SYSTEMATIC REVIEW OF SELF-MONITORING ACCURACY OF SAFETY BEHAVIOR

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ABSTRACT

Self-monitoring procedures have been applied to various populations, in diverse settings, and have focused on a wide variety of behaviors. While the relation between the accuracy of self-monitored data and changes in target behavior has been examined in research, there has been relatively less research focusing on the accuracy of self-monitored data in relation to the change in safety behavior. Studies (n=11) where self-monitoring procedures were introduced to target specific safety behaviors in adults were reviewed and analyzed to determine the relation between the accuracy of self-monitored data and various other aspects of an intervention, including the percent change of target behavior. This analysis found a positive but small correlation between the relevant measures. This analysis suggests that the act of self-monitoring in and of itself is important for behavior change. There is a possibility that increases in self-monitoring accuracy could lead to desirable changes in targeted safety behaviors, but further analysis of a larger sample size of studies would be required to determine the relationships among these measures.

Keywords: behavior based safety, behavioral self-monitoring, self-monitoring accuracy

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CHAPTER 1:

INTRODUCTION

Ensuring that members of an organization engage in expected safety behaviors has value for both the individual members and the organization as a whole. Yet workplaces in the USA averaged 3.1 nonfatal injuries or illnesses per 100 employees in 2018, as well as accounting for 5,250 fatal incidents (Bureau of Labor Statistics, 2018). The burdens placed on an organization by failing to ensure that its members are exhibiting correct safety behaviors could threaten the functioning, or possibly the continued existence, of the organization itself. Furthermore, the ethical and moral onus is on organizations, and those in managerial, supervisory, or administrative roles, to provide a safe environment for the organization's members. The ethical and moral imperative to ensure a safe work environment, lost time or decrease in productivity due to injury, and financial burdens stemming from workplace accidents are all issues that an organization's leaders must acknowledge and address.

Behavior Based Safety (BBS), defined by Sulzer-Azaroff & Austin (2000) as "a systematic approach to promoting behavior supportive of injury prevention" (pg. 19), has been employed in various ways to address the problem of unsafe practices in the workplace. A seminal study on behavior-based workplace safety targeted worker behavior in an industrial bakery (Komaki et al., 1978). This study set the stage for the procedures now common in behavior-based safety work: identifying safe behaviors; focusing on increasing these safe behaviors rather than reducing accidents and injuries; providing feedback and reinforcement for changes in safe behaviors; and using observers as data collectors. Many other studies have focused on BBS procedures with different participants and settings through the years, including landscaping employees (Martinez-Onstott et al, 2016), in a simulated office setting (Beal & Eubanks, 2008), on a Hong Kong construction site (Li et al, 2015), and elementary students learning safe street crossing behavior (Yeaton & Bailey, 1978).

Some form of an observational method is used to record participant behavior in BBS, for example in-person observers (Lebbon, Sigurdsson, & Austin, 2012), video recording (Olson, Hahn, & Buckert, 2009), or computer recording (Hickman & Geller, 2005). While these observational approaches can provide accurate data, they also present several challenges. Observations can be intrusive and can lead to reactance (Kazdin, 1979), and often require an allocation of financial and/or personnel resources that can be impractical or impossible for organizations to commit.

Behavioral Self-Monitoring (BSM) practices, those where, "individuals repeatedly observe, evaluate, and record aspects of their own behavior," (Olson & Winchester, 2008, p. 10) have been implemented across varying settings, populations, and behaviors. This research includes studies focusing on lifeguards completing maintenance and custodial duties at a swimming pool (Rose & Ludwig, 2009), elementary students focusing on academic performance (Maag, Reid, & DiGangi, 1993), and teachers in various settings focused on their own job performance (Rispoli et al, 2017).

Self-monitored or self-reported data reduces the resources required to implement data collection, but relying on individuals to report their own behavior can call into question the accuracy and validity of these data. The accuracy of self-monitored data has been assessed among undergraduate students playing educational video games (Riemer & Schrader, 2016), with a positive correlation established between self-monitoring procedures and various target behaviors (mental model accuracy and behavioral engagement in game phases), and among students in a special education classroom (Carr & Punzo, 1993), where student self-monitored data were compared with teacher recorded data and measured at 96% agreement. This correlated with significant improvements in target behavior (on-task behavior). Further research has implemented a self-monitoring training component to a similar intervention with students in a special education classroom (Marshall et al, 1993), reporting small and unstable increases in the accuracy of self-monitoring but a significant increase in the target behavior (attention to task). However, there has been less research focused on the relation between the accuracy of self-monitored data and the change in safety behaviors. Determining the relation between the accuracy of self-monitored or self-reported data and the change in specific safety behaviors could clarify whether this type of observational method can be a legitimate option for smaller organizations that require behavior change procedures to be economically feasible, or if it is too inaccurate to be reliable or valid.

This review is designed to identify the relationship between the accuracy of self-monitored data and the change in specified safety behaviors, in the hopes that a clearer understanding of this relationship might help maximize the effectiveness of BBS procedures while minimizing the resources required for implementation. Effective implementation of BBS procedures would fulfill the ethical and moral obligation organizations and their leadership have to ensure a safe environment for members or employees, while minimizing the resource burden of implementation could allow smaller organizations the opportunity to access BBS procedures that might otherwise be too expensive or impractical.

CHAPTER 2:

METHOD

Search Procedures

This analysis was composed of three main steps. First, studies focused on safety behaviors of individual members of an organization were identified via computerized searches of Medline, Psychinfo, and Pubmed. Search terms included “Behavior-Based Safety” and “Behavioral Self-Monitoring”, and were searched as keywords. Additional qualified studies were found through reference tracking. The term “Self-Reporting” was originally included as an additional search term, but returned a large number of irrelevant studies and was therefore removed.

Next, these studies were reviewed and categorized by the type of observational method used. Observations were categorized as “In-person” if they were conducted via direct observation either by another member of the organization or an outside observer, “Mechanical” if they were recorded via video recording or computer software, and “Self-Monitored” if they relied on individual members to self-monitor their own safety behaviors. In order to be included, a study must use either in-person or mechanical observation, as well as self-monitoring procedures.

Finally, data were extracted from the studies to determine the accuracy of self-monitored data regarding specified safety behavior, as well as other metrics that could be extracted and analyzed from the data presented.

Eligibility Criteria

To be included in this analysis, studies must have used adult participants who were expected to engage in specific safety behaviors, must have targeted a specific safety behavior or set of behaviors as a dependent variable, and must have recorded both self-monitored data as well as in-person or mechanically observed data. Behavioral targets could be primary job responsibilities, behaviors that occur in the workplace or as a part of the participants typical job responsibilities, or be specified safety behaviors occurring outside of the workplace. The setting for a study could be anywhere that the specified safety behaviors are expected to take place.

Data Extraction

Independent variables were the respective targeted safety behaviors, with the dependent variable of analysis being the relations between various metrics of self-reported data and data recorded via in-person or mechanical observation. The online application WebPlotDigitizer (Rohatgi, 2020) was used to extract data displayed graphically.

CHAPTER 3:

RESULTS

This analysis identified 183 studies from the databases searched, using the identified keywords as shown in Figure 1. After removing duplicates and articles that were not relevant to this analysis, a total of 33 studies were reviewed for inclusion. Of these, 11 studies were included in the analysis. Two studies, Hickman & Geller (2003) and Olson & Austin (2001), were the published versions of previous dissertations by Hickman (2002) and Olson (1999) respectively. For the purpose of this analysis, the dissertations are not included as separate studies but the unique data they present is included as a part of the later versions of each study. Figure 1 describes exclusion and inclusion details for studies in this analysis.

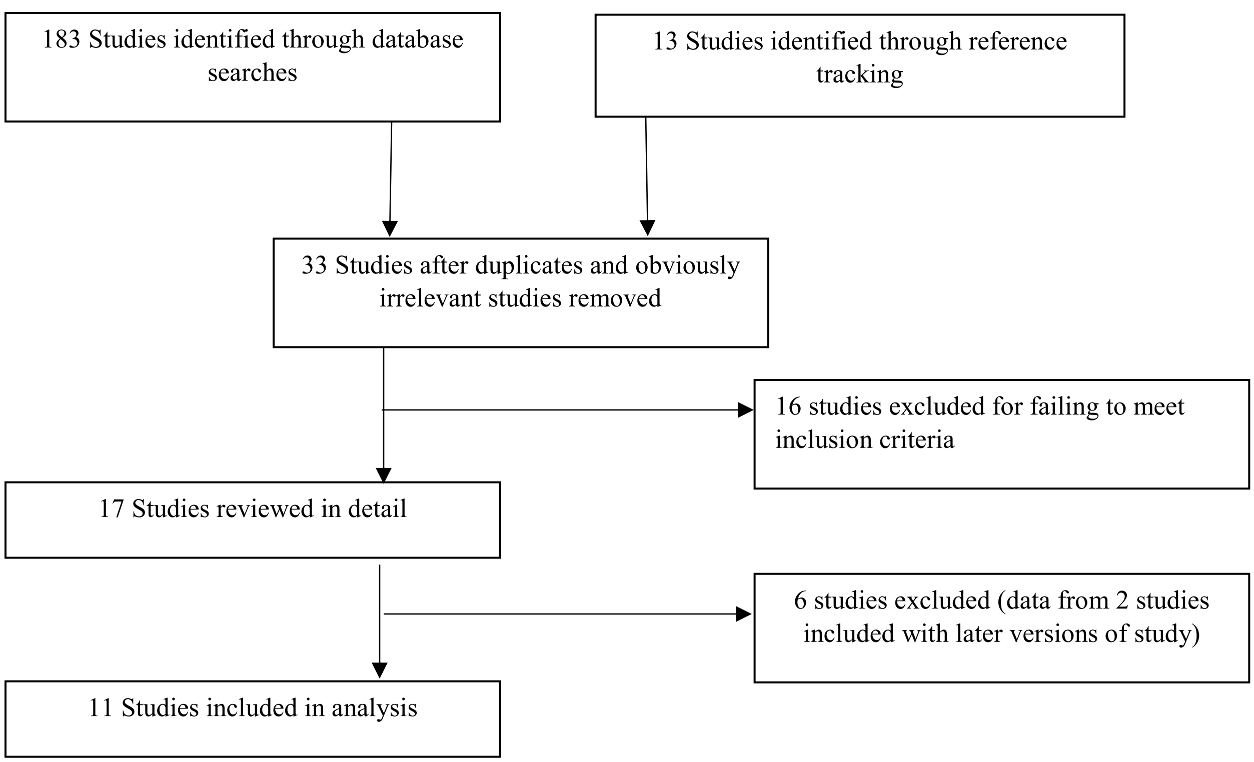

Figure 1. Search Results Structure

Qualifying studies

Eleven studies qualified for the analysis. Table 1 displays various characteristics of the studies.

Study Characteristics

The most common population among the qualifying studies was volunteer college students, which was the population for four studies (Gravina et al, 2008a; Gravina et al, 2013; Sigurdsson & Austin, 2008; and Arnold & VanHouten, 2020). Two studies focused on truck drivers (Hickman & Geller, 2005; and Olson et al, 2009). No other population was the focus of more than one study. University employees (Hagge, 2016), miners (Hickman & Geller, 2003), bus drivers (Olson & Austin, 2001), office workers (McCann & Sulzer-Azaroff, 1996), and recruited members of the public (Gravina et al, 2008b) were all the subject of a single study included in the analysis.

The most common settings among qualifying studies was a simulated office and the participants' typical workplace. Five studies were conducted in a simulated office (Gravina et al, 2008a; Gravina et al, 2013; Sigurdsson & Austin, 2008; McCann & Sulzer-Azaroff, 1996; and Gravina et al, 2008b), while five were conducted in the participants' typical workplace (Hagge, 2016; Hickman & Geller, 2003; Olson & Austin, 2001; Olson et al, 2009; and Hickman & Geller, 2005). One study was conducted in a driving simulator (Arnold & VanHouten, 2020).

Table 1

Qualifying Study Characteristics

Study	Population and Setting	Participant Demographics	Design	Independent Variable	Dependent Variable	Target Bx.
Gravina et al (2008a)	College student volunteers in an analog work setting	Seven participants, no demographic information presented	AB (and C for some participants) multiple-baseline	Ergonomics training pre-baseline, BSM during B, overt video recording added in C	Percentage of observations in which participants body position was recorded as "safe" by observers	Safe Posture and Positioning
Gravina et al (2013)	College student volunteers in a research laboratory	Three participants, no demographic information presented	AB multiple-baseline	Ergonomics training pre-baseline, BSM during B	Percentage of observations in which participants body position was recorded as "safe" by observers	Safe Posture and Positioning
Hickman & Geller (2005)	Short haul truck drivers in the course of their workplace responsibilities	Thirty-three participants, 30 male and 2 female, 32 Caucasian and 1 American Indian, 24-61 years of age	ABA interrupted time-series	Post baseline self-management for safety (SMS) training, SMS and feedback during B, followed by withdrawal of interventions	Two specified safety behaviors-overspeed and extreme braking	Safe Driving behavior

Table 1

(continued)

Study	Population and Setting	Participant Demographics	Design	Independent Variable	Dependent Variable	Target Bx.
Olson et al (2009)	Short haul truck drivers in the course of their workplace responsibilities	Three participants, Caucasian males with an average age of 48.6 years old	AB Single-case repeated measures	Camera installed during baseline, BSM during B	11 specified safety behaviors	Severe Trunk Posture and Recognizing Risk Factors
Gravina et al (2008b)	Recruited members of the public in a simulated office environment	Eight participants, three male, five female ages 19-58	ABC multiple baseline	BSM w/ data collected every 2 minutes during B, BSM w/ data collected every 15 minutes during C	Percentage of observations in which participants body position was recorded as "neutral" by observers	Safe Posture and Positioning
McCan & Sulzer-Azaroff (1996)	Office workers in a simulated office setting	Six participants, ages 26-58	ABC multiple baseline	Discrimination training after baseline, BSM during B, feedback, goal-setting, and reinforcement added during C	Percentage of observations in which participants posture and hand-wrist position were recorded as "safe" by observers	Safe Posture and Positioning

Table 1

(continued)

Study	**Population and Setting**	**Participant Demographics**	**Design**	**Independent Variable**	**Dependent Variable**	**Target Bx.**
Arnold & VanHouten (2020)	College student volunteers in a driving simulation laboratory	Three participants, no demographics presented	ABA non-concurrent multiple baseline across participants	Safe driving training following baseline, BSMand feedback during B, withdrawal during C	Average following head-way and braking deceleration	Safe Driving Behavior
Olson & Austin (2001)	Bus operators in their typical workplace	Four participants, all male, ages 40-50. Average experience of 20.5 years	ABCD multiple baseline across behaviors	BSM of one target behavior during B, additional target behavior added during C, two additional target behaviors during D	Six safety behaviors divided into; loading/unloading passengers, bus in motion, and stopping	Safe Driving Behavior

Table 1

(continued)

Study	**Population and Setting**	**Participant Demographics**	**Design**	**Independent Variable**	**Dependent Variable**	**Target Bx.**
Sigurdsson & Austin (2008)	College student volunteers in a simulated office setting	Eight participants, demographics not presented	ABC Nonconcurrent multiple baseline across participants	Safety information session before A, safety information, feedback, and BSM during B, real-world probes during C	Three safe posture/positioning behaviors	Safe Posture and Positioning
Hickman & Geller (2003)	Miners in their typical workplace	15 participants, all Caucasian male, ages 18-45	ABA multiple baseline across participants	SMS training following baseline, SMS, feedback and monetary reinforcement for participation during B, withdrawal during C	Percentage of observations in which Personal Protective Equipment was correctly worn	PPE Usage

Table 1

(continued)

Study	**Population and Setting**	**Participant Demographics**	**Design**	**Independent Variable**	**Dependent Variable**	**Target Bx.**
Hagge (2016)	University employees in their typical workplace	Unionized custodians separated in 3 treatment groups, no demographics presented	ABCDE counterbalanced multiple baseline across treatment groups	BBS training following baseline, alternating BSM, peer observations, supervisor observations, and participant choice across all other phases	Safe lifting and safe vacuuming	Expected Safety Behaviors

Study Characteristics (continued)

The most common dependent variable among the qualifying studies was safe posture and positioning, which was the focus of five studies (Gravina et al, 2008a; Gravina et al, 2013; Sigurdsson & Austin, 2008; Gravina et al 2008b; and McCann & Sulzer-Azaroff, 1996). Three studies targeted safe driving behavior (Arnold & VanHouten, 2020; Olson & Austin, 2001; and Hickman & Geller, 2005). Severe trunk posture and recognizing risk factors (Olson et al, 2009), Correct PPE usage (Hickman & Geller, 2003), and safe lifting and vacuuming (Hagge, 2016), were all target behaviors in a single study, respectively.

Calculations

While some qualifying studies presented measures of self-monitoring accuracy, either for individual participants or for the study overall, other qualifying studies required the calculation of such a measure. For this review, self-monitoring accuracy was calculated as the percentage of agreement between self-monitored data and observer or technologically recorded data. Not all qualifying studies presented a measure of compliance with self-monitoring procedures, and there was no way to calculate such a measure in those that did not. Qualifying studies that included a measure of self-monitoring compliance presented such measures either for individual participants or for the study overall.

Calculations of the mean for both self-monitoring accuracy and compliance among individual participant data as well as the mean between qualifying studies were conducted using Microsoft Excel. The relations between self-monitoring accuracy, self-monitoring compliance, and the change in target behavior was analyzed using Pearson's correlation coefficient. Pearson's correlation coefficient is a measure of the linear relationship between two variables, as seen in (1).

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2])}} \quad (1)$$

Pearson's correlation coefficient was calculated using an online coefficient calculator (Pearson Coefficient Calculator, 2018).

Self-Monitoring Accuracy

Seven studies presented either researcher or technologically observed data, and self-monitored data capturing the same behavioral event. Table 2 displays the mean accuracy of self-monitored data. It is notable that Gravina et al (2008a) did not include any self-monitoring accuracy training for participants. Gravina et al (2013) added such a procedure, and reported a significant increase in self-monitoring accuracy. Gravina et al (2008a) may be an outlier because of the lack of a self-monitoring accuracy training.

Table 2

Mean Self-Monitoring Accuracy

Study	Self-Monitoring Accuracy
Gravina et al (2008a)	44%
Gravina et al (2013)	77%
Olson et al (2009)	82.23%
McCann & Sulzer-Azaroff (1996)	71.75%
Olson & Austin (2001)	84.5%
Sigurdsson & Austin (2008)	74%
Hickman & Geller (2003)	89.06%
Mean	74.65%

Self-Monitoring Compliance

Five studies presented a measure of participant compliance with, or integrity of, self-monitoring procedures. Table 3 displays the mean rate of compliance with self-monitoring procedures. As with the accuracy of self-monitored data, the self-monitoring accuracy training used in Gravina et al (2013) could explain the 18% difference between self-monitoring compliance in the study by Gravina et al (2008a) and the expansion on that study by Gravina et al (2013).

Table 3

Mean Self-Monitoring Compliance

Study	**Percent Compliance with Self-Monitoring Procedures**
Gravina et al (2008a)	82%
Gravina et al (2013)	100%
Hickman & Geller (2005)	58.8%
Hickman & Geller (2003)	82.3%
Olson & Austin (2001)	76.5%
Mean	65.92%

Change in Target Behavior

Ten studies presented a measure of change in target behavior. Hickman & Geller (2005) recorded data on two unique safety behaviors, Overspeed and Extreme Braking, which could not be reasonably combined into a single measure, and are therefore displayed as two separate measures. Similarly, Arnold & VanHouten (2020) recorded data on two unique safety behaviors, Following Headway and Braking Deceleration, as well as two unique settings, the driving simulator and real world probes, for one of the targeted behaviors, Following Headway. These measures could also not be reasonably combined, and are presented as separate measures. Table 4 displays the mean change of the target behavior.

Table 4

Mean Change in Target Behavior

Study	Percent Change of Targeted Behavior
Gravna et al (2008a)	25.1%
Gravina et al (2013)	61.5%
Hickman & Geller (2005) Speeding	0.8%
Hickman & Geller (2005) Braking	56.63%
Gravina et al (2008b)	39.5%
McCann & Sulzer-Arazoff (1996)	42.9%
Arnold & Van Houten (2020) Following Headway	224.84%
Arnold & Van Houten (2020) Braking Deceleration	24.76%
Arnold & Van Houten (2020) Following Headway, Real World	45.79%
Olson & Austin (2001)	12.45%
Hickman & Geller (2003)	12%
Sigudsson & Austin (2008)	68.75%
Hagge (2016)	14.17%
Mean	52.33%

Self-Monitoring Accuracy vs. Target Behaviors

Six studies presented both self-monitoring accuracy data and the respective change in target behavior. Figure 2 displays the relation between the accuracy of self-monitored data and the change in target behavior.

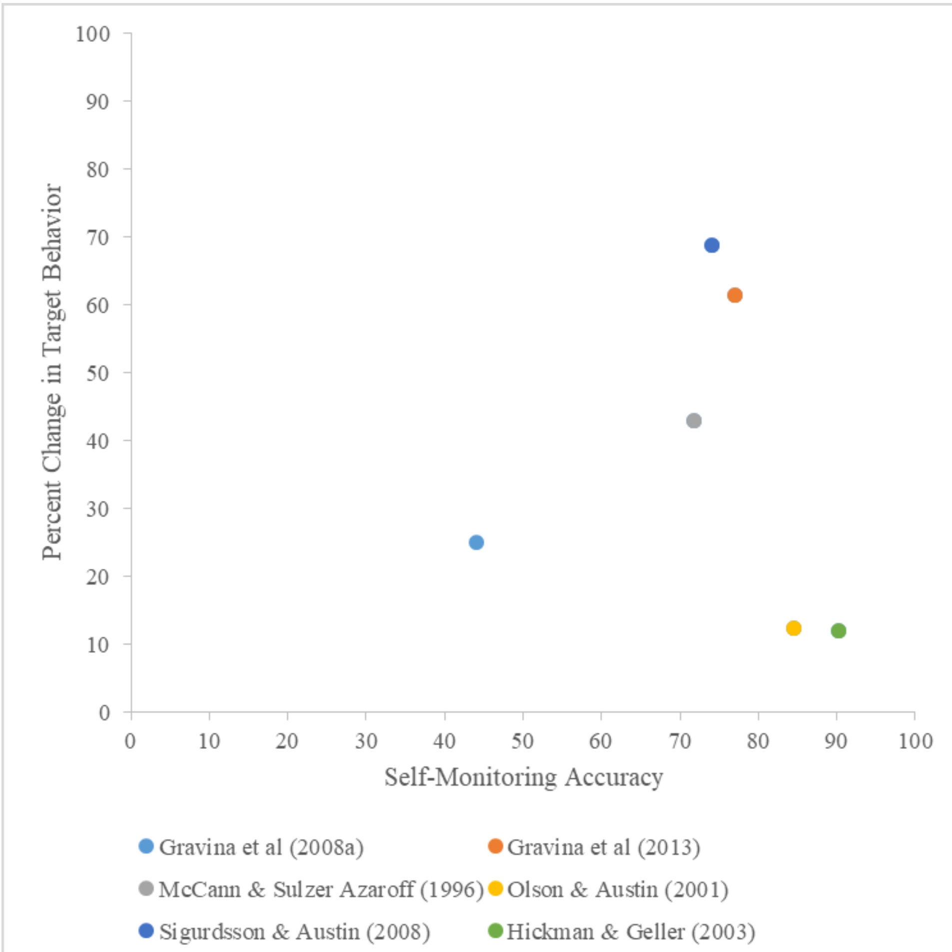

Figure 2. Self-Monitoring Accuracy in relation to Change in Target Behavior

An analysis of the relation between self-monitoring accuracy and the percent change in target behavior shows Pearson's correlation coefficient to be r=.164. This represents a positive correlation between the accuracy of self-monitored data and the change in target behaviors, and according to the interpretation presented by Cohen (1988) the effect size is small.

Self-Monitoring Compliance vs. Target Behavior

Five studies presented both a self-monitoring compliance measure and the change in target behavior. Hickman & Geller (2005) measured two unique target behaviors, Overspeed and Extreme Braking, which could not be reasonably combined and are therefore included as two separate measures. Figure 3 displays the relation between self-monitoring compliance and the change in target behavior.

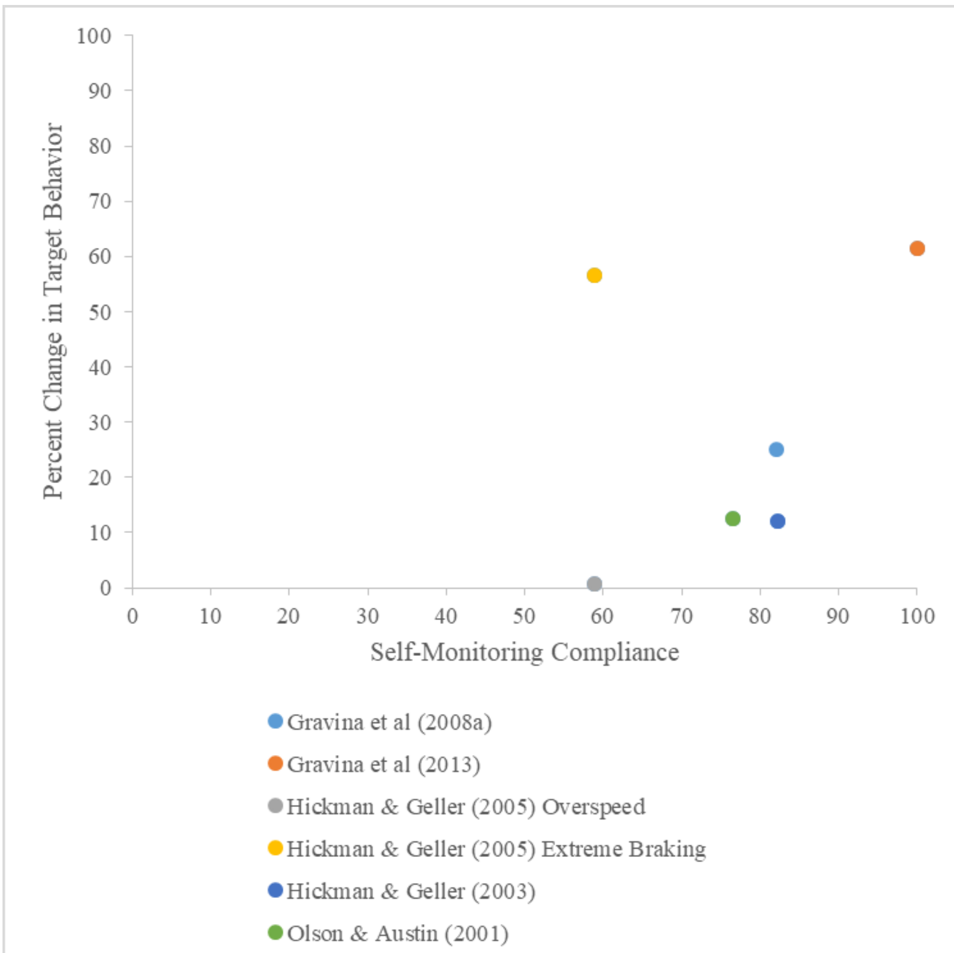

Figure 3. Self-Monitoring Compliance in relation to Change in Target Behavior

An analysis of the relation between self-monitoring compliance and the percent change in target behavior shows Pearson's correlation coefficient to be r=.108. This represents a positive correlation between the rate of compliance with self-monitoring procedures and the change in targeted behaviors, and according to the interpretation presented by Cohen (1988) the effect size is small.

Self-Monitoring Accuracy vs. Self-Monitoring Compliance

Four studies presented both self-monitoring accuracy data and self-monitoring compliance data. Figure 4 displays the relation between self-monitoring compliance and self-monitoring accuracy.

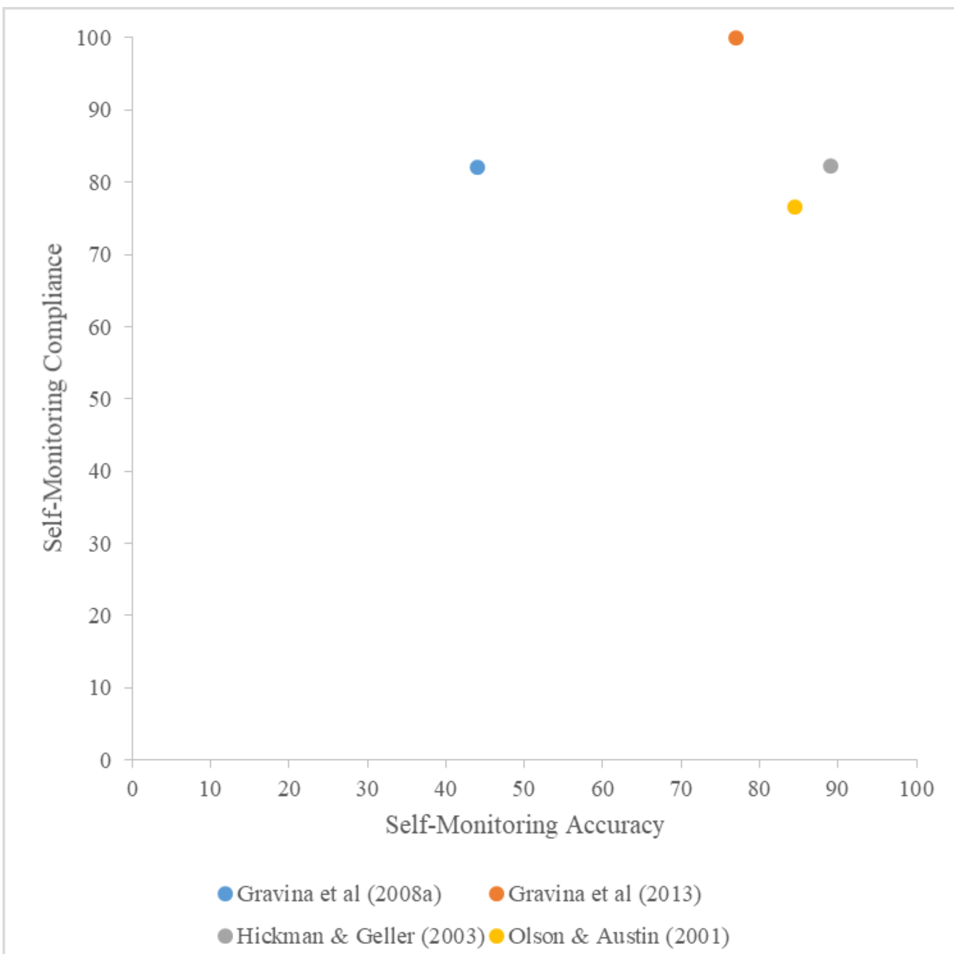

Figure 4. Self-Monitoring Accuracy in relation to Self-Monitoring Compliance

The sample size for this dataset is too small to reliably determine Pearson's correlation coefficient. Gravina et al, (2008a) did not include self-monitoring accuracy training. This could explain the relative inaccuracy of the self-reported data presented in that study, particularly in comparison with Gravina et al (2013), which included a self-monitoring accuracy training component and reported a significant increase in the accuracy of self-monitored data.

CHAPTER 4:

DISCUSSION

This analysis demonstrates small (according to Cohen, 1988), positive correlations between the three measures of focus, self-monitoring accuracy, self-monitoring compliance, and the mean change in target behavior. While this is evidence that increases in self-monitoring accuracy and/or compliance with self-monitoring procedures could lead to more significant changes in the rates of specified safety behaviors, it is far from conclusive. The small correlation could also indicate that the accuracy of self-monitoring procedures is less relevant to the related change in target behavior than the implementation of self-monitoring procedures at all. The implementation of BSM procedures introduces an observer: the individual themselves. The presence of an observer creates reactivity, and that reactivity, rather than a particular level of self-monitoring accuracy, could explain changes in target behavior. The effect of reactivity on participant behavior has been examined in research, and is exemplified by the change in job-coach behavior found by Brackett et al, (2007). The role of the participant as actor and observer could be the significant component of BSM procedures. Regardless, the sample size of qualifying articles was not large enough to permit a conclusive account of the relationship between self-monitoring accuracy and safety behaviors.

When considering the effect size, it is relevant to consider the behaviors in question. A small effect size can indicate a meaningful finding, if the behavior(s) of focus are themselves important. Rosnow and Rosenthal (2003) highlight small effect sizes in medical research, specifically pertaining to studies of the effectiveness of the polio vaccine and of baby asprin's effect on the prevention of heart attacks. Similarly, the small effect size found in the relation between self-monitoring accuracy and the change in specific safety behaviors, could and should be considered important because even a relatively small decrease in the risk of workplace accidents is important.

Further analysis of self-monitoring accuracy and its relation to relevant metrics, particularly the change in targeted safety behaviors, would be beneficial in determining the reliability of self-monitored data and the effect accurate self-monitored data may have on those metrics. Expanding or altering the parameters for inclusion in a future analysis, including expanding the focus of the review beyond safety behaviors specifically to include studies focused on BSM procedures more generally, could also provide a broader sense of the variables that effect self-monitoring accuracy.

Areas of Further Analysis

Studies included in the analysis presented measures other than self-monitoring accuracy, self-monitoring compliance, and the change in target behavior. Gravina et al (2008a) presented the latency of self-monitoring observations, measuring the percentage of opportunities where participants recorded their self-monitored data within 10 seconds following an audio cue. A review of the latency of self-monitoring behavior and its relation to the change in target behavior, as well as its' relation to other relevant measures, could further indicate the value of self-monitored data, maximize the effect of self-monitoring procedures, and provide guidance on implementing self-monitoring procedures for practitioners. A better understanding of latency regarding self-monitoring procedures would inform the practical application of self-monitoring procedures.

Two studies, Gravina et al (2008b) and Hagge (2016), presented data on different aspects of participant preference for self-monitoring procedures. Gravina et al (2008b) found participants significantly favored a 15 minute interval for self-monitoring behavior over a 2 minute schedule, with no significant difference in the change of target behaviors. Hagge (2016) found that participants chose self-monitoring over peer-observations during 75% of opportunities. The further analysis of participant preferences among self-monitoring procedures, or among various methods of observation, and its' relation with the change in target behaviors could also provide insight into the best practice for implementation, particularly among participants who may not be receptive of a behavior change procedure.

Two studies presented both a self-monitoring accuracy measure as well as a measure of participant productivity. Gravina et al (2008a) found a 37.86% increase in productivity, while Sigurdsson & Austin (2008) found an 11% decrease in productivity. Both studies used college student volunteers as participants and targeted safe posture and positioning. A broader analysis of self-monitoring procedures and their relation to productivity, both independent of and in connection with changes in specified safety behaviors, would be beneficial for practitioners in determining the best approach for increasing safe behavior while also either minimizing the lost in productivity or maximizing the increase in productivity.

Limitations

The small number of studies (n=11) included in the review prevents any definitive conclusions regarding the relation between self-monitoring accuracy, self-monitoring compliance, and the change in respective target behavior. An expansion of the review, either through the inclusion of further keywords and databases, the analysis of individual participant data rather than mean data for a study as a whole, or broadening of inclusion criteria, would be required in order to consider any conclusions to be definitive.

The narrow range of target behaviors in qualifying studies, specific safety behaviors, was also a limitation of the review. While the focus of the review was on safety behavior specifically, an exhaustive review of self-monitoring accuracy in relation to change in target behavior could provide a clearer understanding of aspects of BSM, including the accuracy of self-monitored data, and their relation to behavior change. The conclusions of such a review may be applied to behavior change procedures specifically targeting safety behavior, and could inform the best approach for implementation of BBS procedures.

Practical Considerations

The moral obligation of organizations, and consequently those individuals in supervisory, managerial, or administrative positions, to ensure safe working conditions for their members is undeniable. Additionally, ensuring safe working conditions could provide financial benefits to an organization. Unsafe working conditions lead to workplace accidents, which burden an organization through possibly medical or legal expenses, increases in insurance premiums, and potential shortcomings in productivity due to lost time. Depending on the circumstances for a particular organization, these type of burdens could threaten an organization's continued existence.

A better understanding of self-monitoring accuracy, what effect accurate self-monitoring has on the change in target behavior, as well as the various relations between different aspects of BSM procedures and their effects, could allow practitioners to more effectively implement BBS and BSM procedures. Ideally, this would lead to improvements across settings, populations, and specific behaviors relating to workplace safety, and the minimization of workplace injuries and accidents.

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