Table 7. Correlations Between Perceived Situational Constraints, Appraisals of Threat and Opportunity, and Coping Strategies.

	2	3	4	5
1) PSC	.05	.13	.42	-.29
2) Problem-Focused Coping	(.95)	.53	.22	.23
3) Emotion-Focused Coping		(.92)	.22	.06
4) Threat Appraisals			(.90)	.22
5) Opportunity Appraisals				(.89)

Mean	18.7	15.7	10.4	12.5
(sd)	(4.0)	(2.9)	(2.9)	(2.7)

Note. Diagonal entries are internal consistency estimates. Due to list-wise deletion of missing cases, the sample size for all coefficients in this matrix is 143. All coefficients above $|.15|$ are statistically significant at the .05 level (two-tailed).

Table 8. Multiple Regression Estimates of the Independent Effects of Appraisal and PSC Scores on Coping Strategy Use.

Predictors	b	se	Beta	t	p
<u>Emotion-Focused Coping</u>					
Threat Appraisal	.17	.09	.17	1.86	.065
PSC	.06	.10	.05	.60	.548
R-squared = .039, $F(2,141) = 2.89$, $p = .058$					
<u>Problem-Focused Coping</u>					
Opportunity Appraisal	.39	.13	.26	3.07	.002
PSC	.19	.12	.13	1.52	.131
R-squared = .065, $F(2,141) = 4.93$, $p = .009$					

Table 9. Analysis of the Effects of Controllability and Problem-Focused Coping on Constraints at Time Two.

Predictors	b	se	Beta	t	p
<u>Perceived Situational Constraints (PSC) at Time Two</u>					
PSC (Time One)	.63	.08	.57	8.01	<.01
Problem-Focused Coping (PFC)	.28	.23	.36	1.23	.221
Controllability (Con)	.20	.82	.07	.24	.809
PFC X Con Interaction	-.04	.04	-.38	-.918	.360

R-squared for Covariate = .415, $F(1,138) = 97.83$, $p < .001$

R-squared Increment for Main Effects = .032, $\Delta F(3,136) = 3.87$, $p = .023$

R-squared Increment for Interaction = .003, $\Delta F(4,135) = .84$, $p = .360$

Zero-order Correlations

	PFC	Perceived Controllability	PSC Time One
PSC (Time Two)	.10	-.41	.64
PFC		.09	.04
Perceived Controll.			-.42

Note. List-wise deletion resulted in coefficients being computed from a sample size of 140. All coefficients above |.15| are significant at the .05 level (two-tailed).

Table 10. Analysis of the Effects of Controllability and Problem-Focused Coping on Satisfaction at Time Two.

Predictors	b	se	Beta	t	p
<u>Time Two Satisfaction</u>					
Satisfaction (Time One)	.76	.07	.69	10.80	<.01
Problem-Focused Coping (PFC)	-.03	.21	-.05	-.18	.854
Controllability (Con)	-.04	.76	-.01	-.05	.960
PFC X Con Interaction	.01	.04	.04	.09	.927

R-squared for Covariate = .482, $F(1,143) = 133.02$, $p < .001$

R-squared Increment for Main Effects = .001, delta F (3,141) = .10, $p = .906$

R-squared Increment for Interaction = .000, delta F (4,140) = .01, $p = .930$

Zero-order Correlations

	<u>PFC</u>	<u>Perceived Controllability</u>	<u>Satisfaction Time One</u>
Satisfaction (Time Two)	-.14	.16	.69
PFC		.09	-.17
Perceived Controll.			.23

Note. List-wise deletion resulted in coefficients being computed from a sample size of 145. All coefficients above $|.15|$ are significant at the .05 level (two-tailed).

Table 11. Analysis of the Effects of Emotion-Focused and Problem-Focused Coping on Threat Appraisals at Time Two.

Predictors	b	se	Beta	t	p
<u>Time Two Threat Appraisals</u>					
Threat Appraisals (Time One)	.88	.07	.75	12.45	<.01
Problem-Focused Coping (PFC)	-.15	.23	-.18	-.66	.509
Emotion-Focused Coping (EFC)	-.23	.28	-.20	-.81	.422
PFC X EFC Interaction	.01	.01	.33	.77	.446

R-squared for Covariate = .547, $F(1,142) = 171.47$, $p < .001$

R-squared Increment for Main Effects = .000, delta F (3,140) = .06, $p = .947$

R-squared Increment for Interaction = .002, delta F (4,139) = .58, $p = .446$

Zero-order Correlations

	<u>PFC</u>	<u>EFC</u>	<u>Threat Appraisals Time One</u>
Threat Appraisals (Time Two)	.17	.13	.74
PFC		.54	.21
EFC			.19

Note. List-wise deletion resulted in coefficients being computed from a sample size of 144. All coefficients above |.15| are significant at the .05 level (two-tailed).

Table 12. Analysis of the Effects of Controllability and Coping Style on Fall Quarter Grades.

Predictors	Beta	t	p
<u>Fall Quarter Grades</u>			
Coping Style (CS)	.22	2.62	.009
Controllability (Con) Time Two	.07	.86	.392
CS X Con Interaction	.08	.95	.346

R-squared Increment for Main Effects = .053, delta F (2,138) = 3.83, $p = .024$

R-squared Increment for Interaction = .006, delta F (3,137) = .89, $p = .346$

Zero-order Correlations

	<u>Coping Style</u>	<u>Perceived Controllability</u>	<u>CS X Con</u>
Fall QCA	.22	.06	.19
Coping Style		.00	.61
Perceived Controll.			.78

Note. List-wise deletion resulted in coefficients being computed from a sample size of 141. All coefficients above $|.15|$ are significant at the .05 level (two-tailed). Only standardized regression coefficients appear in this table since standardization precludes estimates of the unstandardized coefficients and their standard errors.

APPENDIX

Student Beliefs

Expt #115-36

STUDY DESCRIPTION for RESEARCH PARTICIPANTS

To our research participants:

This study is concerned with your thoughts and beliefs about the academic environment. This research requires us to collect information from you at two different points in time. Therefore, if you participate in tonight's session, please commit yourself to attending the second session also. Without information from you at a second point in time, we will not be able to investigate the problem adequately.

What we ask of you:

Tonight, we ask you to complete some questionnaires. We anticipate that these should take less than 90 minutes to complete. Also, we ask consent from you to obtain information from your academic file. This information will be held in the strictest confidence and all identifiers will be removed to insure the anonymity of our research participants. For this, we have been approved by the Human Subjects Committee to credit you with two (2) extra credit points toward your final grade in PSYC 2000.

Just before you leave tonight, we ask you to sign up for a time slot for the second session. Also, you will be given a set of questionnaires to take home. These are brief versions of the questionnaires you answered tonight. We would like you to give this packet of questionnaires to a friend that knows you well. Have your friend fill out the questionnaires, seal them in the envelope provided, and then you return them to the second session of our study. For this, we are allowed to credit YOU with another extra credit point toward your final grade in PSYC 2000. That's three extra credit points so far.

Five weeks or so from tonight, the second session takes place. The second session will be much like tonight's session in that you will be responding to another set of questionnaires. The second session should take another 90 minutes of your time. The Human Subjects Committee has approved of crediting you with two (2) additional extra credit points. That makes a total of five (5) extra credit points that you can earn by participating in our study.

CONSENT FORM

Should you decide to participate in this research, please know that:

- 1) You will not be exposed to any psychological or physical harm as a result of your participation in this study.
- 2) Tonight's session should last less than 90 minutes and you will be credited with 2 points towards your PSYC 2000 final grade.
- 3) Your consent to participate is voluntary and can be withdrawn by you at any time without penalty.
- 4) All information gathered from your responses is intended for RESEARCH PURPOSES ONLY. Therefore, it will remain confidential and will have all identifiers removed as soon as all responses are combined -- you will only be identified by a code number.
- 5) Any questions that you have will be answered, however, further information can be obtained by contacting one of the individuals listed below:

DR. S.J. Zaccaro (x7916, 5081 Derring)
Mr. Chuck Waring (x5284, 301 Burruss)
P. Villanova (x6581, 5077 Derring)

- 6) There is a copy of this consent form available if you should wish to retain a copy for your personal records, BUT PLEASE FILL OUT THE COPY THAT IS ATTACHED TO THE EXPERIMENTAL PACKET FOR OUR RECORDS.

If you consent to participate voluntarily and with an understanding of the conditions outlined above, please PRINT your name below and provide other relevant information as requested.

NAME (please print):

CLASS LEVEL: FR SO JU SR

CONSENT FORM - ACCESS TO ACADEMIC FILE

To our research participants;

The success of this research project depends on a number of factors. First of course, we need you to attend both sessions and return the questionnaires that your friend fills out. Also, we need access to your student file to retrieve necessary information. We assure you that this information will be strictly confidential and that appropriate procedures are in place to guarantee your anonymity.

The information we wish to retrieve consists of the following:

- your Scholastic Aptitude Test score
- your class standing, whether you are a freshman, sophomore, etc.
- the total amount of credit hours you have completed in college
- the number of credit hours for which you are enrolled this quarter
- your fall quarter QCA
- your fall quarter grade in MATH 1211 or MATH 1521

This information can only be obtained with your consent. If you understand this; that this information will remain confidential; that your anonymity will be protected; and wish to grant consent to an authorized member of our research team to record this data; please indicate so by signing your name below. Please accompany your signature with your student ID number. Thank you.

Signature: _____

Student ID: ____-____-____

OPSCAN and QUESTIONNAIRE INSTRUCTIONS - TIME 2

As during session one, we are trying to collect information by OPSCAN in order to ease our coding burden. Your assistance in this will be greatly appreciated.

1. Check to see if you have the following:
 - a. THREE BLUE OPSCANS with 160 spaces
 - b. A BROWN OPSCAN with 60 spaces
 - c. CONSENT FORM and #2 PENCIL
2. Please CODE YOUR STUDENT ID number ON EACH OPSCAN.
3. Please DO NOT WRITE ON QUESTIONNAIRES. Answer all questions on the opscans. Please make DARK MARKS.
4. Note that the questionnaires have different formats for responding. Each questionnaire is preceded by a brief description to reduce ambiguity.
5. Please know that there are no right and wrong answers to these questions. Please make an effort to answer all questions and ensure that you finish on the OPSCAN number that corresponds to the last item number in the questionnaire sequence.
6. If you have any questions about anything, raise your hand and the experimenter will help you.
7. When you are finished, please turn the material in to the experimenter.

Academic Achievement Environment

INSTRUCTIONS: On the following pages, you will find a series of scales designed to assess your perceptions of various aspects of your academic environment. For each item, you will find a series of adjective pairs separated by seven blank spaces. The adjective pairs were chosen to be "opposites" of each other. Your job is to circle on the OPSCAN the number which best describes your perception of the academic environment. For each adjective pair, please circle one and only one of the numbers on the OPSCAN in order to best describe your academic environment.

Consider the following example:

The FEEDBACK I receive about how well I do in courses is:

UNIMPORTANT	(1)	(2)	(3)	(4)	(5)	(6)	(#)	IMPORTANT
ADEQUATE	(1)	(#)	(3)	(4)	(5)	(6)	(7)	INADEQUATE
NOT EASILY SECURED	(#)	(2)	(3)	(4)	(5)	(6)	(7)	EASILY SECURED

The person making these responses would be indicating that having feedback was extremely important, but that the amount of feedback received was slightly less than adequate. Further, the last check mark would indicate that this person reported feedback was extremely difficult to secure. If you fully understand these instructions, please proceed to the next page where questions begin.

WORK ENVIRONMENT: Refers to the physical aspects (inappropriate workspace, lighting, noise, temperature) that affect your ability to perform student functions.

A. To do my work, WORK ENVIRONMENT is:

97. UNIMPORTANT (1) (2) (3) (4) (5) (6) (7) IMPORTANT

B. Availability: WORK ENVIRONMENT needed to perform as a student is:

98. UNAVAILABLE (1) (2) (3) (4) (5) (6) (7) AVAILABLE

99. OBTAINABLE (1) (2) (3) (4) (5) (6) (7) UNOBTAINABLE

C. Quality: The quality of the WORK ENVIRONMENT I receive is:

100. USELESS (1) (2) (3) (4) (5) (6) (7) USEFUL

101. GOOD (1) (2) (3) (4) (5) (6) (7) BAD

D. Intensity: The effect that problems with WORK ENVIRONMENT have on my performance as a student is:

102. STRONG (1) (2) (3) (4) (5) (6) (7) WEAK

E. Stability: The problems I encounter with WORK ENVIRONMENT with respect to my performance as a student are:

103. LONG-LASTING (1) (2) (3) (4) (5) (6) (7) SHORT-LIVED

F. Generality: Problems in WORK ENVIRONMENT affect my performance:

104. IN FEW SITUATIONS (1) (2) (3) (4) (5) (6) (7) IN MANY SITUATIONS

To what extent do you feel each of the following emotions with respect to your WORK ENVIRONMENT circumstance? Please base your response on the scale below:

(1) (2) (3) (4) (5) (6) (7)
not at all a great deal

105. WORRIED

106. EAGER

107. ANXIOUS

108. FEARFUL

109. CONFIDENT

110. HOPEFUL

111. To what extent do you believe that you can do something to improve your WORK ENVIRONMENT circumstance?

(1) (2) (3) (4) (5) (6) (7)
I doubt I can do anything about it I am sure I can do something about it

112. With respect to WORK ENVIRONMENT, I would say that compared to my peers, I am:

(1) (2) (3) (4) (5) (6) (7)
far better off about the same far worse off

PACKET TWO

INSTRUCTIONS: Please use your BROWN OPSCAN to answer the questions that appear in the following pages. If you did not place your assigned three digit ID number in the seat section earlier, do so now.

Self-Description Inventory

Please answer each of the following questions as accurately and completely as possible. There are no right or wrong answers. Please use the BROWN CPSCAN for these and the questions which follow.

1. Have any of your brothers or sisters attended Virginia Tech?
1) YES 2) NO
2. Did you find yourself alone, or with company in the form of familiar friends when you arrived at Tech?
1) ALONE 2) WITH FRIENDS
3. Do you own a car, truck, or van?
1) YES 2) NO
4. Are you now, or have you recently, considered changing roommates?
1) YES 2) NO 3) DOES NOT APPLY
5. How much time do you spend on hobbies and other personal interests each week?
1) less than 5 hours/week 3) between 10 and 15 hrs/week
2) between 5 and 10 hrs/week 4) more than 15 hrs per week
6. Are you currently employed? -- if no, skip to question #9
1) YES 2) NO
7. How many hours a week do you work?
1) LESS THAN 10 2) BETWEEN 10-20 3) MORE THAN 20
8. Do you work mostly on weekends or weekdays?
1) WEEKENDS 2) WEEKDAYS
9. Do you have a copy of the undergraduate student manual?
1) NO 2) YES
10. How many friends do you have that are upperclassmen?
1) NONE 2) ONE 3) TWO 4) THREE OR MORE
11. Have you ever had to leave your dorm/apartment because there was so much going on that you couldn't study?
1) NO 2) YES

13. Do you belong to any campus group or organizations?
1) NO 2) YES
14. How many magazines do you subscribe to?
1) NONE 2) ONE 3) TWO 4) THREE OR MORE
15. Do you have a syllabus for every course you are enrolled in this quarter?
1) YES 2) NO
16. Do you have a personal computer available to you to work on?
1) YES 2) NO
17. How often do you buy extra things other than books required for class when you go to the bookstore?
1) NEVER
2) ABOUT HALF OF MY VISITS TO THE BOOKSTORE
3) ABOUT EVERY TIME I GO TO THE BOOKSTORE
18. How would you rate the quality of the education you received in highschool?
1) POOR 2) FAIR 3) GOOD 4) EXCELLENT
19. Are you missing any required textbooks for the courses you are enrolled in this quarter?
1) NO 2) YES
20. Do you have your own area for doing school work in your room or apartment?
1) YES 2) NO

Reasons for Trying

Below is a list of REASONS WHY YOU WOULD WANT TO DO WELL IN YOUR COURSES this quarter. Please indicate to what extent each item applies to you by filling in the corresponding circle on your BROWN OPSCAN.

(1) (2) (3) (4)
DOES NOT APPLY APPLIES A GREAT DEAL

21. To please myself and important people in my life.
22. To avoid appearing incompetent to others.
23. To maintain my view of myself as a capable student.
24. To avoid losing the respect and approval of someone important to me.

Satisfaction With School

The following questions ask how satisfied or frustrated you feel with respect to school in general, your current academic performance in all your classes, and your performance in MATH 1211 or MATH 1521. Please mark your response on the BROWN OPSCAN using the scale below.

(1) (2) (3) (4)
STRONGLY DISAGREE DISAGREE AGREE STRONGLY AGREE

25. Trying to do well in all my classes is very frustrating.
26. All in all, I'm satisfied with my overall academic performance so far this quarter.
27. I feel frustrated that Virginia Tech professors don't take into consideration all of the competing demands placed on students.
28. Overall, I find my performance in MATH 1211/1521 to be quite satisfying at this point in time.
29. Being frustrated is a natural part of college student life.
30. Overall, I experience very little frustration with the course work required in MATH 1211/1521.
31. College student life is a satisfying and rewarding experience.
32. Trying to do well in MATH 1211/1521 is a very frustrating experience.

SELF-PERCEPTION QUESTIONNAIRE

The questions below ask how you perceive yourself on various aspects of your college experience. There are no right or wrong answers. Please respond to these questions honestly and completely as they pertain to you personally.

Use the following scale to indicate your response to each item on the BROWN OPSCAN.

1	2	3	4	5	6	7
NOT AT ALL AS I SEE MYSELF			SOMEWHAT SIMILAR TO HOW I SEE MYSELF			VERY MUCH AS I SEE MYSELF

35. To what extent do you see yourself as a high academic achiever?
36. To what extent do you see yourself as having made specific career plans?
37. To what extent do you see yourself as a participant in a wide range of activities?
38. To what extent do you see yourself as being organized and efficient?
39. To what extent do you see yourself as having achieved your personal goals?
40. To what extent do you see yourself and your actions as being guided by personal values?
41. To what extent do you see yourself as being well-liked and respected by your peers?
42. To what extent do you see yourself as having exerted sufficient effort to achieve your academic success?
43. To what extent do you see yourself as being committed to a specific career?
44. To what extent do you see yourself as being dependable in your interpersonal affairs?
45. To what extent do you see yourself as being an active participant in student organizations?
46. To what extent do you see yourself as being tolerant of the opinions and actions of others?
47. To what extent do you see yourself as fulfilling all your course requirements?
48. To what extent do you see yourself as being an active participant in community affairs?
49. To what extent do you see yourself as understanding the opinions and actions of others?
50. To what extent do you see yourself as being an active participant in political affairs?

PACKET THREE - BLUE "B"

Class Achievement Environment

INSTRUCTIONS: This questionnaire is in the same format as the one you completed earlier tonight. However, in this case, the questions pertain to a SPECIFIC CLASS, not to all courses in general. Therefore, please keep this in mind while answering the questions which appear below.

Some of you are enrolled in MATH 1211 or MATH 1521. If you are enrolled in both, then please choose which one to use as the REFERENCE for your answers. BEFORE YOU BEGIN, please mark which class you have in mind for the questions that follow at the top of the BLUE OPSCAN which you will use to mark your responses. Merely, write "MATH 1211" or "MATH 1521" at the TOP of the BLUE OPSCAN.

Also, if you did not do so earlier, go ahead and write your student ID number in the appropriate spaces of the BLUE OPSCAN.

TIME AVAILABILITY: Refers to the availability of time needed to perform student functions in that SPECIFIC CLASS, taking into consideration time limits, interruptions, unnecessary meetings, and distractions.

A. To do my work, TIME AVAILABILITY is:

81. UNIMPORTANT (1) (2) (3) (4) (5) (6) (7) IMPORTANT

B. Availability: TIME AVAILABILITY needed to perform as a student is:

82. UNAVAILABLE (1) (2) (3) (4) (5) (6) (7) AVAILABLE

83. OBTAINABLE (1) (2) (3) (4) (5) (6) (7) UNOBTAINABLE

C. Quality: The quality of the TIME AVAILABILITY I receive is:

84. USELESS (1) (2) (3) (4) (5) (6) (7) USEFUL

85. GOOD (1) (2) (3) (4) (5) (6) (7) BAD

D. Intensity: The effect that problems with TIME AVAILABILITY have on my performance as a student is:

86. STRONG (1) (2) (3) (4) (5) (6) (7) WEAK

E. Stability: The problems I encounter with TIME AVAILABILITY with respect to my performance as a student are:

87. LONG-LASTING (1) (2) (3) (4) (5) (6) (7) SHORT-LIVED

F. Generality: Problems in TIME AVAILABILITY affect my performance:

88. IN FEW SITUATIONS (1) (2) (3) (4) (5) (6) (7) IN MANY SITUATIONS

To what extent do you feel each of the following emotions with respect to your TIME AVAILABILITY circumstance? Please base your response on the scale below:

(1) (2) (3) (4) (5) (6) (7)
not at all a great deal

89. WORRIED

90. EAGER

91. ANXIOUS

92. FEARFUL

93. CONFIDENT

94. HOPEFUL

95. To what extent do you believe that you can do something to improve your circumstance with respect to TIME AVAILABILITY?

(1) (2) (3) (4) (5) (6) (7)

I doubt I can do anything about it

I am sure I can do something about it

96. With respect to TIME AVAILABILITY, I would say that compared to my peers, I am:

(1) (2) (3) (4) (5) (6) (7)

far better off

about the same

far worse off

PACKET FOUR - BLUE "C"

INSTRUCTIONS: This packet contains a series of questionnaires which ask what you did to deal with the problems you encountered for each resource variable. If you did not do so earlier, PLEASE CODE YOUR STUDENT ID NUMBER IN THE APPROPRIATE SPACES OF THE OPSCAN.

Ways of Coping Questionnaire

Now, for each of the resource variables you rated, we would like you to indicate to what extent you relied on various coping strategies to deal with the problems each resource variable posed for you. Use this scale to make your responses to each item.

(1)	(2)	(3)	(4)
DOES NOT APPLY	SELDOM	OCCASIONALLY	USED A
and/or	USED	USED	GREAT DEAL
NOT USED			

A) Indicate to what extent you used each of the following strategies with respect to the problems you may have had with STUDENT ROLE-RELATED INFORMATION.

1. Spoke to someone who could do something concrete about the problem (such as the course instructor, GTA, or parents).
2. Tried not to get too concerned about it.
3. I accepted the situation because there was nothing I could do to change it.
4. Devoted more time and energy to solve the problem.
5. Sought advice from people outside the situation who may not have had power but who could help me think of ways to do deal with it.
6. I set my own priorities based on what I like to do.
7. I reminded myself that my life shouldn't revolve around this problem.
8. I put extra attention on planning and scheduling.
9. I Talked with people who are involved in the problem besides my instructor, GTA, or parents.
10. Tried to see the situation as an opportunity to learn and develop new skills.
11. I anticipated the negative consequences so that I was prepared for worst.
12. I separated myself as much as possible from people who I felt created this problem.
13. I told myself that time takes care of situations like this.
14. I decided what should be done and explained this to people involved in the problem.
15. I tried to get additional people involved in the situation.

**The vita has been removed from
the scanned document**