Electronic Performance Monitoring: A Quantitative Review of Computer-Based Surveillance Research

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ABSTRACT

This meta-analysis examined a number of outcome variables of interest (stress, justice perceptions, affective reactions, and job performance) for computer-based electronic performance monitoring. The results of the meta-analyses revealed that more experimental research is needed in order to get a better picture as to the strength and direction of electronic performance monitoring's effect on employee behavior.

INTRODUCTION

Statement of Purpose

- This study reports the results of a meta-analysis on electronic monitoring/surveillance
- The purpose of this meta-analysis is twofold:
  1. To summarize computer-based electronic performance monitoring research with experimental designs (i.e., comparisons of conditions with monitoring versus those without monitoring)
  2. To gain a fuller picture of electronic performance monitoring's cumulative impact

Electronic Performance Monitoring

- Electronic performance monitoring (EPM) can be defined as the "computerized collection, storage, analysis, and reporting of information about employees' productive activities" (OTA, 1987)
- Computers have been increasingly used by organizations and many organizations have made the decision to monitor their employees via computerized means
- Many researchers have discussed how EPM may affect behavior and attitudes, though no quantitative summary of the literature exists despite a large number of qualitative reviews
- This study will address this gap by summarizing several thematic topics within EPM research via meta-analysis

Dependent Variables

- Stress
  - EPM is thought to increase stress compared to non-monitored environments
- Procedural Justice
  - EPM use by managers is frequently postulated as having a negative impact on justice perceptions
- Affective Reactions
  - EPM implementation is often portrayed as unwanted by employees
- Performance
  - EPM may track performance behaviors effectively, though it is unclear whether it enhances or detracts from task performance

METHOD

- Literature search
  - A total of 117 articles on EPM were identified from database searches and available conference proceedings
    - 57 of these studies were reports of empirical research on EPM; of these, 29 had experimental designs involving computer-based EPM that reported adequate statistics for calculation of effect sizes
    - Where applicable, *r*, *t*, and *F* statistics were converted to *d* using formulas from Hunter & Schmidt (2004)
    - A separate meta-analysis was conducted for each DV

METHOD

- Meta-analytic strategy
  - Due to the small number of experimental studies for each DV, a "bare bones" meta-analysis was conducted using the uncorrected *d* statistic as an indicator of effect size
    - A meta-analytic *d* is a *n*-weighted standardized mean difference statistic and is expressed in standard deviation units
  - Random effects meta-analytic models were assumed
    - i.e., Studies are not necessarily representative of a simple population with one mean effect size
    - Allows conceptual inference into larger population of effect sizes (Kisamore & Brannick, 2008)

METHOD

- Random-effects variance component (*REVC*)
  - Defined by the formula

$$REVC = Var(d) - Var(e)$$

    where *Var(d)* is observed variance and *Var(e)* is the estimated sampling error (Hunter & Schmidt, 2004)
  - As *REVC* diverges from zero, a meta-analytic mean statistic becomes an increasingly poor summary of effect sizes
    - Small *REVC* values indicate a phenomenon is well understood; large *REVC* values indicate unknown moderators may be at work and more research is needed (Kisamore & Brannick, 2008)

RESULTS

- **Stress** (k = 7, N = 1374)
  - Uncorrected d_{avg} = 0.206
    - 95% CI: -0.085 < d < 0.497
    - N_{avg} = 196
  - *Var(d)* = 0.155
  - *Var(e)* = 0.020
  - *REVC* = 0.134

RESULTS

- **Procedural Justice** (k = 3, N = 438)
  - Uncorrected d_{avg} = 0.306
    - 95% CI: 0.013 < d < 0.599
    - N_{avg} = 146
  - *Var(d)* = 0.067
  - *Var(e)* = 0.028
  - *REVC* = 0.039

RESULTS

- **Affective Reactions** (k = 7, N = 1274)
  - Uncorrected d_{avg} = 0.305
    - 95% CI: 0.016 < d < 0.594
    - N_{avg} = 182
  - *Var(d)* = 0.152
  - *Var(e)* = 0.022
  - *REVC* = 0.130

RESULTS

- **Performance** (k = 12, N = 1014)
  - Uncorrected d_{avg} = 0.059
    - 95% CI: -0.160 < d < 0.279
    - N_{avg} = 85
  - *Var(d)* = 0.151
  - *Var(e)* = 0.047
  - *REVC* = 0.104

DISCUSSION

- The meta-analyses reported in this study showed that there is likely significant variability across studies, especially in stress and performance
  - Cannot assume any application of monitoring will have negative *or* positive effects on stress or performance outcomes
- EPM appears to significantly affect procedural justice and affective reactions, though *REVC* values still suggest sampling error

IMPLICATIONS

- The lack of a strong meta-analytic conclusion, coupled with the relatively low *k* per DV, suggests that more experimental research on the effect of EPM is desperately needed to gain a fuller picture of its impact on employees
  - Existing studies may not be representative of possible universe of studies (Schulze, 2007)
- Future research should seek to identify moderator variables when more primary studies are available to allow identification of subpopulations
  - Search for moderator variables within extant literature may be inappropriate without more primary studies

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