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A META-ANALYIS OF THE EFFECTS OF COMPRESSED WORK WEEKS

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This study investigated the effects of compressed work weeks on organizational and employee variables. A thorough literature search located 47 studies dealing with compressed work week effects. Result counting and Hunter, Schmidt, and Jackson's (1982) meta-analytic procedures were applied to these studies. Results indicate that absenteeism, productivity, and job satisfaction are positively affected by the implementation of compressed work weeks.

The purpose of this investigation was to determine the effects of compressed work weeks on employees and organizations by examining existing empirical literature. A compressed work week (CWW) is an alternative work schedule in which a trade is made between the number of hours worked per day, and the number of days worked per week, in order to work the standard number of weekly hours in less than five days (Ronen and Primps, 1981). While there are many variations in scheduling, the most common compressed schedule is a 10-hour day, 4-day week, often designated as the 4/40.

To gain perspective on this alternative work schedule, a brief review of the history of the work week is presented. Today's work week of approximately five days and forty hours is in contrast to the situation of the late 1700s. It was then common to work a 14-hour to 16-hour day, six days per week (Via, 1939). American labor unions were taking a strong stand for a reduction in working hours by the 1830s, but management opposed the position on moral and economic grounds. Moral grounds because management believed that increased leisure would lead to mischievousness by workers and lead to the collapse of the American society. Economic grounds because management feared intolerable increases in the cost of production, leading to business failures with the consequence of mass unemployment (Poor, 1970). Despite this strong opposition, a 10-hour day was established for shipyard workers in Philadelphia (Hellriegel, 1972).

The next major shift in work hours took place in the 1890s. The first eight-hour day was obtained by craft workers in the construction industry in the larger cities. During the next thirty years a number of other unionized groups, such as garment, railroad, and steel workers, obtained the eight-hour day (Dankert, Mann, and Northrup, 1965).

The Ford Motor Company first adopted the five-day work week in 1927. Government legislation, such as the Walsh-Healey Public Contracts Act and the Fair Labor Standards Act, during the Great Depression provided the extra stimulus for acceptance of the five-day standard in American industry (Bloom and Northrup, 1969).

The first documented application of the four- day/forty-hour work week occurred in 1940 when Mobile and Gulf Oil Companies adopted the schedule. Interest in compressed work weeks developed rapidly in 1969 (Poor, 1970) and the number of converted companies also grew rapidly in the 1970s. Compressed work weeks grew four times as rapidly as the 16% overall employment growth between 1979 and 1985 (Smith, 1975).

Legal Issues

Legal issues concerning the number of hours worked and the rate of pay are major concerns. The Walsh- Healey Act put a cost burden on those firms that had a government contract over $10,000 because it required overtime to be paid for work after 8 hours in one day.

The Federal Employees Flexible and Compressed Work Schedules Act (1978) made it possible on a temporary, experimental basis, for Federal agencies to allow employees to choose to work more than 8 hours per day and/or 40 hours per week without paying them overtime, in exchange for granting employees scheduling flexibility. Subsequent legislation permanently authorized the use of flexible and compressed work schedules by Federal agencies but they continued to provide premium time-and-a-half pay when organizations required employees to work overtime.

The Department of Defense Authorization Act (1985) eliminated the requirement that Federal Government contractors provide premium pay for work in excess of 8 hours per day. All private employers must now provide premium pay only for work in excess of 40 hours per week, as provided by the Fair Labor Standards Act.

Meta-Analysis

Meta-Analysis is a collection of methods used to quantitatively accumulate results across studies. In this particular investigation, meta-analysis helped draw more accurate conclusions about inconsistent findings regarding the effectiveness of compressed work weeks. Traditional literature reviews can be highly influenced by the biases of the reviewer, may neglect large amounts of information provided in the original research reports, and imprecisely weight conclusions with regard to the amount of research covered. Thus, statistical techniques of accumulation were used as an alternative to the literature review.

Method

Selection of Studies

A review of 186 studies from the past 21 years was undertaken using the Social Science Citation Index, Psychological Abstracts, Business Periodicals Index, and references from previous review articles and books. From this pool, 51 studies were found usable. The vast majority of the empirical literature is descriptive in nature, based primarily on single case studies and relies heavily on anecdotal reports. A rigorous appraisal can only conclude that there is questionable validity in the findings reported to date. In fact, most of the reports are characterized by a simplistic and subjective conclusion of "we tried it, and we liked it".

Analytic Procedures

Counting Method - One method of meta-analysis that was used was a simple voting or counting procedure. With this method, the number of companies in the studies finding criteria (i.e. absenteeism) to be positively affected with the compressed work week schedule was compared to the number of companies that found criteria to be negatively affected or not affected at all. This method was needed for those studies that indicated anecdotal reports of the results of the implementation of the compressed work week schedule. The voting method has considerable appeal; however, it does not take into account the level of significance of the reported effects.

Effect Size Computation - Hunter, Schmidt, and Jackson's (1982) meta-analytic procedures were applied to the results of 15 studies that denoted appropriate test statistics which were able to be formulated in achieving the average effect size of absenteeism, productivity, and job satisfaction data on compressed work weeks. The effect size was computed for all criterion in the studies and were weighted by the sample size. Thus, results from larger samples were given larger weights because they were considered to be more reliable estimates of the population parameter.

After computing the weighted mean and variance of the sample effects sizes, the sampling error variance was computed. If the statistical artifacts accounted for less than 75% of the observed variance, then criterion data was split on the basis of hypothesized moderator variables and the meta-analysis was repeated. Moderators that were coded were date of the study, job type, number of employees, sex, age, marital status of the employees, industry class, and union or nonunion companies.

The 95% confidence interval was then computed to determine the significance of the finding. If the confidence interval included zero then the computed d may have been due to chance. The mean effect size was then categorized according to the table developed by Cohen (1969) and concluded as having a small, medium, or large effect.

Results

Table 1 shows the effect compressed work weeks have on absenteeism. To account for additional observed variance, the criterion had to be split according to the moderator variable of date of the studies.

Studies from the 1980's indicated a mean effect size of .57 with all observed variance accounted. Since all the observed variance was accounted for, the 95% confidence interval is .57. Thus, compressed work weeks have a moderate effect on reducing absenteeism in the 1980s.

The mean effect size = .32 for the studies in the 1970s with only 36% of the observed variance accounted for by sampling error. These results indicate that 36% of the variance in effect sizes across these studies was due to sampling error; the other 64% was due to a combination of error of measurement, restriction of range, other artifacts, or real differences between some of the studies. The 95% confidence interval of -.03 to .67 includes zero which indicates that the effect may be due to chance. It seems as though compressed work weeks in the 1970s had less of an effect on reducing absenteeism than in the 1980s. The mean effect size of .32 is a small effect.

Table 1

Summary Table for Absenteeism

	Study Date	
Summary Variable	1970's	1980's
Number of Studies	3	2
Sample Size	714	657
Mean Effect Size	.32	.57
Effect Size Variance	.0477	.0051
Sampling Error	.017	.013
Sampling Error %	36%	100%
90% Confidence Interval		
Lower Bound	-.03	.57
Upper Bound	.67	.57

Table 2 shows the effect compressed work weeks have on productivity. Job type was found to be a moderator variable. The criterion was split into blue-collar and white-collar employees. The mean effect size for blue- collar employees is .10, which is a small effect. Sampling error accounted for 93% of the variance. The 95% confidence interval ranges from .04 to .16. The mean effect size of compressed work weeks on white collar employees is .80 which is a medium effect. Results indicated that 47% of the variance was due to sampling error and 53% is still not accounted for. The confidence interval ranges from .41 to 1.19.

Table 3 indicates that compressed work weeks increase job satisfaction for the majority of employees, but in firms where 5-100 employees are on a compressed work week, only 19% of the variance was attributed to sampling error. It has a large mean effect size of 1.16 and the confidence interval has a wide range of .06 to 2.26, but does not include zero.

Table 2
Summary Table for Productivity

Summary Variable	Job Type: Blue Collar	Job Type: White Collar
Number of Studies	6	2
Sample Size	2717	238
Mean Effect Size	.10	.80
Effect Size Variance	.0095	.0768
Sampling Error	.0088	.0363
Sampling Error %	93%	47%
95% Confidence Interval		
Lower Bound	.04	.41
Upper Bound	.16	1.19

The mean effect size for firms of 101-250 employees that utilize a compressed work week is a medium effect of .77 with all variance accounted for. These results indicate that job satisfaction increased by a significant amount after implementation of a compressed work schedule.

Table 4 indicates single studies on other criterion that compressed work weeks effected. Hodge (1975) reports that commuting costs, time, and problems reduced after implementation of a 4/40 schedule with an effect size of .16.

Table 3
Summary Table for Job Satisfaction

Summary Variable	Company Size: <100	Company Size: >100
Number of Studies	3	2
Sample Size	192	330
Mean Effect Size	1.16	.77
Effect Size Variance	.3812	.0085
Sampling Error	.0730	.0260
Sampling Error %	19%	100%
90% Confidence Interval		
Lower Bound	.06	.77
Upper Bound	2.26	.77

Table 4
Effect on Other Measures

Study	Measure	n	d
Hodge (1975)	Commuting	223	.16
Hodge (1975)	Fatigue	223	-.35
Bus Week (1971)	Overtime	250	.22
Crowder (1982)	Sick Leave	154	.29

Hodge (1975) also reported an increase in employee fatigue after implementation of the 4/40 schedule. Other anecdotal reports also support this finding. The mean effect size of compressed work week on fatigue is -.35.

Business Week (1971) reported a decrease in overtime in a police department of an effect size of .22. Crowder (1982) reported a decrease in sick leave in a police department. Sick leave decreased by an effect size of .29 after implementation of a compressed work schedule.

Table 5 shows the results of the counting method of meta-analysis. After implementation of the compressed work week, there are increases in employee fatigue, job satisfaction, productivity, and easier organizational recruiting. There are decreases in absenteeism, turnover, and overtime.

Table 5
Counting Method Review

Measure	# Studies	Study Result: Increase	Study Result: Decrease
Fatigue	6	4	2
Satisfaction	37	37	0
Productivity	42	42	0
Absenteeism	34	0	34
Turnover	20	0	20
Recruiting	21	21	0
Overtime	4	0	4

Table 6 shows the reported percentage of employees that were satisfied with the compressed work week. The total number of employees included is n = 3,864. The mean percentage of employees satisfied with the 10-hour schedule is 88%. Only one report was found for the satisfaction with the 12-hour schedule and the number of employees is n = 850 and a satisfaction percentage of 78%. Both of these figures are relatively high indicating that employees are satisfied with compressed work week schedules.

Table 6

Percent of Employees Satisfied with Compressed Work Weeks

Study	Sample	Percent
Goodale (1975)	474	78%
Moore (1987)	140	74%
Bekassy (1981)	1400	94%
ENR (1971)	600	97%
Levy (1972)	400	97%
Dacri (1985)	850	78%
TOTAL	3864	
MEAN	644	86%

Conclusion

The results of the present study indicate that compressed work weeks are positively correlated with employee absenteeism, productivity, job satisfaction, turnover, commuting costs, sick leave, and easier organizational recruiting. Employee fatigue was shown to be a disadvantage in the implementation of compressed work weeks. The data from six studies that showed the percentage of employee satisfaction with compressed work weeks indicate that employees are generally very satisfied with the work schedule.

The lack of longitudinal studies on the long term effects of compressed work weeks was recognized as a weakness due to the possibility of Hawthorne effects. The long term effects may show the employee measures lessen as the novelty of the new work schedule diminishes.

Another weakness of this investigation is the lack of statistical evidence concerning the effects of compressed work weeks. As stated earlier, only 15 studies from the pool of 51 were able to be converted to standardized effect sizes. Additional research needs to be conducted in substantiating other criteria that are effected with compressed work weeks, such as employee fatigue, overtime, sick leave, commuting costs, equipment utilization, scheduling, and customer service.

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