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A Systematic Quantitative Review of Effective Implementation of Self-Monitoring (1983-2020)

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A Systematic Quantitative Review of Effective Implementation of Self-Monitoring

(1983-2020)

by

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Abstract

Title: A Systematic Quantitative Review of Effective Implementation of Self-Monitoring

(1983-2020)

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A systematic quantitative review was conducted to analyze articles using self-monitoring in the Journal of Organizational Behavior Management (JOBM) from 1983 to present. Specifically, the diversity of characteristics used when implementing a self-monitoring procedure were examined along with the effects produced in order to determine the most effective components of a self-monitoring intervention. Results indicate a combination of other interventions are used substantially more compared to self-monitoring as a sole intervention. Moreover, results from this particular sample of studies demonstrated that a combination of variables led to more consistent effects than when self-monitoring was applied as a sole intervention. However, there is insufficient data to draw firm conclusions. Recommendations for future research are provided.

Keywords: self-monitoring

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Dedication

I would like to dedicate my thesis to my parents and sister, who always encouraged me to pursue resilience. I would also like to dedicate this thesis is Ms. Green, who gave me the intellectual skills to pursue a higher level of education and always encouraged me to “rise”.

Chapter 1: Self-monitoring and Self-Management

Organizational behavior management (OBM) is a subfield of Applied Behavior Analysis that uses behavior analytic principles to pinpoint behaviors and modify environmental variables in order to enhance employee performance (Wilder et al., 2009). Perhaps due to its cost effectiveness, and ease of implementation, one area that has received a growing interest within the OBM literature has been self-management (Godat & Brigham, 1999). Skinner (1953) defined self-management as a method to teach individuals to change variables in their environment that effect their own behavior. Self-monitoring is often used in conjunction with other self-management procedures (Watson & Tharp, 1993). Self-monitoring has been defined as a procedure that involves repeatedly observing and recording one's own behavior for the purpose of continued self-evaluation (Olson & Winchester, 2008). Along with "Self-monitoring," authors frequently use the term behavioral self-monitoring (BSM), which, according to Olson and Winchester (2008) involves recording and analyzing aspects of one's own behavior as the behavior occurs in real time. Once an individual identifies a behavior that requires change, they can then begin to analyze the antecedents that occur before the behavior, as well as the consequences that occur after the behavior. It is then possible to modify the antecedents and consequences to make the desired behavior more likely to occur

through self-management (Watson and Tharp, 1993). There does not seem to be a clear definition discriminating the distinct differences between self-monitoring, behavioral self-monitoring, and self-recording, all terms which have been used to describe a form of monitoring one's own behavior. All, however, are frequently acknowledged to be integral to the self-management process (Godat & Brigham, 1999; Hickman & Geller, 2005; Watson & Tharp, 1993).

Self-monitoring has shown substantially improved results for behaviors occurring in both clinical and workplace settings. Examples of when BSM is used in clinical settings include work with panic and anxiety disorders (Craske & Tsao, 1999), habit and tic disorders (Himle et al., 2008), and in exploring healthy eating behaviors (Tinker et al., 2001). While self-monitoring was effective in the studies mentioned, Craske and Tsao (1999) suggest self-monitoring should have a more "standardized" definition in order to keep pre-treatment and post-treatment evaluations more consistent (p. 467).

Effective Self-Monitoring

There are several steps embedded in the self-monitoring process in order to increase its effectiveness. The first step includes the identification of specific behaviors in order to provide operational definitions to participants throughout the study (Cervone & Wood, 1995). The next step requires recording baseline data on previously defined behaviors to ensure they are occurring at undesired levels, as well identifying antecedent, behavior, and consequence (ABC) data on the

behaviors of interest (Cormier & Cormier, 1991). After identifying a behavior, the individual must ensure the behaviors are specific, feasible, socially valid, measurable, and are behaviors the individual is motivated to change (Olson & Winchester, 2008). The next step is observing and recording the individual's own behavior during the intervention phase, which typically requires the participant to undergo a training session on how to self-monitor (Kirschenbaum et al.,1982).

Self-monitoring has been used in a variety of formats and is not always effective at maintaining desired performance (Dunlap & Dunlap, 1989; Woods et al., 1996). Due to this limitation, Watson and Tharp (1983) provide precise recommendations for increasing the reliability of the self-monitoring process. These recommendations include: engaging in direct observation in real time as the behavior is occurring, operationally defining the target behavior(s) to minimize confusion, using a recording method that is fairly simple to reduce response effort, using discriminative stimuli as a cue to record the target behaviors, and keeping the recording method in close proximity to where the behavior occurs as another discriminative stimuli. Some other suggestions include counting behaviors in real time, remaining accurate in frequency data collection, and lowering response effort by making the environment as similar to the natural setting as possible. Additionally, Foster et al., (1999) recommend emphasizing the importance of being truthful when participating in this intervention, considering self-report measures can be easily falsified.

Other techniques to improve self-monitoring effectiveness include recording data in short intervals in order to record desired behaviors exactly as they have occurred (Babor et al., 1990; Olson & Winchester, 2008). Several researchers also recommend that individuals using self-monitoring should be able to choose their own behaviors and create ways to improve them in their own way in order to ensure motivation for behavior change (Godat & Brigham, 1999; Watson & Tharp, 1993; Yates, 1985). Despite these helpful insights, the recommendations for enhancing self-monitoring vary based on previous studies, indicating a lack of knowledge regarding the most impactful way to self-monitor.

Package Interventions

Along with the definition, self-monitoring procedures can also vary. Thus, the most effective components of self-monitoring remain unclear. Perhaps one reason is due to combining the self-monitoring intervention into a package. Once a target behavior has been identified, there are other interventions that can be combined with self-monitoring to further enhance its effects. For instance, among other interventions, self-monitoring has been used in combination with checklists (Rose & Ludwig, 2009), feedback (Krigsman & O'Brien, 1988), and goal-setting (Caplin et al., 1988). Interventions are frequently introduced as a package to increase the likelihood of desired effects (Wilder et al., 2009). However, while the effects may potentially be enhanced when using packaged interventions, it should also be noted that using multiple independent variables can have drawbacks. For

instance, when a packaged approach is used in combination with an intervention such as self-monitoring, this can undermine the primary benefit of self-monitoring which is its ease of use and cost effectiveness. From a research standpoint, because the interventions are introduced as part of a package, there are limits to the conclusions that can be drawn. While the package may prove to be effective, the effect of each intervention component in isolation remains unclear. Furthermore, when a robust package is used, one cannot make firm conclusions regarding the effects of a less comprehensive version of the package.

Although self-monitoring has been shown to be effective in previous literature, results are variable when it is used as a sole intervention (Gravina et al., 2008). More commonly it has been shown to be most effective when used as a multifaceted approach (Hickman & Geller, 2003; McCann & Sulzer-Azaroff, 1996; Olson & Austin, 2001). For instance, Gaetani and colleagues (1983) observed the most favorable results when implementing a multifaceted approach that consisted of self-time logging (self-monitoring) and data plotting (graphic feedback) when attempting to decrease tardiness in a business setting.

Rationale for Study

While additional intervention components may enhance its effects, as mentioned, there are drawbacks. When an intervention, such as self-monitoring, is rarely evaluated by itself, it is difficult to conclude the effects it would have as a sole intervention. It could be that self-monitoring is an unnecessary part of a

treatment package, and desired behaviors would occur regardless of the self-monitoring component. Alternatively, self-monitoring could be effective on its own, making the other intervention components unnecessary. With this in mind, identifying which components within treatment packages tend to lead to the most consistent and robust effects could ultimately save money, time, and response effort. Previous literature suggests a paucity of research on self-management as a sole intervention and recommends a component analysis (Arnold & VanHouten, 2020; Caplin et al., 1988; Petscher & Bailey, 2006).

Similar to the search for the most effective method for implementing self-monitoring, a literature review on feedback by Alvero and colleagues in 2001 determined that certain characteristics of feedback tended to lead to more consistent desired results than others. The authors also examined the effects of feedback when it was combined with other interventions (e.g., antecedent, consequences, etc.) This literature review was invaluable in that it provided Organizational Behavior Management (OBM) researchers and practitioners with a better understanding of the characteristics of effective feedback as well as interventions that should supplement feedback. Future research could take a similar approach with self-monitoring. Such a review would likely be particularly valuable given that many individuals turn to self-monitoring for its ease of implementation and cost-effectiveness. Therefore, having a better understanding of which intervention

components are necessary depending on the behavior and which may not be necessary could be helpful in designing the most cost-effective intervention.

The lack of self-monitoring research outside of treatment packages, indicated in previous literature, could be due to the hypothesis that self-monitoring is ineffective by itself. For example, in a study Belfiore and colleagues (2008) conducted, after self-monitoring was implemented, behaviors failed to maintain over time. Petscher and Bailey (2006) reported similar results in that there was a decrease in desired behaviors during the maintenance phase, with a return to higher levels once treatment was reinstated. Another study by Woods and colleagues (1996) using self-monitoring also failed to maintain across students who were monitoring their motor tics. Woods and colleagues (1996) suggested this could be due to a lack of motivating operations to comply with the self-monitoring procedure. These package interventions could be more popular due to the assurance that the intervention will be effective, which is especially valuable in an applied setting, but this leaves a gap in the research literature. Results show self-monitoring alone does not always promote consistent behavior change, especially if the individual is not highly motivated to engage in the target behavior (Woods et al., 1996). However, results could depend on a variety of factors.

Additionally, even if self-monitoring was determined to be ineffective as a standalone intervention, it would be helpful to know which intervention combinations tend to produce the most consistent effects. Moreover, perhaps the

effects of self-monitoring are enhanced based on the types of behaviors that are being assessed. Therefore, it would also be interesting to examine the effects of self-monitoring and various intervention combinations along with the types of behaviors that are being targeted. For instance, perhaps one would find that self-monitoring alone tends to produce consistent effects for behaviors that are countable or discrete versus behaviors that are continuous. It is possible that for self-monitoring to be effective, the behavior being targeted must be specific, or, if it is not specific, self-monitoring may be effective if it is preceded with self-monitoring training. Overall, the research on self-monitoring effectiveness as a sole intervention or in combination with other interventions shows mixed results, indicating a need to further investigate the level of effectiveness self-monitoring can have on dependent variables. Moreover, some research suggests certain components of intervention packages are best disseminated for select settings and behaviors.

Types of Behaviors

Self-management can be impactful on both a small and larger company-scale. Even though self-management is an individual method of teaching, it is possible for multiple employees to simultaneously engage in their own self-monitoring behaviors. Godat and Brigham (1999) evaluated the effectiveness of introducing a self-management training for thirty-three employees at a mid-sized organization. Results showed 31 out of the 33 participants benefited from the

training (Godat & Brigham, 1999). Some of the behaviors targeted during this study were the number of compliments delivered, number of minutes spent on personal phone calls, and number of negative responses to coworkers. There were a total of 20 different dependent variables treated using self-monitoring across all participants. This study is valuable because it highlights the diversity of behaviors that are able to be self-monitored.

It is very likely that employees at a larger organization may benefit from a more individualized approach in order to increase desired behaviors. However, research has not been explored to assess whether some behaviors would benefit more or less from self-monitoring based on their characteristics (continuous, ill-defined dependent variables versus discrete, well-defined dependent variables). Specifically, more complex behaviors such as back posture (Gravina et al., 2008), productivity (Harris, 1986), on-task behavior (Richman et al., 1988), tidying (Rose & Ludwig, 2009), and verbal behavior (Copeland, 2018) may be more difficult to self-monitor compared to other behaviors such as number of clips wires (wires used to clip equipment in a factory setting) lost (Krigsman & O'Brien, 1988), number of minutes late arriving to work (Gaetani et al., 1983), and number of direct client hours (Caplin et al., 1988).Therefore, the behaviors best chosen to self-monitor may depend on the complexity and operational definition of dependent variables for self-monitoring to be effective, but previous research does not appear to investigate this hypothesis.

Purpose

There are several patterns shown in previous literature on self-monitoring. This independent variable has been found to be an effective intervention when combined with a treatment package including other interventions such as feedback and supervision but is not commonly evaluated on its own. Additionally, there are some behaviors in which self-monitoring might not be as effective, such as complex behavior or behaviors that are not well-defined. These discrepancies suggest a need for an in-depth review of the self-monitoring literature to determine which characteristics lead to the highest level of effectiveness. However, there is not enough data to suggest the effectiveness of self-monitoring without additional components. The most common recommendation for future research in the analyzed literature was to conduct a component analysis in order to determine each intervention's effectiveness and how they contribute to the change in dependent variables. This review analyzed each of these gaps in past studies in order to identify the most effective characteristics/components, combinations, and behaviors to target when implementing a self-monitoring intervention. The main purpose for this review was to analyze the most effective way to self-monitor. Some of the questions that were addressed included: Is self-monitoring effective enough on its own or does there need to be other interventions paired with it? Are there some behaviors that would benefit more from using self-monitoring than others? All of

these questions will be further analyzed as common trends in the literature are described.

Chapter 2: Method

Article Selection

All studies in The Journal of Organizational Behavior Management (JOBM) were reviewed by the Primary Researcher and a Research Assistant to identify articles using self-monitoring/self-management procedures as independent variables either alone or in combination with other interventions in an applied or analogue workplace setting. Settings such as classrooms or in-home services were excluded from this review. Any studies that appeared in the search results that were not published in JOBM were excluded from further investigation. This exclusion allowed studies that solely focused on workplace setting behaviors (i.e. cleaning, timeliness, posture) to be evaluated, rather than also including more clinical applications of self-monitoring (i.e. treatment of weight loss, problem behavior)The keywords searched were “self-monitoring” and “journal of organizational behavior management” and “self-management” and “journal of organizational behavior management” using the database PsycINFO. Out of that search criteria, all studies in which the words “self-monitoring” or “self-management” were used in the abstract or procedures section were included in the review. Overall, 13 articles were yielded from the database search that met the aforementioned inclusion criteria (See Appendix A).

Data Collection

Each article was then categorized based on several characteristics, including the application in which self-monitoring was used, the setting in which the study took place, the consistency of effects, the characteristics used to describe self-monitoring, the time when self-monitoring occurred, the characteristics of the dependent variables, and if self-monitoring training was included prior to any intervention phases. The coding methods used were similar to those used by Alvero et al. (2001), specifically the application code and consistency of effects code. Furthermore, it should be noted that, some studies evaluated self-monitoring/self-management in its own phase before implementing a treatment package. For this reason, each application of self-monitoring was evaluated on its effectiveness. Table 1 shows each category of codes used to evaluate these articles. The information provided below describes the definitions of each code in further detail.

Key Word Used in Abstract

Recorded word used in abstract to describe independent variable.

Application

Similar to Alvero et al. (2001), an application of self-monitoring was defined as each separate intervention condition that included self-monitoring somewhere within the intervention. Baseline phases and intervention phases that did not include self-monitoring (either alone or in combination with other independent variables) were not considered an application of self-monitoring.

Overall Applications of Self-Monitoring

Alone Only Evaluated. For all phases that assessed self-monitoring within a single study, self-monitoring was always assessed alone, and it was never combined with any other interventions. In other words, there was never a phase that assessed self-monitoring in combination with another independent variable throughout the entire duration of the study.

Combination Only Evaluated. For all phases that assessed self-monitoring, self-monitoring was always assessed in combination and it was never assessed alone. In other words, there was never a phase that assessed self-monitoring alone throughout the entire duration of the study.

Alone Plus Combination Evaluated. Self-Monitoring was evaluated on its own in one or more phases, but self-monitoring was also assessed in combination with one or more interventions in a separate phase at some point in the study.

Self-Monitoring Application Alone or Combination Within Phases

Alone. For each specific phase or application in which self-monitoring was applied, self-monitoring was evaluated on its own and was not combined with any other interventions. Combination.

For each specific phase or application in which self-monitoring was applied, self-monitoring was assessed in combination with one or more interventions. In

other words, self-monitoring was combined with at least one or more other interventions.

Setting

The setting of the study was also categorized according to whether the study was conducted in an applied or laboratory setting.

Consistency of Effects

As mentioned, the codes for consistency of effects were similar to Alvero et al. (2001) and are described in more detail below:

Consistent. The effects of the intervention were coded as consistent if the author(s) used the term "effective" or "consistent" mean increase in desired behaviors across all participants/settings/behaviors in the results or discussion section. If this criterion was not able to be applied, the graph must have demonstrated an increase in mean level of the last three data points from the previous phase compared to the last three data points in the current phase across all participants/settings/behaviors with no over-lapping data points and the data had to show increases in the desired direction.

Mixed. The effects of the intervention were coded as mixed if the author(s) use the term "effective" or "consistent" mean increase in desired behaviors across some of the participants/settings/behaviors in the results or discussion section. If this criterion was not able to be applied, the graph must have demonstrated an increase in mean level of the last three data points from the previous phase

compared to the last three data points in the current phase across some, but not all, of the participants/settings/behaviors. Additionally, this code was used when results did not maintain higher than baseline levels.

No Effect. No effect was reserved for when the author(s) reported no mean increase in desired behaviors across all participants/settings/behaviors. If this criterion was not able to be applied, the graph must not have demonstrated an increase in mean level of the last three data points from the previous phase compared to the last three data points in the current phase across any participants/settings/behaviors.

Definition of Self-Monitoring

Record. The term record was used as a code for all applications of self-monitoring in which there was a form/document in which behavior was collected/recorded by the participants.

Antecedent. The term antecedent was used to denote all applications of self-monitoring in which a beep, or some form of antecedent, was used to function as a prompt right before the participants were expected to engage in the self-monitoring behavior.

Checklist. The term checklist was used to describe all applications in which a form of a checklist/check sheet/charge ticket was used to record self-monitored behaviors.

Time Self-Monitoring Occurred

Each application was also assessed based on the time in which self-monitoring occurred. Each category and its corresponding definition are provided below:

Immediate. Self-monitored behavior recorded in the moment the behavior was occurring (or within five minutes) of it having occurred.

Later. Self-monitoring occurred at the end of a shift or designated time period that was not immediately after the behavior had been performed.

Unspecified. The time in which the participants observed/engaged in the behavior and recorded behavior was not specifically mentioned in the study.

Type of Dependent Variable

Each application was also assessed based on the type of dependent variable that was being addressed according to how it was described to the participants who were engaging in self-monitoring behavior. Each category and its corresponding definition are provided below:

General. Dependent variables did not use any type of measurement metric such as time, frequency, percent correct, or duration and were not countable.

Specific. Dependent variables did use a measurement metric such as time, frequency, percent correct, or duration and were countable.

General Plus Specific. Dependent variables that used both general and specific characteristics. Specifically, this included describing a behavior to

participants without using any type of measurement, while also describing another behavior using a countable metric.

Self-Monitoring Training

Reviewers also coded each application according to whether training had been provided.

Unspecified. Unspecified was reserved for when the authors did not specify whether or not training had occurred.

No. Each application was coded as not including training if the word "training" was not used in the study

Yes. Training was coded as having been provided if the word "training" was used in the study.

Chapter 3: Interobserver Agreement

Prior to conducting interobserver agreement (IOA), the Research Assistant went through a training process during which the Primary Researcher used Behavioral Skills Training to ensure efficient and accurate codes. This process included instructions in the form of a task analysis that broke down each code with definitions, examples, and non-examples (See Appendix B). Additional instructions were provided for a particularly difficult category to code in the form of a job aid (See Appendix C). Then, the Primary Researcher modeled the approach to coding by demonstrating how to find the information in the article and then ultimately what information in the article led to the chosen code. Next, a rehearsal portion was implemented in which the Research Assistant practiced coding articles using examples pulled from previous literature. This process occurred across multiple articles with in-vivo feedback provided until codes were reported accurately 90% of the time across three instances.

Following training, the Research Assistant evaluated 31% of the articles that were selected and coded by the Primary Researcher to collect IOA data. These articles were randomly selected. Trial-by trial IOA was then calculated for each of the following categories: key word, definition of self-monitoring, time of occurrence, general or specific dependent variables, setting, whether training occurred, combinations or alone applications of self-monitoring throughout the

entire study and within each phase, and application effects. Interobserver agreement on codes labeled in each category mentioned above was calculated by dividing the total number of agreements by the number of agreements plus disagreements on each category within each study (Kazdin, 2011). The mean score for reliability from the initial IOA data was 81.8% (range = 50-100). After IOA was calculated, the Primary and Secondary Researchers discussed disagreements regarding some of the categories. Specifically, only the Primary Researcher had access to both coding sheets, the Secondary Researcher only had access to their own coding sheet during this process. In order to further strengthen the IOA data, the Secondary Researcher was asked to re-code one article, and additional articles were selected for IOA. Following the initial coding, the Research Assistant evaluated 46% of the articles that were selected and coded by the Primary Researcher. IOA was collected for 46% of the articles reviewed. The mean score for reliability was 89.4% (range = 66.7-100.)

Chapter 4: Results

A total of 13 studies were reviewed which included 23 applications overall. As mentioned, applications within each study that did not include self-monitoring, such as a baseline phase or a training phase, were not included in the 23 applications. Table 1 shows all variables assessed during this review.

Article Publication Date and Setting

Table 2 depicts the number of studies published prior to 2000 and during the year 2000 or later, as well as the setting in which each study took place. Considering all the studies analyzed (N = 13), less than half (n = 5) were published prior to 2000 while the remaining studies (n = 8) were published between 2000-2020. Additionally, the majority of studies (n = 11) were conducted in an applied setting with few (n = 2) conducted in a laboratory setting.

Overall Applications of Self-Monitoring

Figure 1 represents the type of applications used across studies. Out of 13 studies included in the review, no studies assessed the application of self-monitoring alone throughout the entire duration of the study. In other words, while self-monitoring may have been assessed as a sole intervention in at least one application within the study, all studies (N = 13) always included at least one or more applications in which self-monitoring was assessed in combination with other variable(s). Specifically, slightly over half, (n = 8) used a combination of

interventions along with self-monitoring, and the remaining (n = 5) used both a combination of interventions and also assessed self-monitoring alone at some point in the study.

Application and Effects

Figure 2 shows the type of application used along with the effects produced. Of the 23 applications, the majority (n =18) assessed the effects of self-monitoring in combination with one or more other variables while a more modest number (n =5) assessed the effects of self-monitoring alone. Considering the effects of the applications that used self-monitoring in combination (N = 18), the majority (n = 11) produced consistent effects, while the remaining led to mixed effects (n =6) and no effects (n =1) respectively. Of those studies in which self-monitoring was evaluated alone (N = 5), the inverse was found to be the case, with the majority producing mixed effects (n = 4) and the remaining indicating consistent effects (n = 1).

Definition of Self-Monitoring and Effects

Figure 3 illustrates the characteristics used to describe self-monitoring and the effects produced. Out of the total applications (N = 23), a small portion (n = 5) included checklist in the operational definition of self-monitoring, fewer (n = 4) included an antecedent, and over half (n = 14) met the aforementioned criteria for record. Out of those (N = 5) that defined self-monitoring through the use of a checklist, only a small number (n = 1) demonstrated consistent effects, the majority

(n = 3) led to mixed effects, and the remaining (n = 1) produced no effects. Considering the applications that included an antecedent (N = 4), only one produced consistent effects, and the remaining (n = 3) experienced mixed effects. Alternatively, defining self-monitoring as record led to the most consistent effects with substantially more than half (n = 10) of the 14 applications producing consistent effects and the remaining (n = 4) suggesting mixed effects.

Time Self-Monitoring Occurred and Effects

Figure 4 shows the time in which participants were instructed to engage in self-monitoring and the effects produced. Out of the total applications (N = 23), a modest number (n = 3) did not specify the latency between engaging in the target behavior and recording the target behavior. Many (n = 8) instructed that self-monitoring could be completed later, and the majority (n = 12) required immediate self-monitoring. Considering the effects based on time in which the self-monitoring occurred, all three of the unspecified applications produced consistent effects. Of the later applications (N = 8), slightly under half (n = 3) produced consistent effects and slightly over half (n = 5) produced mixed effects. Of the immediate applications (N = 12), half (n = 6) suggested consistent effects, and slightly under half (n = 5) led to mixed effects, with the remaining (n = 1) producing no effects.

Type of Dependent Variable and Effects

Figure 5 shows the characteristics of the dependent variables as described to the participants and the effects produced. Considering the total (N = 23)

applications, a small number (n = 2) reported both general and specific dependent variable characteristics. Over half (n = 14) reported only specific dependent variable characteristics, and a moderate portion (n = 7) reported only general dependent variable characteristics. Of the general and specific (N = 2), the results were either mixed or no effects. Considering those applications in which the dependent variables were described to be specific (N = 14), over half (n = 9) produced consistent effects and the remaining (n = 5) produced mixed effects. Of the applications in which the dependent variables were described to be general (N = 7), slightly under half (n = 3) produced consistent effects and slightly over half (n = 4) resulted in mixed effects.

Self-Monitoring Training and Effects

Figure 6 depicts the reporting of training as being present (Yes), absent (No), or not reported (Unspecified) and the effects produced. Out of the total (N = 23) applications, many (n = 8) were unspecified, none (n = 0) reported that training was absent, and over half (n = 15) indicated that training was present. Of the unspecified (N = 8), the majority (n = 5) suggested consistent effects, while few led to mixed (n = 2) and no effects (n = 1) respectively. Of the (N = 15) applications that indicated that training was present, slightly under half (n = 7) produced consistent effects and slightly over half (n = 8) produced mixed effects.

Self-Monitoring Training and Dependent Variable Characteristics and Effects

To assess the effects of dependent variable type (General vs. Specific) as a potential moderator for training effects, these two variables were examined together. Figure 7 represents the type of dependent variable along with reported training and the effects produced. Out of the total (N = 23) applications, only one application (n =1) was coded as general and did not specify whether training had been provided. Only one application (n = 1) included dependent variables that were both general and specific and did not specify whether training had been provided. Few applications (n = 5) included dependent variables that were specific and did not specify whether training had been provided. No applications (n = 0) included dependent variables that were general and no training. Few applications (n = 6) included dependent variables that were general and specified the presence of training. No applications (n = 0) included dependent variables that were specific and also did not specify the presence of training. Finally, the majority of studies (n = 9) included dependent variables that were determined to be specific and specified the presence of training. Considering the effects of training and dependent variable type, the focus will be on those categories that contained at least five or more applications. Of those applications in which the dependent variables were coded as specific and the training was unspecified (N = 5), the majority (n = 4) resulted in consistent effects, while only one resulted in mixed effects. For those in which the dependent variables were determined to be general and training was provided (N =

6), a modest number (n = 2) led to consistent effects while more (n = 4) produced mixed effects. Finally, considering the applications that involved both specific dependent variables and the presence of training (N = 9), slightly over half (n =5) resulted in consistent effects while the remaining (n = 4) produced effects that were mixed.

Applications and Dependent Variables Used and Effects

To assess the effects of dependent variable type (General vs. Specific) as a potential moderator for the effects of self-monitoring as a sole intervention, these two variables were examined together. Figure 8 shows the type of dependent variables along with the type of application (Combination or Alone) and effects produced. Out of the total (N = 23) applications analyzed, slightly under half (n = 10) used self-monitoring in combination with one or more other variables and also used specific characteristics when describing the dependent variable to the participants. Only one (n =1) used self-monitoring in combination and included both general and specific dependent variables. Only one application (n = 1) used self-monitoring alone and dependent variables that were both general and specific. A modest amount (n = 6) used self-monitoring in combination with one or more variables and included dependent variables that were general. Few (n = 3) assessed self-monitoring alone with dependent variables that were specific. Finally, the remaining few (n = 2) examined self-monitoring alone with dependent variables that were general. Considering the combined effects of application type and

dependent variable type, the focus will again be on those categories that contained at least five or more applications. Of the applications that assessed Combination and Specific (N = 10), the majority (n = 7) produced consistent effects while few (n = 3) had mixed effects. Alternatively, of the applications that included Combination and General (N = 6), half (n = 3) produced consistent effects and the remaining half (n = 3) demonstrated mixed effects.

Chapter 5: Discussion

This review analyzed the different variables implemented within each application of self-monitoring (or phase in which self-monitoring was applied) and the effects produced. The main purpose was to determine the most effective ways to self-monitor. Applications of self-monitoring were examined across each of the 13 studies and then each of the 23 applications of self-monitoring within each study. Figure 1 demonstrates the breakdown of the 13 studies using self-monitoring alone or in combination with other variables. Alternatively, Figures 2-8 show the effects within each of the 23 applications in which self-monitoring was used. This form of coding was done to show the different effects produced per application of self-monitoring because it was hypothesized that these differences would have an effect on the results produced. The goal of this coding process was to explore patterns that could indicate the most effective methods for implementing self-monitoring in a workplace setting.

Publication Date and Setting

Table 2 reflects the diversity in publication date in JOBM concerning the self-monitoring literature. Based on these data, there was an increased number of studies using self-monitoring published in the past 20 years. A majority of the studies analyzed (62%) were published between 2000-2020, compared to the other 38% of studies published prior to 2000. This could indicate a heightened interest in

self-monitoring as a performance improvement tool. From the articles reviewed, 85% were applied studies compared to lab studies. This could suggest that self-monitoring can be commonly used in a workplace setting.

Overall Applications of Self-Monitoring

Of the 13 studies, over 60% assessed self-monitoring combined with other variables across all applications. Less than 40% included applications in which self-monitoring was assessed alone, but there were always additional interventions present in the following phases. However, none of the studies assessed self-monitoring as the only intervention across all applications within the study. Figure 1 demonstrates the gap that exists in the literature evaluated regarding self-monitoring. These data suggest a lack of studies evaluating the effects of self-monitoring as a primary intervention.

One potential reason for this could be the lack of evidence supporting that self-monitoring is effective on its own. Specifically, there are few research studies that use self-monitoring as the only intervention, and therefore, make evaluating self-monitoring effectiveness as a sole intervention difficult. Consistent with previous literature, self-monitoring can be defined in a myriad of ways (e.g., some include only recording and monitoring behavior while others include graphic feedback and rewards). Another reason could be due to previous studies using self-monitoring and the results of these studies not producing robust effects (Hickman & Geller, 2005). A final reason could be that previous literature has shown mixed

results regarding the effectiveness of self-monitoring not only as an intervention, but also being used as the sole intervention of an experiment. While self-monitoring is commonly used as part of a treatment package, the effects are not always consistent with an increase in desired behavior across all participants, behaviors, and settings. Perhaps self-monitoring is not evaluated alone because there is little research analyzing the effects of self-monitoring alone. However, there are several benefits of using self-monitoring alone, including a reduction in cost and time.

Application and Effects

Recall that in order to assess the effects of each application of self-monitoring, the findings were categorized as consistent, mixed, or no effect. In order for an application to be coded as consistent, results must have demonstrated an increase in mean level for desired behavior among all participants compared to the previous phase. For an application to be categorized as mixed, the data must have shown an increase in mean level for desired behavior among some, but not all participants compared to the previous phase. No effect was used when none of the participants experienced an increase in mean level.

To review, the category “combination” was defined as self-monitoring implemented with at least one other independent variable. Alternatively, the category “alone” was reserved for all applications in which self-monitoring was

used by itself, which excluded other independent variables, such as prompts or supervisor feedback (Arnold & VanHouten, 2020).

Across all 23 applications, the most common application of self-monitoring used a combination of self-monitoring combined with other independent variables compared to using self-monitoring as the sole application with nearly 80% of the studies using a combined approach. One reason could perhaps be due to the fact that a combination approach tended to lead to more consistent effects. Studies that used applications with self-monitoring as a combination also reported more consistent effects compared to mixed or no effects. When self-monitoring was used alone, there were more mixed effects reported than consistent effects. Another reason for this could be due to an absence of self-monitoring training that is replaced with a prompt as a part of the self-monitoring process. Additionally, recall that there were also less studies that assessed self-monitoring alone compared to self-monitoring in combination with other interventions. This could indicate the need for more studies that evaluate self-monitoring as a sole intervention in order to conduct a more complete analysis of its effects.

Definition of Self-Monitoring and Effects

To recap, self-monitoring was defined as a process in which the participants either only recorded the desired behavior, used a checklist to self-monitor, or used an antecedent intervention. The most common characteristic of self-monitoring as described to participants involved the observing and recording of behavior.

Specifically, 61% of studies emphasized a recording process rather than a checklist or an antecedent intervention, such as vocal or auditory prompt. Of the studies using self-monitoring with antecedents or as a checklist, none reported consistent effects, while 71% of studies coded as record reported consistent effects.

This could suggest that using self-monitoring along with additional variables such as prompts, or a checklist does not increase the value of self-monitoring rather than simply observing and recording behavior. One reason for this could be that including additional components other than the observing and recording of behavior may decrease the accuracy of or compliance with the self-monitoring process. Specifically, as the number of tasks to engage with increases (i.e. complete the task, listen for the prompt, reference the checklist, record on the checklist, go back to engaging in the behavior all within a short period of time), accuracy or compliance may decrease. If only recording was used, this simplified process could potentially lead to more consistent effects and would also decrease response effort for both researchers and participants. This, however, is only one theory and would need to be explored through research.

Time Self-Monitoring Behavior Occurred and Effects

Based on the studies evaluated, latency to self-monitor was classified as immediate, later (end of day/shift), or not specified based on how the participants were instructed to self-monitor. Over half of the applications had a latency that was immediate, with 50% of those applications reporting consistent effects.

Alternatively, the majority of the applications that had a latency of later (63%) had mixed effects while only 36% yielded consistent effects. One reason for this could be the likelihood of participants' compliance and accuracy of self-monitored behavior to be recorded directly after engaging in the behavior. Interestingly, even though only 13% of studies did not specify the latency to self-monitor, 100% of articles within this category produced consistent effects. However, it is important to keep in mind that this was a very small number (3) and thus firm conclusions cannot be drawn. Additionally, while patterns are able to be observed within the data by examining the time self-monitoring occurred and its effects, it should be noted that, given that other variables varied across applications along with time, (e.g., combination or alone, type of dependent variable, etc.), firm conclusions cannot be drawn. However, observing such patterns is intended to aid in the development of future research questions which can be explored more directly through more controlled studies.

Type of Dependent Variable and Effects

Across all studies, the dependent variables were defined in a measurable way that led to effective data collection. However, not all of those dependent variables were defined in that same way to the participants who were engaging in the self-monitoring behavior. For this reason, the types of dependent variables were coded based on how they were presented to participants as either specific (e.g., wash dirty dishes under water at 105 degrees Fahrenheit for 30 seconds on each

side and place in dishwasher) or more general definitions (e.g., clean the dishes). The hypothesis was that participants who were given ways to measure the desired behavior in a specific countable format with clearly defined instructions of what, when, and how often to self-monitor would produce more consistent effects.

More than half of the applications used specific definitions when instructing participants on the data collection process of self-monitoring. Of those studies, 64% produced consistent effects. Only one study used both general and specific definitions when describing self-monitoring, and no consistent effects were produced. One reason for this could be more detailed instructions of the self-monitoring process could function as an informal way to train participants as they engage in the behavior. This indicates a need for a measurable data collection process for not only researchers, but also participants engaging the the self-monitored behavior.

Notably, Figure 5 indicates that the definitions of self-monitoring don't need excessive information when describing how to engage and record a certain behavior. Based on the data, specific characteristics of the dependent variables were all that was necessary, excluding the addition of more general/unmeasurable characteristics. However, more studies need to be evaluated using these combined characteristics in order to further evaluate the implications of the definition of self-monitoring and the effects it produces. Additionally, it is important to re-emphasize that while patterns are able to be observed within the data by examining the type of

dependent variable as it was described to the participants, given that other variables varied across applications along with the type of dependent variable, firm conclusions cannot be drawn. However, as mentioned, seeing this pattern is intended to aid in the development of future research questions which can be explored more directly through controlled studies.

Self-Monitoring Training and Effects

Data were collected based on whether self-monitoring training was explicitly present, absent, or unspecified. A majority of studies (65%) reported that they conducted training while the rest (35%) did not specify. Interestingly, for the applications that included training, the results reported the same number of mixed effects as consistent effects. However, as mentioned this was only a small sample and other variables also varied along with the presence of training. Thus, it would be interesting to explore the impact of training more directly. For the 35% of applications in which training was unspecified, the majority produced consistent effects. It is possible that training may have been occurring and was not reported or was not occurring and was therefore not reported. Either way, identifying these procedures could provide beneficial information. If training is not necessary in order to produce consistent effects, this would allow researchers to focus on other components of the procedure. If training is necessary to produce consistent effects, it should be included in all self-monitoring studies in order to ensure the highest

level of effectiveness. It is also possible that the presence of training may depend on the type of dependent variable being assessed.

Self-Monitoring Training and Dependent Variable Characteristics

Figure 7 demonstrates the combination of two categories, training and dependent variable characteristics. The coding process for these categories was the same as discussed previously. The types of dependent variables along with the presence or absence of training was assessed across applications. While there were seven different categories, the most common was specific dependent variables and training and the reported the same number of consistent and mixed effects. Given the small number of applications in each category no firm conclusions can be drawn. However, it would be interesting to specifically assess if the need for training varies based on dependent variable type.

Applications and Dependent Variables

Figure 7 combined two categories, Application and Dependent variables. The coding process for these categories was the same as discussed previously. Types of dependent variables were coded along with the type of application used in order to look for trends in the data with respect to specific or general dependent variables when implemented with only self-monitoring or as part of a package intervention. Results show the most common categories were self-monitoring used in a combination with specific and general dependent variables. Specifically, 43% were coded as combination and specific and 26% were coded as combination and

general. The majority of these demonstrated consistent effects (specifically seven of the 10). Applications in which self-monitoring was used alone with specific dependent variables made up 13% and with general dependent variables made up less than 1%. One reason for this could be that combination was more popular across both types of dependent variables. Another reason could be the lack of studies evaluating self-monitoring alone. These data suggest there are not enough opportunities for self-monitoring alone to show if effects are consistent.

Limitations

The primary limitation of the study is the correlational data collected rather than using an experimental design. The way the data are analyzed separates several different components from each study and reports the effect. This led to less certain conclusions considering there were many different components throughout the studies that could have had interactive effects in order to produce consistent effects. For instance, researchers were looking at the latency to self-monitoring and the effects it had on behavior, however, given that researchers were looking across different applications, other variables varied that could have affected the effectiveness of the self-monitoring process. Thus, firm conclusions can be drawn. That being said, this approach to data collection was purposeful in order to show the variability present among self-monitoring studies regarding which components are present when implementing the intervention. Now, hypotheses can be formed and explored in future studies.

Another limitation was the unequal distribution of codes within each category. While there is no method to control for this, the variability in number of variable types within each application makes it difficult to determine correlation effects. For example, there were substantially more consistent effects produced when a combination of interventions (18) was used instead of using self-monitoring alone, however, there were substantially less studies in which self-monitoring was used alone (5). If there was an equal representation of studies only using self-monitoring compared to self-monitoring in a treatment package, a more accurate correlation may be identified regarding consistent effects.

Another limitation of the study is the number of articles reviewed. There were only 13 that met criteria in JOBM. The reason JOBM was the focus of this review was to analyze self-monitoring studies exclusively in a workplace setting. In future reviews, other journals could be reviewed that use self-monitoring in other settings, such as the Journal of Applied Behavior Analysis (JABA), Behavior Analysis and Practice (BAP), and the Behavior Analyst Today (BAT).

A final limitation involved the lack of direct assessment for the dependent variables. Rather than categorizing the specific type of behaviors used, researchers coded according to how the behavior was operationally defined to the participants regarding data collection because it was hypothesized that a more specific operational definition of any behavior would lead to more consistent effects. Thus, it is unclear whether some behaviors are more effective when using a self-

monitoring tool. Future studies should explore in more depth the types of behaviors in which self-monitoring is more or less useful as an intervention.

Recommendations and Future Research

There are several recommendations for future research based on the findings reported, which involve: the design used when implementing self-monitoring, the statistical analysis when reporting consistent effects, the number of studies reviewed, assessing additional components, assessing specific types of dependent variables, and the maintenance of self-monitoring.

Gravina and colleagues (2008) along with several other authors (Arnold & VanHouten, 2020, Caplin et al., 1988; Rodriguez et al., 2006) recommend self-monitoring being evaluated using a component analysis rather than a treatment package. Results from this review suggest this recommendation still needs to be considered in future studies. Moreover, this experimental design could provide causal results as opposed to the correlational data used in the current study.

It is difficult for a self-monitoring literature review to analyze studies that use the same type of dependent variables and equal numbers of intervention components in order to report a mean that accurately reports the distribution of components used and that produces consistent effects in studies using self-monitoring. A weighted mean may be beneficial for future researchers if they continue to analyze the most effective components of self-monitoring interventions. This type of calculation allows the data to show what percent each component

analyzed contributes to the mean number. For example, if five studies used specific variables and 15 studies used more general dependent variables and produced consistent effects, the data could show the mean as well as a percentage to show a majority of the studies used dependent variables, rather than an equal number of specific and general dependent variables across all studies.

Future literature reviews could also assess the correlational effects of additional variables such as compliance data, accuracy data, and the function of self-monitoring, noted by other authors (Copeland, 2018; Gravina et al., 2008; Gravina et al., 2013; Hickman & Geller, 2005; Olson & Austin, 2001). Based on the data, a further analysis of the function of self-monitoring, as well as the value of accuracy training and compliance data may have on self-monitoring is an essential next step in future research.

For authors who are interested in using self-monitoring in combination with other dependent variables, it could be beneficial for a review to include which specific independent variables are best used to enhance the effects of self-monitoring. As mentioned, a more detailed method for reporting the specific behaviors that were used as dependent variables may also be worthwhile to assess in future research. This was not accomplished in the current literature review, as the primary focus was examining the effects of other variables.

While it is imperative to assess the most effective ways to implement self-monitoring as the primary intervention, once this is accomplished, self-monitoring

should be evaluated as a maintenance tool. Arnold and VanHouten (2020) recommended this be done once the participant is trained and can consistently monitor their own behavior. This could be beneficial to other interventions in which maintenance data is a consistent limitation due to response effort or generalization issues.

Finally, patterns in the data concerning the different variables and effects from the present literature review are intended to assist researchers in developing future hypotheses that can be explored through more direct methods. Using a combination of variables appeared to be associated with more consistent effects for this particular small sample. Immediacy of the self-monitoring may be a factor for consideration. It also may be helpful to use a more specific versus general dependent variable, on as one consideration. Future research is needed to assess each of these variables through an experimental design in order to draw firm conclusions.

Conclusion

Based on the present literature review, while self-monitoring used in a combination yielded a higher number of consistent effects compared to when it was implemented as a sole intervention, there are not enough opportunities to evaluate effects of self-monitoring alone. There were consistent effects produced when self-monitoring was used alone, but there were not the same number of opportunities for this type of implementation to be equally compared to self-monitoring used in a

treatment package or with other independent variables. Especially because there were no studies only using self-monitoring as the sole intervention, all studies had used self-monitoring as part of a packaged intervention.

There seems to be a definition of self-monitoring that yielded more consistent effects compared to others, further emphasizing the need to operationally define self-monitoring not only to researchers, but also to participants engaging in the recording process of the self-monitoring behavior. If the definition of self-monitoring was clearer, this could lead to more consistent effects, or at least a clear discrimination between the different characteristics included in the self-monitoring process across studies.

The shorter latency of self-monitoring seems to yield more consistent effects, however, there were a number of studies that produced consistent effects but did not specify when the recoding of the self-monitored behavior took place. This indicates a need for researchers to specify when this recording process is occurring. Procedures need to include more specific times to record behaviors when instructing participants in order to access if latency to self-monitor contributes to effects of the intervention.

More specific dependent variables, as described to participants using a countable method of data collection was associated with more consistent effects compared to general descriptions and definitions of dependent variables. This

should be further evaluated across specific behaviors and not just the way in which the behavior is described.

Interestingly, those that specified whether training occurred did not produce more consistent effects than mixed effects, but those that did not specify produced the most consistent effects. None of the studies reported no training, which indicates that under-reporting of training could be occurring. Some authors suggest training in compliance, accuracy, and overall procedures leads to more enhanced effects (Gravina et al., 2013). This should be further evaluated in future studies.

In conclusion, the purpose of this study was to identify the most effective components of a self-monitoring intervention, as well as what characteristics are commonly used when implementing this type of independent variable. Results indicate a need for an increase in studies using self-monitoring as the sole intervention or as a part of a component analysis. Self-monitoring is a cost effective, individualized, and low response effort skill that can be generalized across most settings, behaviors, and participants. Considering that all studies reviewed used an application of self-monitoring combined with other interventions, even those that had applications of self-monitoring alone, suggests there is a need for additional variables when implementing self-monitoring. Identifying if/what additional variables are necessary for the effectiveness of self-monitoring to occur will be an invaluable discovery for behavior analysis, as well as other productivity measurement tools.

References

Arnold, M. L., & VanHouten, R. (2020). Increasing Following Headway in a Driving Simulator and Transfer to Real World Driving. *Journal of Organizational Behavior Management*, 1-19. http://dx.doi.org.portal.lib.fit.edu/10.1080/01608061.2020.1746475

Alvero, A. M., Bucklin, B. R., & Austin, J. (2001). An objective review of the effectiveness and essential characteristics of performance feedback in organizational settings (1985-1998). *Journal of Organizational Behavior Management, 21*(1), 3-29. https://doi.org/10.1300/J075v21n01_02

Babor, T. F., Brown, J., & del Boca, F. K. (1990). Validity of self-reports in applied research on addictive behaviors: Fact or fiction? *Behavioral Assessment, 12*(1), 5-31. https://search-proquest-com.portal.lib.fit.edu/docview/617758254?accountid=27313

Belfiore, P. J., Fritts, K. M., & Herman, B. C. (2008). The role of procedural integrity: Using self-monitoring to enhance discrete trial instruction (DTI). *Focus on Autism and Other Developmental Disabilities, 23*(2), 95-102. http://dx.doi.org.portal.lib.fit.edu/10.1177/1088357607311445

Calpin, J. P., Edelstein, B., & Redmon, W. K. (1988). Performance feedback and goal setting to improve mental health center staff productivity. *Journal of Organizational Behavior Management*, *9*(2), 35-58. http://dx.doi.org.portal.lib.fit.edu/10.1300/J075v09n02_04

Cervone, D., & Wood, R. (1995). Goals, feedback, and the differential influence of self-regulatory processes on cognitively complex performance. *Cognitive Therapy and Research, 19*(5), 519-545. http://dx.doi.org.portal.lib.fit.edu/10.1007/BF02230512

Copeland, J. E., Ludwig, T. D., Bergman, S., & Acikgoz, Y. (2018). Increasing Sales by Managing the Interlocking Contingencies Between Sales Representatives and Customers Using Behavioral Self-Monitoring. *Journal of Organizational Behavior Management*, *38*(2-3), 116-143. http://dx.doi.org.portal.lib.fit.edu/10.1080/01608061.2017.1423147

Craske, M. G., & Tsao, J. C. I. (1999). Self-monitoring with panic and anxiety disorders. *Psychological Assessment, 11*(4), 466-479. http://dx.doi.org.portal.lib.fit.edu/10.1037/1040-3590.11.4.466

Dunlap, L. K., & Dunlap, G. (1989). A self-monitoring package for teaching subtraction with regrouping to students with learning disabilities. *Journal of Applied Behavior Analysis, 22*(3), 309-314. http://dx.doi.org.portal.lib.fit.edu/10.1901/jaba.1989.22-309

Foster, S. L., Laverty-Finch, C., Gizzo, D. P., & Osantowski, J. (1999). Practical issues in self-observation. *Psychological Assessment, 11*(4), 426-438. http://dx.doi.org.portal.lib.fit.edu/10.1037/1040-3590.11.4.426

Gaetani, J. J., Johnson, C. M., & Austin, J. T. (1983). Self-management by an owner of a small business: Reduction of tardiness. *Journal of Organizational Behavior Management*, *5*(1), 31-39. http://dx.doi.org.portal.lib.fit.edu/10.1300/J075v05n01_04

Godat, L. M., & Brigham, T. A. (1999). The effect of a self-management training program on employees of a mid-sized organization. *Journal of Organizational Behavior Management*, *19*(1), 65-83. http://dx.doi.org.portal.lib.fit.edu/10.1300/J075v19n01_06

Gravina, N. E., Loewy, S., Rice, A., & Austin, J. (2013). Evaluating Behavioral Self-Monitoring With Accuracy Training for Changing Computer Work Postures. *Journal of Organizational Behavior Management*, *33*(1), 68-76. http://dx.doi.org.portal.lib.fit.edu/10.1080/01608061.2012.729397

Gravina, N., Austin, J., Schoedtder, L., & Loewy, S. (2008). The effects of self-monitoring on safe posture performance. *Journal of Organizational Behavior Management*, *28*(4), 238-259. http://dx.doi.org.portal.lib.fit.edu/10.1080/01608060802454825

Harris, K. R. (1986). Self-monitoring of attentional behavior versus self-monitoring of productivity: Effects on on-task behavior and academic response rate among learning disabled children. *Journal of Applied Behavior Analysis, 19*(4), 417-423. http://dx.doi.org.portal.lib.fit.edu/10.1901/jaba.1986.19-417

Hawkins, A. M., Burgio, L. D., Langford, A., & Engel, B. T. (1993). The effects of verbal and written supervisory feedback on staff compliance with assigned prompted voiding in a nursing home. *Journal of Organizational Behavior Management, 13*(1), 137-150. http://dx.doi.org.portal.lib.fit.edu/10.1300/J075v13n01_09

Hickman, J.S., & Geller, E. S. (2005). Self-management to increase safe driving among short-haul truck drivers. *Journal of Organizational Behavior Management, 23*(4), 1-20. http://dx.doi.org.portal.lib.fit.edu/10.1300/J075v23n04_01

Himle, J. A., Perlman, D. M., & Lokers, L. M. (2008). Prototype awareness enhancing and monitoring device for trichotillomania. *Behaviour Research and Therapy, 46*(10), 1187-1191. http://dx.doi.org.portal.lib.fit.edu/10.1016/j.brat.2008.06.013

Kazdin, A. E. (2016). Single-case experimental research designs.

Kirschenbaum, D. S., Ordman, A. M., Tomarken, A. J., & Holtzbauer, R. (1982). Effects of differential self-monitoring and level of mastery on sports performance: Brain power bowling. *Cognitive therapy and Research*, *6*(3), 335 341. https://doi.org/10.1007/BF01173581

Krigsman, N., & O'Brien, R. M. (1988). Quality circles, feedback and reinforcement: An experimental comparison and behavioral analysis. *Journal of Organizational Behavior Management*, *9*(1), 67-82. https://doi.org/10.1300/J075v09n01_06

McCann, K. B., & Sulzer-Azaroff, B. (1996). Cumulative trauma disorders: Behavioral injury prevention at work. *Journal of Applied Behavioral Science*, *32*(3), 277-291. http://dx.doi.org.portal.lib.fit.edu/10.1177/0021886396323003

Olson, R., & Austin, J. (2001). Behavior-based safety and working alone: The effects of a self-monitoring package on the safe performance of bus operators. *Journal of Organizational Behavior Management*, *21*(3), 5-43. http://dx.doi.org.portal.lib.fit.edu/10.1300/J075v09n01_06

Olson, R., & Winchester, J. (2008). Behavioral self-monitoring of safety and productivity in the workplace: A methodological primer and quantitative literature review. *Journal of Organizational Behavior Management*, *28*(1), 9-75. http://dx.doi.org.portal.lib.fit.edu/10.1080/01608060802006823

Petscher, E. S., & Bailey, J. S. (2006). Effects of training, prompting, and self-monitoring on staff behavior in a classroom for students with disabilities. *Journal of Applied Behavior Analysis, 39*(2), 215-226. http://dx.doi.org.portal.lib.fit.edu/10.1901/jaba.2006.02-05

Richman, G. S., Riordan, M. R., Reiss, M. L., Pyles, D. A., & Bailey, J. S. (1988). The effects of self-monitoring and supervisor feedback on staff performance in a residential setting. *Journal of Applied Behavior Analysis*, *21*(4), 401-409. http://dx.doi.org.portal.lib.fit.edu/10.1901/jaba.1988.21-401

Rodriguez, M., Wilder, D. A., Therrien, K., Wine, B., Miranti, R., Daratany, K., ... & Rodriguez, M. (2006). Use of the performance diagnostic checklist to select an intervention designed to increase the offering of promotional stamps at two sites of a restaurant franchise. *Journal of Organizational Behavior Management*, *25*(3), 17-35. http://dx.doi.org.portal.lib.fit.edu/10.1300/J075v25n03_02

Rose, H. M., & Ludwig, T. D. (2009). Swimming pool hygiene: Self-monitoring, task clarification, and performance feedback increase lifeguard cleaning behaviors. *Journal of Organizational Behavior Management*, *29*(1), 69-79. http://dx.doi.org.portal.lib.fit.edu/10.1080/01608060802660157

Tinker, L.F., Ruth'e, P.A.T.T.E.R.S.O.N., Kristal, A. R., Bowen, D.J., Kuniyuki, A., Henry, H., & Shattuck, A. (2001). Measurement characteristics of 2 different self-monitoring tools used in a dietary intervention study. *Journal of the American Dietetic Association, 101*(9), 1031-1040. https://doi.org/10.1016/S0002-8223(01)00254-1

Wilder, D. A., Atwell, J., & Wine, B. (2006). The effects of varying levels of treatment integrity on child compliance during treatment with a three-step prompting procedure. *Journal of Applied Behavior Analysis, 39*(3), 369-373. http://dx.doi.org.portal.lib.fit.edu/10.1901/jaba.2006.144-05

Woods, D. W., Miltenberger, R. G., & Lumley, V. A. (1996). Sequential application of major habit-reversal components to treat motor tics in children. *Journal of Applied Behavior Analysis, 29*(4), 483-493. http://dx.doi.org.portal.lib.fit.edu/10.1901/jaba.1996.29-483

Table 1

Categories Coded for Each Self-Monitoring Article

Article #	Authors	Application	Setting	Consistency (Effects)	Self-Monitoring Definition	Time of Occurrence	DV (General/ specific)	Self-Monitoring Training
1.	Arnold & VanHouten (2020)	Combination	Lab	Consistent	Record	Immediate	General	UN
2.	Caplin et al., (1988)	Alone Combination	Applied	Mixed Mixed	Checklist	Later	Specific	Y
3.	Copeland (2018)	Alone Combination	Lab	Mixed No effect	Checklist	Immediate	General plus Specific	UN
4.	Gaetani et al., (1983)	Alone Combination Combination	Applied	Consistent Consistent Consistent	Record	Immediate plus Later	Specific	Y
5.	Godat & Brigham (1999)	Combination	Applied	Mixed	Record	Later	Specific	Y
6.	Gravina et al., 2008)	Alone Combination Combination	Applied	Mixed Mixed Mixed	Antecedent	Immediate	General	Y
7.	Gravina, et al., (2013)	Combination	Applied	Consistent	Antecedent	Immediate	General	Y
8.	Hawkins et al., (1993)	Combination Combination	Applied	Mixed Consistent	Record	Immediate	Specific	Y
9.	Hickman & Geller (2005)	Combination	Applied	Consistent	Record	Later	Specific	Y
10.	Krisman & O'Brien (1988)	Alone Combination	Applied	Mixed Consistent	Record	Later	Specific	UN
11.	Olson & Austin (2001)	Combination	Applied	Mixed	Record	Later	General	Y
12.	Rodriguez et al., (2006)	Combination Combination Combination	Applied	Consistent Consistent Consistent	Record	Unspecified	Specific	UN
13.	Rose & Ludwig (2009)	Combination	Applied	Consistent	Checklist	Later	General	Y

Note. This table demonstrates each category used to code the studies evaluated in this literature review. Applications and Effects codes were used for each phase

within the study that included self-monitoring. DV = dependent variable. Y = Yes. UN = unspecified training

Table 2

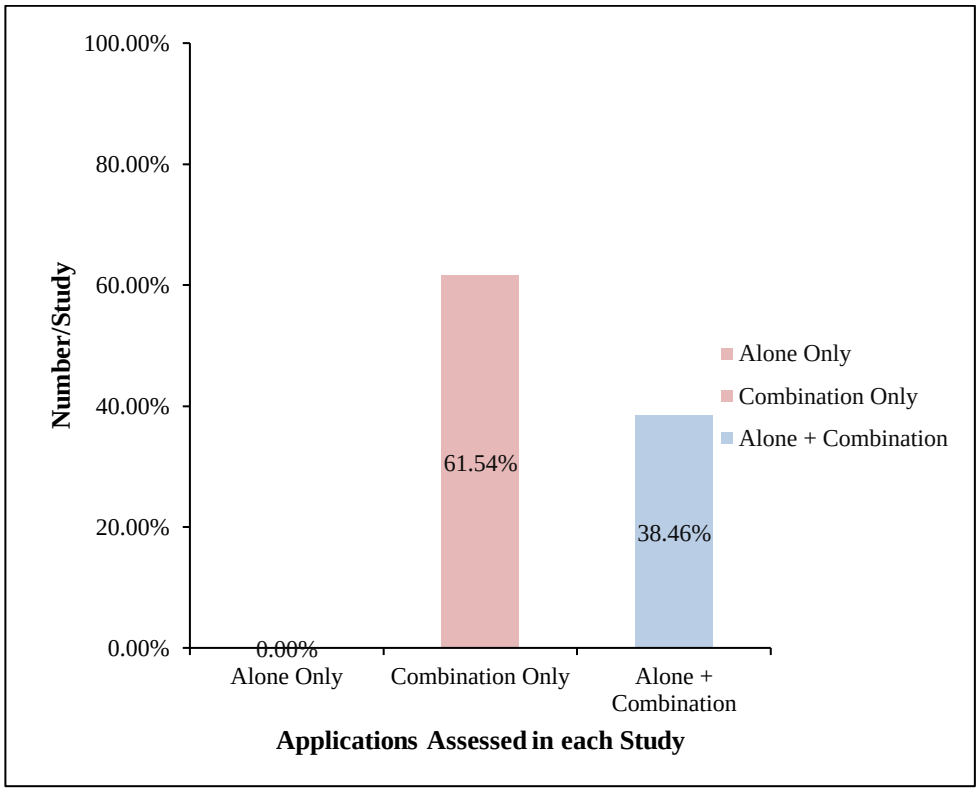
Article Publication Date and Setting

Publication date & Authors	*Articles prior to 2000*	*Articles from 2000-2020*	*Lab study*	*Applied study*
Arnold & VanHouten (2020)		1	1	
Caplin et al., (1988)	1			1
Copeland (2018)		1	1	
Gaetani et al., (1983)	1			1
Godat & Brigham (1999)	1			1
Gravina et al., 2008)		1		1
Gravina, et al., (2013)		1		1
Hawkins et al., (1993)	1			1
Hickman & Geller (2005)		1		1
Krisman & O'Brien (1988)	1			1
Olson & Austin (2001)		1		1
Rodriguez et al., (2006)		1		1
Rose & Ludwig (2009)		1		1
Total	**5**	**8**	**2**	**11**

Note. This table discriminates the number of studies published before 2000 and after 2000. It also compares the number of lab and applied studies. All applied studies were in a workplace setting. The bolded numbers indicate total number per article.

Figure 1

Overall Applications of Self-Monitoring

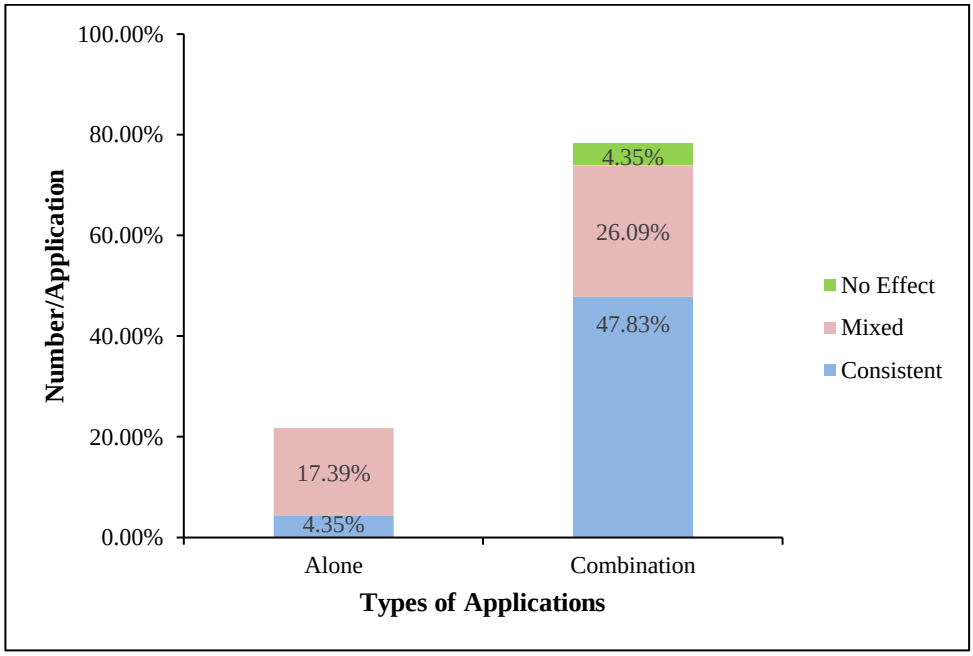


Note. This figure demonstrates overall applications of self-monitoring. Alone Only indicates the number of studies that assessed self-monitoring as a sole intervention throughout the entire duration of the study. Combination only denotes the number of studies that only assessed self-monitoring in combination with one or more other independent variables throughout the entire duration of the study. Alone + Combination depicts the number of studies that assessed self-monitoring alone in at least one phase within the study, and also assessed self-monitoring in combination

with at least one or more other independent variables in at least one or more phases within the same study.

Figure 2

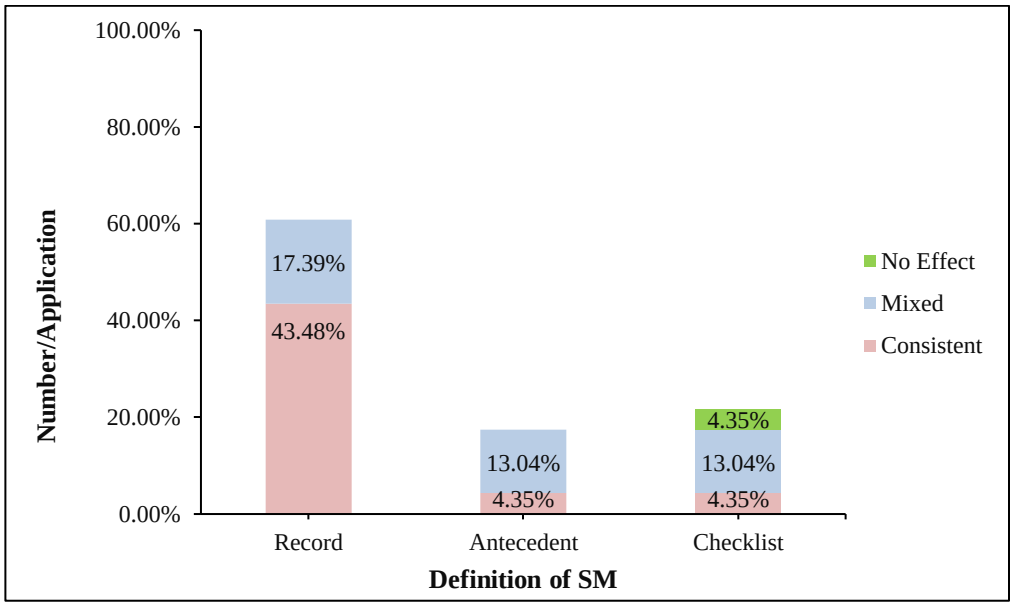
Application and Effects



Note. This figure illustrates the effects of various applications assessed within each study. Alone represents applications that assessed self-monitoring as a sole intervention. Combination represents applications in which self-monitoring was combined with at least one other independent variable.

Figure 3

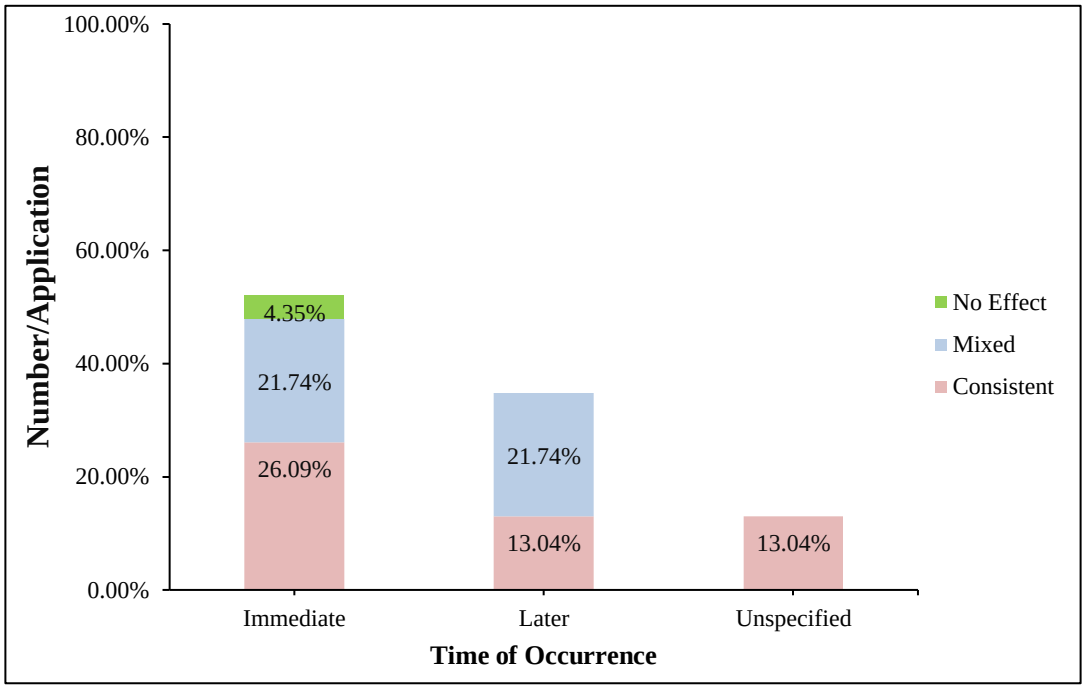
Definition of Self-Monitoring and Effects



Note. This figure demonstrates the effects of various applications assessed within the study based on the definition of self-monitoring provided. Checklist indicates those applications that included a checklist as the method for recording the self-monitored behavior. Antecedent represents all applications that included additional antecedent interventions along with the observing and recording process, such as prompts in the form of a peep or supervisor feedback indicating when a participant should have engaged in the self-monitoring behavior. Record represents all applications that included a form of written data collection as part of the self-monitoring process.

Figure 4

Time Self-Monitoring Occurrence

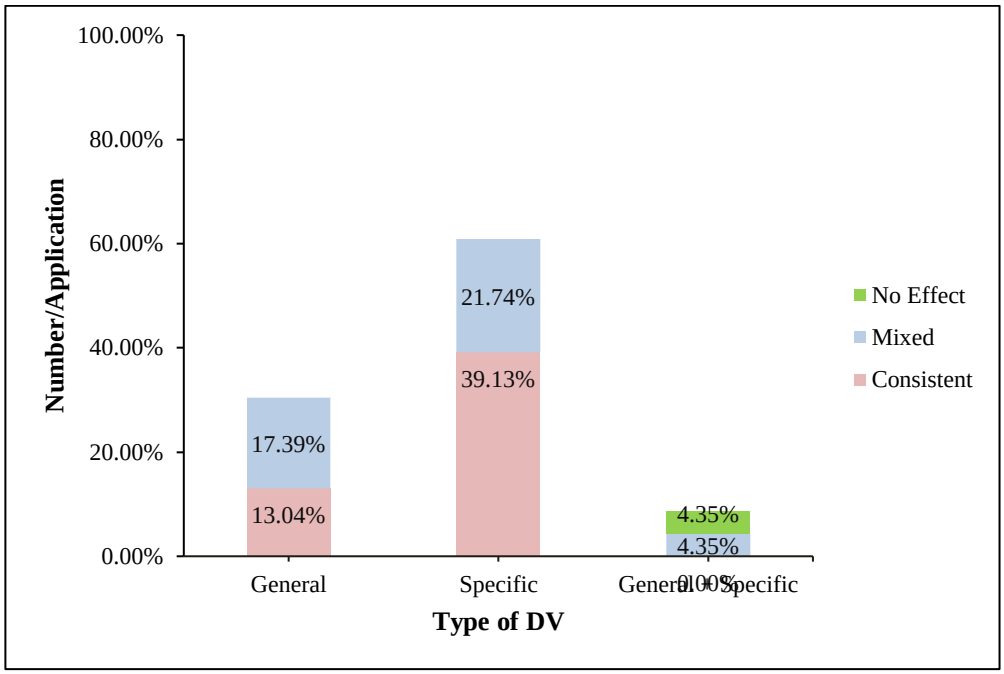


urred and Effects

Note. This figure depicts the time self-monitoring occurred following the target behavior and the effects. Immediate indicates that the self-monitoring occurred within 5-minutes of the target behavior having occurred. Later signifies any duration that was specified to be longer than 5-minutes after the target behavior had occurred. Unspecified represents those applications in which the time of recording was not specified.

Figure 5

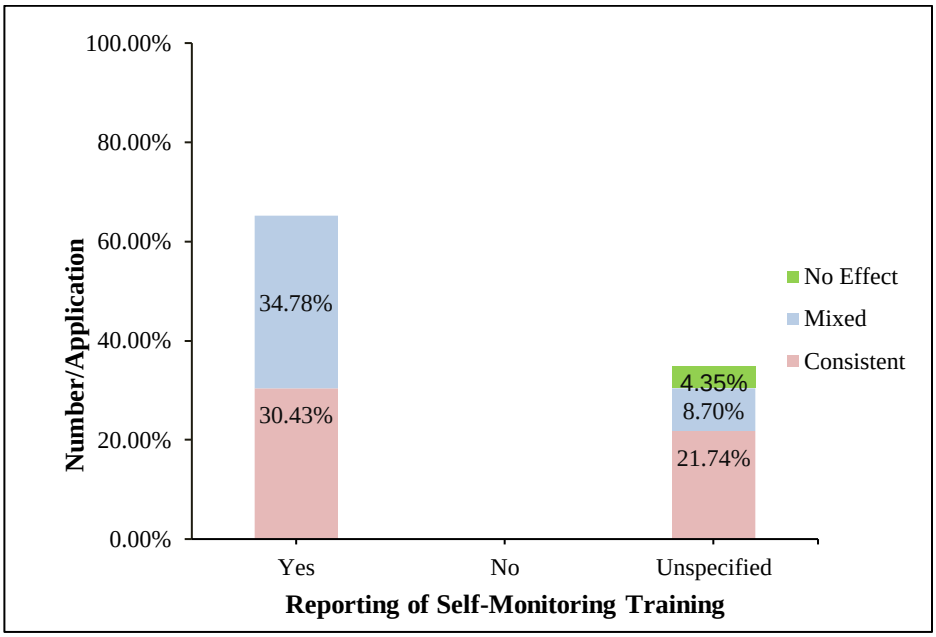
Type of Dependent Variable and Effects



Note. This figure illustrates the type of dependent variable assessed within each application and its corresponding effects. General represents applications with dependent variables determined to contain general descriptions. Specific indicates applications with dependent variables assessed to contain specific descriptions. General + Specific is used to denote applications with both general and specific dependent variable descriptions.

Figure 6

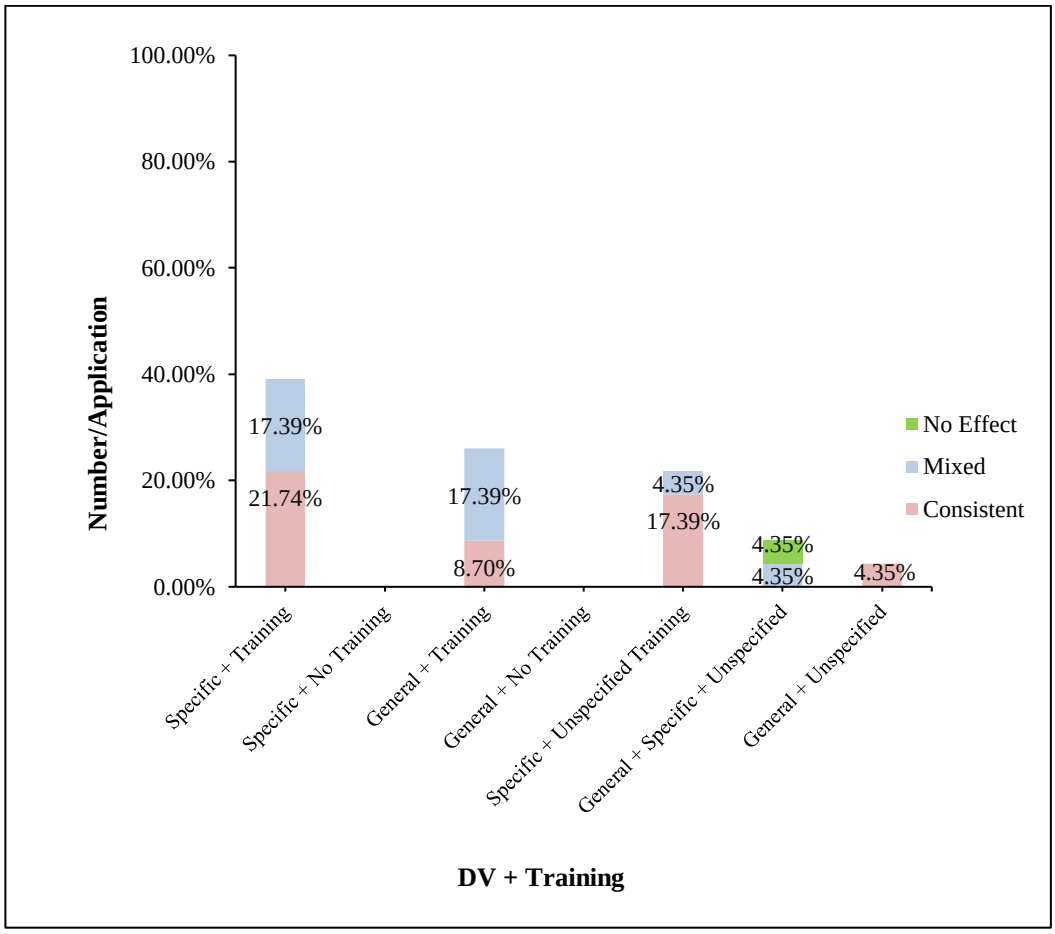
Self-Monitoring Training and Effects



Note. This figure illustrates the presence of self-monitoring training and effects based on application. Yes denotes all applications that specified the presence of self-monitoring training. No indicates applications that specifically indicated an absence of self-monitoring training. Unspecified represents all applications that did not specify whether training had occurred, but also did not specify an absence of training.

Figure 7

Self-Monitoring Training and Dependent Variable Characteristics and Effect

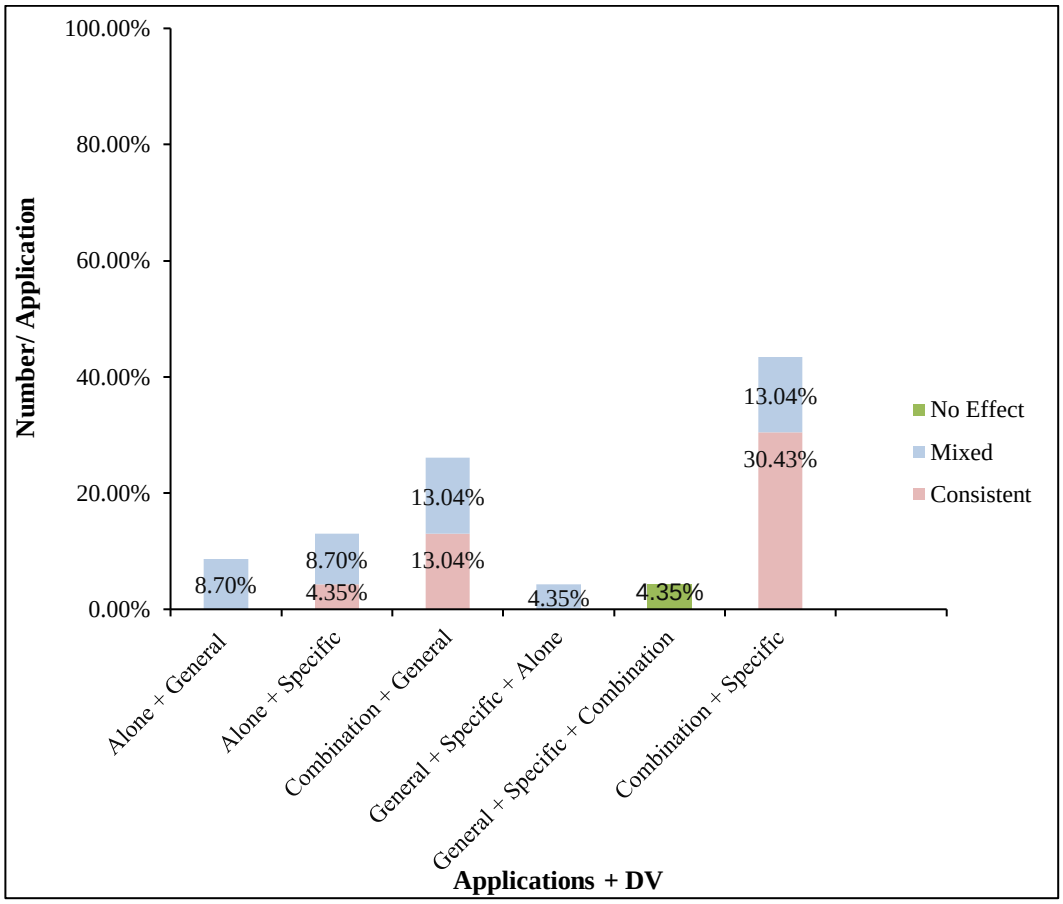


Note. This figure denotes the presence of self-monitoring training, dependent variable characteristics, and effects. Specific + Training indicates all applications that contained dependent variables that were specific and also indicated the presence of self-monitoring training. Specific + No Training represents all applications that included dependent variables that were specific and also indicated an absence of self-monitoring training. General + Training indicates all applications

that included general dependent variable descriptions and specified the presence of self-monitoring training. General + No Training indicates all applications that included general dependent variable descriptions and specified an absence of self-monitoring training. Specific + Unspecified Training signifies all applications that used specific descriptions for dependent variables and did not specify the presence of self-monitoring training. General + Specific + Unspecified represents all applications that contained both general and specific descriptions of dependent variables and also did not specify the presence of self-monitoring training. General + Unspecified indicates all applications that contained general dependent variable descriptions, and also did not specify the presence self-monitoring training.

Figure 8

Applications and Dependent Variables Used and Effects

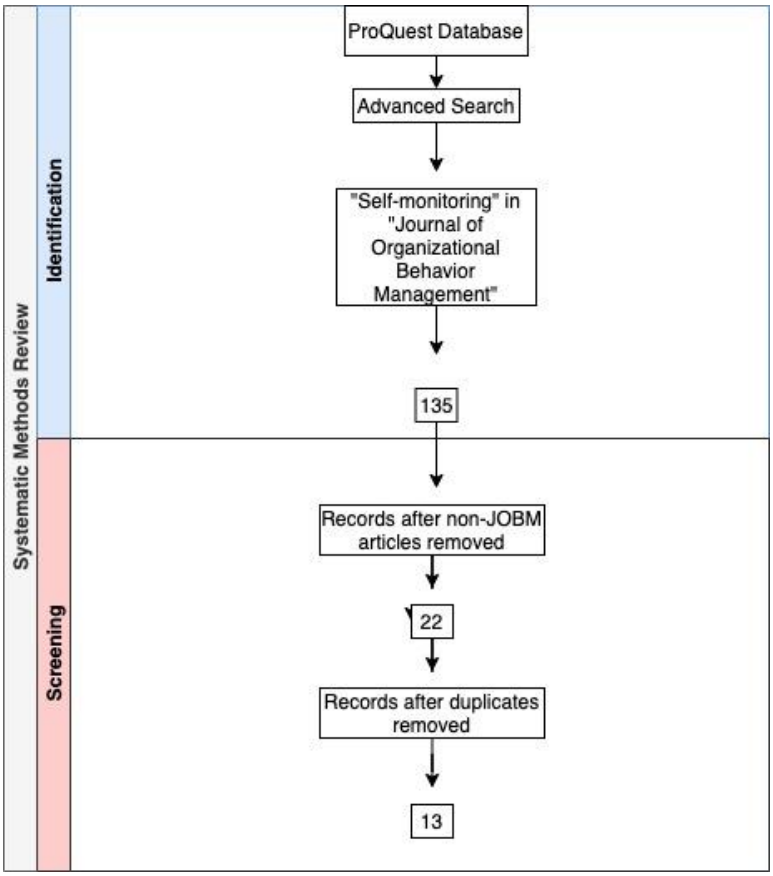


Note. This figure illustrates the effects of the self-monitoring application and dependent variable type. Alone + General indicates that self-monitoring was used alone with a dependent variable that was described as general. Alone + Specific denotes that self-monitoring was used alone with a dependent variable that was described as specific. Combination + General signifies that self-monitoring was used in combination with one or more other independent variables with a

dependent variable that was General. General + Specific + Alone indicates that self-monitoring was applied alone with dependent variables that were both general and specific. General + Specific + Combination indicates that self-monitoring was applied in combination with one or more independent variables and included dependent variables that were both general and specific. Combination + Specific indicates that self-monitoring was applied in combination with one or more independent variables with dependent variables that were specific.

Appendix A

Coding Search Process



Appendix B

Task Analysis for Data Collection

1. Key Word Used in Abstract
Self-Monitoring/Self-Management

2. Definition of Self-Monitoring
Record
There is a form/document in which behavior is collected/recorded by the participants.
Antecedent
A beep or some form of antecedent is used to function as a prompt right before the participants should engage in the self-monitoring behavior.
Checklist
A form of a checklist/check sheet/charge ticket is used to record self-monitored behaviors.

3. Time of Self-Monitoring Occurrence
Immediate
Self-monitored behavior recorded in the moment the behavior is occurring.
Later
Self-monitoring occurs at the end of a shift or designed time period that is not immediately after the behavior has been performed.
Unspecified
The time in which the participants observe/engage in the behavior and record behavior is not specifically mentioned in the study.

4. Dependent variables as General or Specific:
- *General*
  - DVs did NOT specify the use any type of measurement metric such as time, frequency, percent correct, or duration and were not countable to its participants when teaching/instructing them to self-monitor.
    - Ex. Salsa dancing, cleaning, talking
    - Non-example # of stamps, amount of time repairing tools
- *Specific*
  - DVs did use a measurement metric such as time, frequency, percent correct, or duration **or were countable.**
    - Ex. % of steps completed to the side and back while dancing with salsa partner

- Ie. amount of coins collected; number of cars stolen
- Non-ie. performance goals

5. Setting

Lab

Analogue workplace

Applied

Anywhere that is NOT in a lab. Doesn't just have to be a workplace.

6. Training

- Go to procedures section
- Look for word "training"
  - "Train" or "trained" is acceptable
- If word is found, mark Y (yes)
- If word is not found, mark N (no)
- Ignore context in which training is used (formal vs. informal training)
  - We are just focusing on if training was present, regardless of intensity or method

Combinations

- Where to Start:
  - Go to procedures section
    - Look through headings (phases) as they are labeled
      - Note those headings (don't need to record them till Applications)
        - Reference criteria below for coding

7. Combinations within Each Phase

- ***Within a Phase (One Phase). Evaluating each phase or separate application***
  - *Alone*
    - self-monitoring is evaluated on its own and is not combined with any other interventions. If Self-monitoring training was provided, it would still be considered alone. Classify this NOT based on what the author claims. In other words, if the author claims that the SM was assessed alone and the phase also included a prompt, then it should be classified as combination.

  Combination

    - Self-monitoring is assessed in combination with one or more interventions. In other words, self-monitoring is combined with at least one or more other interventions.

- (*update on manuscript)

8. Overall Combinations Across all Phases

- ***Overall Phases- All Phases, not just one phase)***
  - **<u>Alone Only Evaluated</u>**
    - For all phases that assessed Self-Monitoring (SM), self-monitoring was always assessed alone, and it was never combined with any other interventions. In other words, there was never a phase that assessed self-monitoring in combination with another IV. If Self-monitoring training was provided, it would still be considered alone. Classify this NOT based on what the author claims. In other words, if the author claims that the SM was assessed alone and the phase also included a prompt, then it should be classified as combination.
- ***(Overall Phases- All Phases, not just one phase)***
  - **<u>Combination Only Evaluated</u>**
    - For all phases that assessed Self-Monitoring (SM), Self-monitoring (SM) was always assessed in combination and it was never assessed alone. In other words, there was never a phase that assessed self-monitoring alone.
- **(Across Phases Overall Study- All Phases, not just one phase)**
  - **<u>Alone + Combination Evaluated</u>**
    - Self-Monitoring is evaluated on its own in one or more phases, but SM is also assessed in combination with one or more interventions in a separate phase

9. Applications Effects

- Where to start:
  - List phases as they are written or described in the procedure section
    - Each application is a phase in which SM is used
    - Do NOT record applications (phases) in which SM is not used
      - *needs to be done for EACH application (phase) in which SM is used, not just overall effectiveness/consistency
- Go to results section
  - ***Option 1***: “Consistent”
    - Read through to see if authors write whether the intervention was “effective”/” consistent”/” mean increase in desired

behavior" (doesn't have to be those exact words, those are just examples) in which ALL participants improved across of behaviors/settings.
    - Take what the authors are saying.
        - Ex. If they say the findings are consistent across all participants, but you think the graph says something else, use the words they say rather than your own interpretation to ensure reliable coding
        - Mark as Consistent
    - If not explicated said in results section, go to graph
        - If all bxs/settings/subjects increased the mean of the last 3 points from the previous phase compared to the last 3 phases in the current phase across ALL bxs/participants/settings AND…
        - …there are no overlapping data points and the data is going in the desired direction, mark as Consistent
- ***Option 2:*** "Mixed"
    - Results section reports the mean increased but was NOT for all bxs/participants/settings OR results did not maintain
        - Ie. results were effective for 4/5 participants
            - Even though it says the word effective, it is NOT including all bxs/participants/settings, so record as Mixed
    - *maintain = levels did not go below baseline
    - If not explicated said in results section, go to graph
        - If all bxs/settings/subjects increased the mean of the last 3 points from the previous phase compared to the last 3 phases in the current phase across SOME BUT NOT ALL bxs/participants/settings, mark as Mixed
- ***Option 3:*** "No Effect"
    - Results section reports there was no mean increase for any bxs/participants/settings, mark as No Effect
        - Ie. results showed no improvement in desired performance
    - If not explicated said in results section, go to graph
        - If all bxs/settings/subjects maintained or decreased the mean of the last 3 points from the previous phase compared to the last 3 phases in the current phase across any bxs/participants/settings, mark as No Effect

Appendix C

Job Aid

Article Information (Authors): **Application #:**	
Verify application- Is this a separate intervention condition that includes self-monitoring somewhere within the intervention? If not, it is not an application of self-monitoring and should not be included.	
If Single Subject Design (Ask Below Questions):	**Yes/No**
1. **Consistent**- When compared to the *previous* condition (condition immediately before), did the intervention(s) in this condition produce a desired mean increase or decrease for ALL participants, settings, and/or behaviors?	
2. **Consistent**- If yes, did the effects also maintain?	
Responding Yes to BOTH items 1 and 2 = Consistent Responding Yes to item 1 and No to item 2 = Mixed	
3. **Mixed**- When compared to baseline condition (not necessarily the previous condition, just baseline), were desired increases or decreases in performance observed for at least 1of the participants settings, and/or behaviors analyzed?	
Responding Yes to item 3 = Mixed	
4. **No Effects**- Were mean performance levels equal to the levels in baseline?	
Responding No to item 4 = No Effects	
If Group Design (Ask below questions)	**Yes/No**
5. **Consistent**- Did the author report statistically significant effects for ALL dependent variables assessed in the condition?	
6. **Consistent**- Did the effects maintain?	
Responding Yes to BOTH items 5 and 6 = Consistent Responding Yes to item 5 and No to item 6 = Mixed	
7. **Mixed**- Were statistically significant effects observed for some, but not all dependent variables or conditions?	
Responding Yes to item 7 = Mixed	

8. **No Effects**- Mark no if no statistically significant differences were observed to occur in any of the dependent variables or conditions.	
Responding No to item 8 = No Effects	