Research Report

# LONGITUDINAL STUDY OF PROCRASTINATION, PERFORMANCE, STRESS, AND HEALTH: The Costs and Benefits of Dawdling

Dianne M Tice and Roy F. Baumeister

*Case Western Reserve University*

**Abstract**—*Procrastination is variously described as harmful, innocuous, or even beneficial Two longitudinal studies examined procrastination among students Procrastinators reported lower stress and less illness than nonprocrastinators early in the semester, but they reported higher stress and more illness late in the term, and overall they were sicker Procrastinators also received lower grades on all assignments Procrastination thus appears to be a self-defeating behavior pattern marked by short-term benefits and long-term costs*

Doing one's work and fulfilling other obligations in a timely fashion seem like integral parts of rational, proper adult functioning Yet a majority of the population admits to procrastinating at least sometimes, and substantial minorities admit to significant personal, occupational, or financial difficulties resulting from their dilatory behavior (Ferrari, Johnson, & McCown, 1995)

Procrastination is often condemned, particularly by people who do not think themselves guilty of it (Burka & Yuen, 1983, Ferrari et al , 1995) Critics of procrastination depict it as a lazy self-indulgent habit of putting things off for no reason They say it is self-defeating in that it lowers the quality of performance, because one ends up with less time to work (Baumeister & Scher, 1988, Ellis & Knaus, 1977) Others depict it as a destructive strategy of self-handicapping (Jones & Berglas, 1978), such as when people postpone or withhold effort so as to give themselves an excuse for anticipated poor performance (Tice, 1991, Tice & Baumeister, 1990) People who finish their tasks and assignments early may point self-righteously to the stress suffered by procrastinators at the last minute and say that putting things off is bad for one's physical or mental health (see Boice, 1989, 1996, Rothblum, Solomon, & Murakami, 1986 Solomon & Rothblum, 1984)

On the other hand, some procrastinators defend their practice They point out correctly that if one puts in the same amount of work on the project, it does not matter whether this is done early or late Some even say that procrastination improves performance, because the imminent deadline creates excitement and pressure that elicit peak performance "I do my best work under pressure," in the standard phrase (Ferrari, 1992, Ferrari et al , 1995, Lay, 1995) Even if it were true that stress and illness are higher for people who leave things until the last minute—and research has not yet provided clear evidence that in fact they both are higher—this might be offset by the enjoyment of carefree times earlier (see Ainslie, 1992)

The present investigation involved a longitudinal study of the effects of procrastination on quality of performance, stress, and illness Early in the semester, students were given an assignment with a deadline Procrastinators were identified using Lay's (1986) scale Students' well-being was assessed with self-reports of stress and illness The validity of the scale was checked by ascertaining whether students turned in the assignment early, on time, or late Finally, task performance was assessed by consulting the grades received Competing predictions could be made

Address correspondence to Dianne M Tice Department of Psychology, Case Western Reserve University 10900 Euclid Ave Cleveland OH 44106-7123, e-mail dxt2@po cwru edu

## STRESS AND ILLNESS

### Possible Costs

Procrastination has been linked to a variety of negative mental health variables Solomon and Rothblum (1984) found that procrastination was significantly correlated with depression, irrational beliefs, low self-esteem, anxiety, and poor study habits (Unfortunately the scale these authors used to measure procrastination operationalized it as dilatory behavior accompanied by negative affect about the dilatory behavior, leaving open the possibility that other people may procrastinate merrily without adverse effects, see Flett, Blankstein, & Martin, 1995 ) Lay, Edwards, Parker and Endler (1989) found that anxiety levels in procrastinators who have delayed studying are extremely high near the exam period, and Ferrari et al (1995) cited several similar findings from unpublished studies (see pp 29–30) Researchers have frequently found a link between dejection and procrastination, and Lay (1995) showed that dejection is an outcome of procrastination (rather than a cause) Flett, Blankstein, and Martin (1995) reported that scores on a procrastination scale were positively correlated with measures of perceived stress, negative life events, and daily hassles Thus, a variety of evidence suggests that procrastination is linked to negative mental health outcomes

### Possible Benefits

Procrastinators might claim that focusing on the last-minute efforts and stresses is misleading Yes, procrastinators may suffer more than other people at the last minute but that may conceal a pattern of stress suffered by nonprocrastinators who do their worrying and hard working earlier in the project period In this view, procrastinators may suffer late whereas others suffer early, but the total amount of suffering could be the same Indeed, it could even be that procrastinators suffer less, because they compress the stress into a short period

## PERFORMANCE

In principle, procrastination would not necessarily have any effect on task performance Whether a task is done far ahead of the deadline or only slightly ahead of it does not necessarily make any difference in the quality of the work Thus, there is a reasonable theoretical basis for the null hypothesis prediction that procrastination would not affect quality of performance Still, both procrastinators and their critics

  

ave proposed possible reasons why task performance may be affected

## Possible Costs

On the negative side, it seems plausible that procrastination could result in less effort on the task If the person underestimates how much time a task will take—a problem that is endemic to nearly all planning (Buehler, Griffin, & Ross, 1994) and perhaps especially to procrastinators (Aitken, 1982, cited in Ferrari et al , 1995, p 44, McCown, 1986)—the late starter may be unable to find the additional time required for success

Even if the estimate of time is accurate, the late starter may perform worse because unforeseen delays or obstacles arise Task-related setbacks (e g , computer difficulties) or extraneous interferences (e g , personal problems) may temporarily impair one's capacity to work, and if the project has been put off until the last minute, the result may be failure In contrast, if most of the work is already completed before the delay, or if the delay occurs when there is still plenty of time to finish, satisfactory completion of the task may still be possible

Moreover, performance may be worse under stress If the person performs the task with the deadline approaching and finds greater stress at that point, then he or she may suffer various negative effects of stress or pressure (e g , Amabile, DeJong, & Lepper, 1976, Baumeister, 1984, Glass, Singer, & Friedman, 1969)

## Possible Benefits

The negative effects of stress on task performance are not uniform, and it is possible that some people may not experience them Indeed, some forms of stress can improve performance (e g , Hanson, 1986) People who are not harmed by stress would have less reason to perform a task far ahead of the deadline, and self-selected procrastinators might well be such people

If one is not adversely affected by stress and pressure, then in some ways it makes sense to postpone the task until near the deadline Sometimes additional, useful information is made available only near the deadline Indeed, if one assumes that a student is learning new material all semester long, then he or she should be able to write a better paper at the end of the term than at the beginning

Another possible benefit of waiting is that efficiency may increase Some people may find that in the absence of external constraints, they waste time exploring tangential ideas and possibilities, and so they perform effectively and efficiently only under the discipline imposed by the deadline Others may find that without external constraints, they lack motivation to perform well, after all, a deadline is an important form of extrinsic motivation, and in the relative absence of intrinsic motivation, a deadline may be the main or sole motivator (see Amabile et al , 1976) The procrastinators' claim that they do their best work under pressure thus could have some justification

# STUDY 1

## Method

Participants were 44 students taking a health psychology course They volunteered

At the start of the semester, the due date for the term paper was announced, and students were also told that if they could not meet the deadline they could have an automatic extension to a specific later date Four weeks into the fall semester, participants filled out Lay's (1986) General Procrastination Scale For the next 30 days, they completed daily symptom checklists and weekly measures of stress and work requirements

At the end of the semester, the date that each student handed in the required paper was recorded (specifically, whether the paper was turned in early, on time, during the automatic extension of the deadline, or late) When students turned in their papers for the course, they were also asked to fill out a questionnaire reporting how relieved they felt about having completed the work

The instructor for the class did not have access to the students' self-report measures, so grading was blind to procrastination status In addition, participants were repeatedly assured that the instructor would not see the self-report measures This confidentiality helped ensure that the self-reports would not be contaminated by students' wishes to communicate anything (e g , excuses for poor performance) to the instructor Only after the semester was ended did the students who chose to allow their materials to be used in this study provide their names linked to their subject numbers so that grades could be matched to personality and health reports All students were fully debriefed

## Results and Discussion

### *Procrastination behavior*

Scores on the General Procrastination Scale were correlated with the date the paper was handed in, $r = .45$ Procrastinators turned in their papers significantly later than nonprocrastinators (Unless otherwise noted, all correlations are significant at $p < .05$ or better, with 42 degrees of freedom For ease of discussion, high scorers on the procrastination scale are referred to as procrastinators, and low scorers are referred to as nonprocrastinators ) Of the 7 students turning in their papers late (i e , after both the deadline and the extension), only 1 student scored below the median on the procrastination measure, and more than half scored more than one standard deviation above the mean procrastination score, confirming the validity of Lay's measure of procrastination

### *Grades*

Procrastinators received significantly lower grades than nonprocrastinators both on the term paper, $r = -.29$, and on the two exams, $r = -.64$

### *Health*

Procrastination scores were correlated with stress, $r = .29$, and symptom reporting, $r = .36$ The negative correlations mean that procrastinators experienced significantly less stress and fewer symptoms than nonprocrastinators Procrastinators also reported significantly more relief after turning in their papers than nonprocrastinators

Taken together, the pattern of results provides mixed evidence about the costs and benefits of procrastination Procrastinators received poorer grades but reported better health than nonprocrastinators Unfortunately, an alternative explanation for the health benefits of procrastination is possible given the timing of the data collection The health measures were completed in the early part of the semester,

whereas any adverse effects of procrastination on stress and health would presumably arise late in the semester Study 2 was conducted to investigate this possibility

## STUDY 2

Study 2 was designed to replicate the finding that procrastinators experience less stress and fewer symptoms of physical illness early in the semester and to determine whether this outcome reverses and procrastinators suffer poorer health as semester deadlines approach We predicted that the correlation between procrastination and illness would be negative early in the semester (replicating Study 1) but positive at the end of the term

### Method

Participants were 60 students taking a health psychology course They volunteered Two failed to complete the materials, and another took the class but declined to allow his or her data to be used for research, the data for these 3 students were dropped

The procedure for Study 2 was similar to the procedure for Study 1 except that students also filled out reports of any visits to health-care professionals and a number of additional questionnaires were administered in the last week of class Also, to provide converging evidence, we used the McCown and Johnson (1989, cited in Ferrari et al , 1995) measure of procrastination in addition to Lay's measure The final questionnaires were similar to the questionnaires completed in the first month of class Students reported the number of symptoms they had experienced in the past week, the amount of stress they had experienced in the week, and the number of visits they had made to the health-care center in the past month For health-care visits, we excluded routine visits such as for birth control or allergy shots

### Results and Discussion

All the findings for Lay's scale in Study 1 were replicated in Study 2 First, scores on this procrastination scale were correlated with behavioral procrastination (turning in the paper late), $r = .37$ (Unless otherwise noted, all correlations are significant at $p < .05$ or better, with 56 degrees of freedom ) Of the 6 students turning in their papers late (after both the deadline and the extension), only 1 student scored below the median on the procrastination measure, and two thirds scored more than one standard deviation above the mean procrastination score, confirming the validity of the scale Second, procrastination scores were negatively correlated with early symptom reports, $r = -.45$, and stress ratings, $r = -.31$ Thus, early in the semester, procrastinators experienced significantly less stress and fewer symptoms of physical illness than nonprocrastinators There was no relationship between procrastination and health-care visits during the first month of the semester, $r = .00$ Thus, procrastination seems innocuous or even beneficial to health early in the semester

Third, procrastination scores were negatively correlated with grades on the assigned paper, $r = -.26$, and with grades on the exams, $r = -.66$ Thus, procrastinators received significantly lower grades than nonprocrastinators on all tasks in both studies

The main contribution of Study 2 concerned health outcomes late in the semester (which had not been assessed in Study 1) As predicted, the seemingly beneficial relationship between procrastination and health was reversed at the end of the semester Procrastinators reported more symptoms, $r = .65$, more stress, $r = .68$, and more visits to health-care professionals, $r = .37$, than nonprocrastinators Procrastinators may enjoy a healthy, stress-free life when deadlines are far off, but they suffer more than other people when deadlines are imminent (see Fig 1)

It is of some interest to ask whether the late-semester costs of procrastination outweigh the early-semester benefits The present data do not offer a complete answer because health was not measured continually over the entire semester, and it is not possible to estimate at what point the shift from benefit to cost may have occurred Still it seems reasonable simply to add our data, weighting them so that the assessments of 30 days of early-semester health and 1 week of late-semester health would be equally represented Combining the data in that way yields the conclusion that procrastinators suffered significantly more symptoms, $r = .46$, and marginally significantly more stress, $r = .25$, than nonprocrastinators They also visited health-care professionals for illness more often, $r = .27$ In sum, combining all data in Study 2 leads to the conclusion that procrastinators were sicker than nonprocrastinators

Analyses were also computed using McCown and Johnson's Adult Inventory of Procrastination (AIP) instead of Lay's General Procrastination Scale The two scales were highly correlated with each other, $r = .86$, and results using the AIP were similar to those for Lay's scale The AIP was negatively correlated with symptoms and stress early in the semester, positively correlated with symptoms, stress, and clinic visits at the end of the semester, and positively correlated with total symptoms and clinic visits summed across all measurements It correlated negatively with exam grades and positively with date of handing in the term paper Thus, it too associated trait procrastination with better health early but poorer health later and overall, with poorer performance, and with lateness The only result not replicated significantly was the negative correlation between procrastination scores and

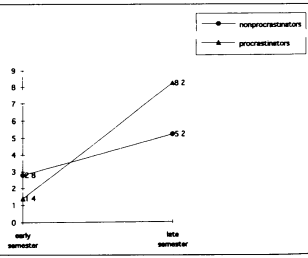


**Fig 1** Number of symptoms (per week) reported by procrastinators and nonprocrastinators in Study 2 Participants were categorized as procrastinators and nonprocrastinators based on a median split of Lay's General Procrastination Scale The numbers in the figure represent the mean number of symptoms reported each week by procrastinators and nonprocrastinators The mean score on the scale was 42 7 the median was 45, and the range was 18–63

rades on the term paper AIP scores did not correlate significantly ith term paper grades

## GENERAL DISCUSSION

The results of the present investigation shed light on the benefits and costs of procrastination As noted at the outset, there are plausible theoretical bases for a broad range of competing predictions about the effects of procrastination The results do not fully support any one view, and so a proper evaluation of procrastination may need to compromise between its sternest critics and its most optimistic apologists The main results can be summarized as follows

First, it appears that procrastination does bring short-term benefits to health Procrastinators do appear to benefit from the carefree, casual situation they create for themselves early in the project phase Nonprocrastinators get right to work on the project and apparently begin to suffer from the stress and health problems right away, too There are thus at least two significant benefits of procrastination, which are that stress is lowered and illness is reduced by putting off the task As long as the deadline remains remote, procrastinators are better off

Second, however, the stress and health benefits of procrastination are reversed as time goes by Toward the end of the project period, procrastinators reported greater stress and more illness than nonprocrastinators Thus, although procrastination may produce initial benefits, it produces significant costs later on, as the deadline approaches

Third, the cumulative effect of procrastination on stress and health, summed across early and late measures, is negative Total stress and illness are higher for procrastinators than for nonprocrastinators Or, to put it another way, the early benefits are outweighed by the later costs Procrastination does not simply shift the same amount of stress and illness from early to late in the project period, rather, it apparently increases the amount of stress and illness Further work to corroborate this finding is needed, however

Fourth, procrastinators end up producing inferior work The present studies found no support for the claim that procrastinators do better work because of motivational or other consequences of deadline pressure Rather, the present results are consistent with the view that postponing work on a project may lead to compromises and sacrifices in quality Procrastination is not a neutral or innocuous form of time management, let alone a helpful or beneficial one (as some people claim)

A potential alternative explanation for procrastinators' lower grades is that procrastinators are less intelligent or less talented students than others Several prior studies have refuted that suggestion, however, by showing no relation between procrastination and intelligence (Ferrari, 1991, Taylor, 1979), and occasional findings have even linked procrastination to higher scholastic aptitude scores (Aitken, 1982, cited in Ferrari et al , 1995, p 44) Hence, it seems most likely that the procrastination itself is to blame for the poor performance

It is worth emphasizing that the present findings are based on self-selection into procrastinator and nonprocrastinator groups Although self-selection weakens the causal inferences that could be made had there been experimental randomization, it increases some of the theoretical and practical importance of the results Thus, if the present study had shown that health and performance were impaired among people who had been randomly assigned to procrastinate, other procrastinators might object that they would not suffer the same fate Some procrastinators do in fact claim that they, unlike other people, benefit by doing their best work under last-minute pressure The present findings refute such a claim, however, Even people who freely choose to procrastinate and believe procrastination to be beneficial end up doing worse and being sicker than others

Limitations of this work must be acknowledged Without random assignment and experimental control, we cannot assert that procrastination causes the stress and health effects Our results are essentially correlational The possibility that procrastination causes stress that in turn causes illness is perhaps the most plausible account of our findings, but the data do not provide evidence regarding those possible causal relationships Furthermore, although high scores on the procrastination scales predicted turning the paper in late, we can only assume (as opposed to directly verifying) that the self-identified procrastinators actually did procrastinate on their assignments Apart from the two procrastination scales themselves, there is no way to differentiate among people who might have planned all along to do the work at the last minute, people who ended up working at the last minute because they just did not get around to working on their assignments (although they meant to), and people who may have ended up working at the last minute for other reasons (such as unexpected crises) All we can say is that self-identified procrastinators tended to work at the last minute (more than other students) and to suffer various consequences A final limitation is that the present studies used samples of university students Universities might conceivably cluster their deadlines more than other institutions (e g , at the end of the semester), thereby making procrastination more costly than would be the case if deadlines were diffused

## IMPLICATIONS

The present results suggest that procrastination should be considered as one category of self-defeating behavior because it apparently leads to stress, illness, and inferior performance It corresponds to the pattern of short-term gains and long-term costs, which is a common feature of self-defeating behaviors (Baumeister, 1997, Baumeister & Scher, 1988, Loewenstein & Elster, 1992, Platt, 1973)

Choosing short-term benefits over greater long-term ones is also a hallmark of poor self-regulation, a finding first identified by early studies of delay of gratification (Mischel, 1974, 1996) This pattern also extends to alcohol and drug abuse, violence, and other impulsive acts (see Baumeister, Heatherton, & Tice, 1994, for review) In view of the present findings, claims that procrastination is innocuous or beneficial appear to be rationalizations for self-indulgent behavior The present evidence suggests that procrastinators enjoy themselves rather than working at assigned tasks, until the rising pressure of imminent deadlines forces them to get to work In this view, procrastination may derive from a lack of self-regulation and hence a dependency on externally imposed forces to motivate work

An alternative view is that procrastinators sincerely but mistakenly believe that they can improve performance by such postponement According to this view, a procrastinator who has both the time and the inclination to work on the task far ahead of the deadline might still put it off, because of a sincere belief that he or she will perform better by waiting until later One might even admire the procrastinator for the willpower shown, while feeling sorry for the person because of the false assumption behind that exercise Still, there is little evidence to

support this view Correlational findings from questionnaire research point toward a deficit in self-control as the explanation Flett, Hewitt, and Martin (1995) found that procrastinators scored low on a measure of self-control, and Shouwenburg (1995) found that procrastinators reported poor work discipline Ferrari et al (1995, p 44) proposed that low Conscientiousness is the main Big Five characteristic of procrastinators

## CONCLUSION

Part of the appeal of procrastination may be that it confers genuine benefits in the short run Procrastinators may find that they feel better and are healthier when the deadline is far off and they postpone the task These benefits are eventually more than offset by the costs, however, because the stress and illness suffered by procrastinators late in the task exceed and outweigh the initial benefits Furthermore, procrastination appears to result in work of inferior quality

Thus, despite its apologists and its short-term benefits, procrastination cannot be regarded as either adaptive or innocuous Procrastinators end up suffering more and performing worse than other people

**Acknowledgments**—Findings from this article were presented at the annual convention of the American Psychological Society in San Francisco, June 1996

## REFERENCES

Ainslie G (1992) *Picoeconomics The strategic interaction of successive motivational states within the person.* Cambridge England Cambridge University Press

Amabile T M DeJong, W & Lepper M R (1976) Effects of externally imposed deadlines on subsequent intrinsic motivation *Journal of Personality and Social Psychology 34* 92–98

Baumeister R F (1984) Choking under pressure Self consciousness and paradoxical effects of incentives on skillful performance *Journal of Personality and Social Psychology 46* 610–620

Baumeister R F (1997) Esteem threat, self-regulatory breakdown and emotional distress as factors in self-defeating behavior *Review of General Psychology, 1* 145–174

Baumeister R F Heatherton T F & Tice D M (1994) *Losing control How and why people fail at self regulation.* San Diego Academic Press

Baumeister R F & Scher S J (1988) Self-defeating behavior patterns among normal individuals Review and analysis of common self-destructive tendencies *Psychological Bulletin, 104* 3–22

Boice R (1989) Procrastination busyness and bingeing *Behavior Research and Therapy 27* 605–611

Boice R (1996) *Binge writing and procrastination/blocking amongst new professors* Manuscript submitted for publication

Buehler R, Griffin, D & Ross M (1994) Exploring the 'planning fallacy Why people underestimate their task completion times *Journal of Personality and Social Psychology 67* 366–381

Burka, J B & Yuen L M (1983) *Procrastination Why you do it and what to do about it* Reading PA Addison Wesley

Ellis A & Knaus, W J (1977) *Overcoming procrastination.* New York Institute Rational Living

Ferrari J R (1991) Compulsive procrastination Some self-reported personality characteristics *Psychological Reports 68* 455–458

Ferrari J R (1992) Psychometric validation of two adult measures of procrastination Arousal and avoidance measures *Journal of Psychopathology & Behavioral Assessment 14* 97–100

Ferrari J R Johnson J L & McCown W G (Eds.) (1995) *Procrastination and task avoidance Theory research, and treatment* New York Plenum Press

Flett, G L Blankstein K R & Martin T R (1995) Procrastination negative self evaluation and stress in depression and anxiety A review and preliminary model In J R Ferrari J L Johnson & W G McCown (Eds.) *Procrastination and task avoidance Theory research and treatment* (pp 137–167) New York Plenum Press

Flett, G L Hewitt P L & Martin T R (1995) Dimensions of perfectionism and procrastination In J R Ferrari J L Johnson & W G McCown (Eds.) *Procrastination and task avoidance Theory research, and treatment* (pp 113–136) New York Plenum Press

Glass D C Singer J E & Friedman L N (1969) Psychic cost of adaptation to an environmental stressor *Journal of Personality and Social Psychology 12* 200–210

Hanson P G (1986) *The joy of stress* Fairway KS Andrews McMeel & Parker

Jones E E & Berglas S C (1978) Control of attributions about the self through self handicapping strategies The appeal of alcohol and the role of underachievement *Personality and Social Psychology Bulletin 4* 200–206

Lay C H (1986) At last my research article on procrastination *Journal of Research in Personality 20* 474–495

Lay C H (1995) Trait procrastination agitation dejection and self-discrepancy In J R Ferrari J L Johnson & W G McCown (Eds.) *Procrastination and task avoidance Theory, research and treatment* (pp 97–112) New York Plenum Press

Lay C H Edwards J M Parker J D A & Endler N S (1989) An assessment of appraisal anxiety coping and procrastination during an examination period *European Journal of Personality 3* 195–208

Loewenstein G & Elster J (Eds.) (1992) *Choice over time* New York Russell Sage

McCown W (1986) Behavior of chronic college-student procrastinators An experimental study *Social Science and Behavioral Documents 17* 133

Mischel W (1974) Processes in delay of gratification In L Berkowitz (Ed.) *Advances in experimental social psychology* (Vol 7 pp 249–292) San Diego Academic Press

Mischel W (1996) From good intentions to willpower In P Gollwitzer & J Bargh (Eds.) *The psychology of action* (pp 197–218) New York Guilford Press

Platt, J (1973) Social traps *American Psychologist 28* 641–651

Rothblum E D Solomon L J & Murakami, J (1986) Affective cognitive and behavioral differences between high and low procrastinators *Journal of Counseling Psychology 33* 387–394

Shouwenburg H C (1995) Academic procrastination Theoretical notions measurement and research In J R Ferrari J L Johnson & W G McCown (Eds.) *Procrastination and task avoidance Theory research and treatment* (pp 71–96) New York Plenum Press

Solomon L J & Rothblum, E D (1984) Academic procrastination Frequency and cognitive behavioral correlates *Journal of Counseling Psychology 31* 503–509

Taylor R (1979) Procrastination The personality and situational correlates of procrastination behavior for achievement tasks *Dissertation Abstracts International 40*(4) 1967B

Tice D M (1991) Esteem protection or enhancement? Self handicapping motives and attributions differ by trait self esteem *Journal of Personality and Social Psychology 60* 711–725

Tice D M & Baumeister R F (1990) Self esteem self-handicapping and self presentation The strategy of inadequate practice *Journal of Personality 58* 443–464

(RECEIVED 8/12/96, ACCEPTED 12/1/96)