



UNIVERSITA' DI VERONA
VERONA

XIII WORKSHOP

dei Docenti e dei Ricercatori Universitari di Organizzazione Aziendale
Verona, 28-29 maggio 2012



**Desperately seeking performance
in organizations**

ISBN 978-88-6129-871-2



Error Reporting in the Healthcare.

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Abstract. Errors are an inescapable part of medical activity. The only way organizations might be aware of errors and learn from them is through error reporting. Error reporting is a discretionary individual behavior that reflects the decision of individuals of communicating and disclosing errors to managers or supervisors, either verbally or through formal error reporting system. In this paper, we use the theoretical framework of behavioral reasoning theory to explore the reasoning processes underlying intentions to report errors in the workplace. We also investigate if the severity of error-related consequences might influence individuals' formation of intentions. The findings of this study show that reasons, especially 'reasons against', are significantly associated with individuals' intentions to report or not to report errors in the workplace over and above individuals' attitudes, perceived control, and subjective norms (i.e. global motives). We discuss the implication of this study for theory and practice.

Keywords. Errors, healthcare, behavioral reasoning theory, nursing profession.

Introduction

Errors are an inescapable part of medical practice [1]. The Institute of Medicine (IOM) in two famous reports on this subject [2,3] has documented that medical errors cause in the US thousands of deaths and billions of dollars in legal causes annually. The Italian Association of Oncology [4] has shown that medical errors are responsible of 90 deaths daily, and about 50 thousands annually. Notably, all reports agree that the majority of medical errors are 'absolutely evitable'.

These arguments suggest the need to conduct more studies on error management in the workplace in order to reduce the number of errors, understand the causes of them, individuate strategies to prevent them, and effective interventions to promote the positive consequences of errors. Indeed, errors might affect healthcare providers' motivation and dissatisfaction, patients' safety, quality of care, and the overall costs of the healthcare system. However, if properly managed, errors might be associated with positive consequences for individuals and organizations, in terms of learning and innovation opportunities [5,6].

A great bulk of research has shown that the most beneficial practice to manage errors is encouraging error reporting [5,6]. Error reporting is a discretionary individual behaviour that reflects the decision of individuals of communicating and disclosing errors to managers or supervisors, either verbally or through formal incident reporting

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system [6]. Zhao and Olivera [6] argued that error reporting is a critical activity since “[it] is often the only means by which organizations become aware of errors and of the circumstances leading to them” (p. 1012). Several studies have shown that error reporting has positive consequences for the organizations because it is associated with quick detection and handling of errors [7], error prevention [8], organizational learning [6], victim satisfaction [1], and enhanced trust and safety for what concerns the medical setting [2].

Research on error reporting is at an early-stage and additional studies are necessary to favor a better understating of this behaviour in the workplace. For example, even though intentional models are used to explore major human behaviors in the workplace, scholars have rarely investigated error reporting by adopting major intentional theories such as theory of reasoned action [9], theory of planned behavior [10] or behavioral reasoning theory [11].

In the current article, we aim to overcome some limitations of existing research on error reporting by developing and testing a conceptual model in which intentions to report errors in the workplace are influenced by individual and context characteristics. Specifically, using a sample of Italian nurses we aim to provide a better understanding of error reporting behaviors by adopting the theoretical framework of behavioural reasoning theory [11]

1. Error Reporting and Behavioral Reasoning Theory

A considerable contribution to the understanding of error reporting come from medical setting, where scholars have investigated how individuals experience and decide to report medical errors to colleagues, supervisors, and patients [1,12,13,14]. Recently, Zhao and Olivera [6] have proposed a conceptual model for the analysis of error reporting, arguing that it is as a multistage process including three different steps: error detection, situation assessment, and behavioral responses. The first step, error detection, refers to the extent to which individuals recognize an error made in the workplace. This is an essential and instrumental step because detecting an error is the necessary condition to activate the following stages of the error reporting process. The second step, situation assessment, refers to the extent to which an individual is likely to evaluate costs and benefits associated with reporting before taking the final decision. Finally, the third step, behavioral response, relates to the final decisions to report or not to report errors, and how to disclose them [6].

In this paper, we focus on the second step, the situation assessment, because it is the critical stage of the entire process. We rely on behavioral reasoning theory [11] to capture fundamental determinants of the situation assessment step of the error reporting process. Behavioral reasoning theory provides a useful conceptual model to explain and predict nurses’ error reporting because it allows taking into account pros and cons (labeled ‘reasons for’ and ‘reasons against’) of a human social behavior in addition to traditional antecedents of intentions and behaviors. Behavioral reasoning theory is grounded on models explaining individual intentions to engage in behaviors, and, specifically, on the theory of reasoned action [9] and the theory of planned behavior [10]. Roughly speaking, these theories posit that attitudes toward the behavior, subjective norms, and perceived control predict individual intentions, and that intentions predict behavior. Behavioral reasoning theory extends previous theories by considering the role of context-specific reasons as additional antecedents of

individuals' intentions to engage in a specific behavior [11].

Particularly, reasons have been defined as “the specific subjective factors people use to explain their anticipated behavior” [11; p. 100]. Westaby [11] argued that reasons might highly contribute to the prediction of intentions and behaviors, over and above global motives, because they are self-justifications, which help people make sense of their world, and defend their anticipated behaviors.

Consistent with the conceptual model illustrated in Figure 1, in the next sections we provide a rationale explaining how global motives and context-specific reasons are related to individuals' intentions to report or not to report errors in the workplace.

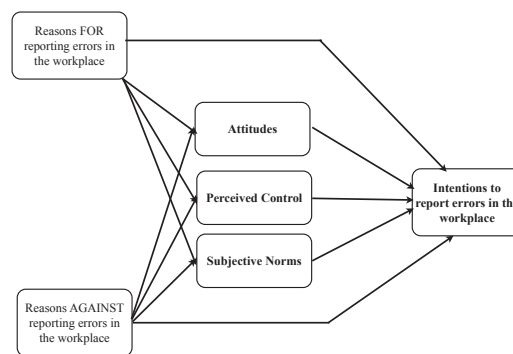


Figure 1. Structural equation modeling of error reporting

1.1. Global motives and error reporting

Theorists of intention models define attitudes toward the behavior, subjective norms, and perceived control like ‘global motives’ predicting human social behaviors [11]. Indeed, attitudes, perceived control and subjective norms are considered ‘global motives’ since they are broad factors that can capture the motivational forces influencing a behavior [10]. In particular, they are indicators of how hard people perceive they can control the behaviors, the consequences associated with it, and feel a social pressure to perform it. Moreover, these motives are ‘global’ because their predictive validity has been validated across numerous studies [15,16,17].

Attitudes toward the behavior refer to personal beliefs that lead an individual to engage in behavior with favorable or unfavorable consequences [10]. Regarding errors, attitudes toward error reporting reflect human beliefs that leading an individual to disclose errors in the workplace might have favorable or adverse consequences for self, the organization, or the victim [1,6,18]. Favorable attitudes toward error reporting in the medical sector relate, for instance, to the belief that disclosing errors in the workplace would increase patient safety and preventability [18]. Instead, unfavorable attitudes relate to beliefs that disclosing an error in the workplace would be detrimental for self-professional image or useless for the organization or potential victims [1]. Existing research has provided empirical evidence that attitudes toward errors are significantly associated with individual intentions to report errors in the workplace [1,18,19].

Subjective norms refer to the extent to which individuals feel a social pressure to perform or not to perform a distinct behavior [10]. With regard to errors, subjective norms refer to the extent to which an individual feels that significant others in the

workplace expect he or she would comply with error prevention and patient safety standards, which, in turn, foster the normative belief that reporting errors is the right thing to do. Existing research has paid low attention to the role of subjective norms in error reporting, even though the evaluation and approval of significant others represent powerful antecedents of various individual behaviors at work.

Finally, perceived control refers to the extent to which an individual perceives the behavior as an easy or difficult thing to perform. Perceived control is influenced by previous experience with a behavior and/or by the perception of anticipated barriers that impede the behavior [10]. With regard to error reporting, existing literature has shown that individual perceptions of the presence of factors that facilitate (i.e. anonymous forms to report) or impede (i.e. excessive time required by completing error reporting procedures) monitoring and communication of errors is significantly related to intentions to report errors [14,18].

To summarize, existing research suggests that attitudes, subjective norms, and perceived control assume a critical role in the prediction of individuals' intentions to report errors in the workplace. In this paper we hypothesize that attitudes toward the behavior, subjective norms, and perceived control over error reporting would be associated with nurses' intentions to report errors in the workplace. Specifically, in a hospital context the more a nurse has favorable attitudes toward error reporting, feels social pressure to do it, and thinks it is easy to report, the higher will be the likelihood to disclose errors in the workplace. Accordingly:

H1: Nurses' global motives (attitudes toward error reporting, subjective norms, and perceived control) are related to intentions to report errors in the workplace.

1.2. 'Reasons FOR' and 'Reasons AGAINST' Error Reporting

Westaby [11] posits that reasons underlying human behaviors have two sub-dimensions: 'reasons for' and 'reasons against'. 'Reasons for' refers to perceived benefits (or pros) that encourage an individual to adopt behaviors, whereas 'reasons against' refers to perceived costs (or cons) that discourage behaviors. 'Reasons for' and 'reasons against' are competing forces, revealing a dichotomous conceptualization of pros and cons, benefits and costs associated with the individual behavior. Reasoning theorists argue that reasons are relevant antecedents of intentions since "[reasons] can place an individual in the mindset of the future with the individual making likely attributions for that future state by evaluating the present" [11, p.101].

The predicting validity of 'reasons for' and 'reasons against' in explaining individual intentions and behaviors has been validated in numerous studies, where the role of reasons has been investigated in association with a number of behaviors in the workplace, such as employee turnover, recruitment, leadership cognition, work-family conflict, and sense-making, just to name a few [11,17,20]. With regard to error reporting, in the literature there are no studies that have directly investigated the role of 'reasons for' and 'reasons against' in association with this behavior. However, even though scholars have not specifically related to behavioral reasoning theory or used the labels 'reason for' and 'reason against', there is evidence that contextual-specific factors have a significant role in the error reporting process. Zhao and Olivera [6] argued, for example, that during situation assessment "individuals attempt to resolve the tension between the reasons to report and not to report, and to decide a specific path of action that is consistent with this assessment" [6, p. 1019]. The evaluation between

costs (i.e. damages for professional reputation) and benefits (i.e. advantages for the organization or victims) of reporting is an illustrative example of how ‘reasons against’ and ‘reasons for’ might be powerful cognitive mechanisms influencing individuals’ intention to report or not to report errors in the workplace. Accordingly:

H2: Nurses’ reasons for (reporting errors in the workplace) are positively related to intentions to report errors in the workplace.

H3: Nurses’ reasons against (reporting errors in the workplace) are negatively related to intentions to report errors in the workplace.

Existing research [11,17] has shown that reasons for and/or against are powerful cognitive mechanisms that can explain individual intentions over and above global motives. In particular, even when an individual has favorable attitudes toward the behavior, perceives the moral obligation to behave in a certain way, or feels that would be easy to perform that behavior (i.e. even when he/she perceives global motives), the likelihood to engage in that behavior would be higher in presence of solid reasons that support it [17]. Consistently, in this paper we posit that reasons (for and/or against) associated with error reporting would contribute to the explanation of intentions to report errors in the workplace over and above global motives. Accordingly:

H4: Nurses’ reasons (for and/or against error reporting) contribute to the explanation of intentions over and above that predicted by global motives (attitudes toward error reporting, subjective norms, and perceived control).

Behavioral reasoning theory postulates two psychological mechanisms on how ‘reasons for’ and ‘reasons against’ might be related to individuals’ intentions [11]. First, it posits that reasons (for and/or against) might be directly related to intentions [17]. This psychological mechanism is grounded on recent intentional models [21,22], which posit that individuals in some circumstances (i.e. because of temporal pressure or crisis) might be likely to simplify their decision-making process, and form their intentions very quickly upon critical and relevant reasons [23]. Second, behavioral reasoning theory posits that global motives partially mediate the relationship between reasons (for and/or against) and intentions to perform the behavior [11]. This psychological mechanism is grounded on traditional intentional models, which posit that an individual tends to rely on a complete processing of their global motives, and not only on reasons, to form intentions to perform or not to perform the behavior.

Relying on these arguments, in this paper we hypothesize that reasons for and/or against error reporting would be associated with intentions directly or indirectly through global motives, and the kind of relationship might depend on outcome severity of errors. There is evidence that error severity influences individuals’ intentions to report errors in the workplace [19]. A study conducted by Schwappach and Koeck [19] has shown that the severity is the most salient factor influencing the choice to disclose errors, since the more the outcome of an error is perceived like severe, the higher will be the likelihood to report it. Consistently, it is plausible to expect that reasons would operate directly on intentions, when the severity of error-related outcomes is high rather than low. In similar circumstances, in fact, an individual might rely only on reasons relevant to the situation to form his or her intentions, without basing upon a complete processing of their global motives. For example, nurses’ reasons for reporting would be quickly shape individuals’ intentions when the circumstances are urgent and critical, i.e. when nurses commit medical errors that might produce serious

consequences on patients. Conversely, reasons would operate indirectly, through global motives, when circumstances are not urgent (i.e. the severity of outcomes is low or moderate), thereby allowing an individual the time to carefully process reasons for and/or against error reporting and global motives to act. Accordingly:

H5: Global motives (attitudes, subjective norms, and perceived control) partially mediate the effect of reasons (for and/or against error reporting) on intentions only when severity of error-related outcome would be low or moderate rather than high.

2. Method

2.1. Sample

Data for the present study were collected during September and December 2011 from five classes of a postgraduate course managed by the Italian National Board of Nursing (I.P.A.SVI.). The sample consisted of 225 nurses working in public hospitals and private clinics in the Campania Region of Italy. A total of 188 self-reported questionnaires were completed (83.5 percent). Of the 188 participants, 58.0 percent were women. The mean age of respondents was 38.8 years (SD = 8.82), and mean tenure in the nursing profession was 13.8 years (SD = 6.1). The education breakdown was as follows: “High school” (38.3 percent), “Three-year degree” (31.9 percent), “Five-year degree” (4.8 percent), and “Master” (25 percent).

2.2. Measures

Intentions to report errors. We used the scenario technique to assess nurses’ intentions to report errors in the workplace. We presented nurses with a medical error concerning the case of administration of cephalosporin antibiotic to a patient with documented allergy to this drug. In addition, we illustrated three different scenarios with low, moderate, and high serious outcomes in order to measure nurses’ intentions at different levels of severity of error-related consequences. In the first scenario, the medical error did not cause serious consequences on patient health. In the second scenario, the medical error caused moderate consequences (e.g. slight tingling). Finally, in the third scenario the patient reported serious consequences, such as respiratory distress and a moderate myocardial infarct, which required transferred to the intensive care unit. Then, nurses were asked to indicate the degree they intended to report errors on a 5-point scale from 1 (“very unlikely”) to 5 (“very likely”) for each one of the presented scenarios. Items are “I will be reporting errors in the workplace”; “I intend to report errors in the workplace”, and “I do NOT intend to report errors I do” (reversed). The Cronbach alpha were .75 (first scenario = no health problems), .78 (second scenario = moderate health complications), and .77 (last scenario = serious health complications).

Global motives. The global motives consisting of attitude, subjective norms and perceived control toward error reporting were measured using three scales developed for the purposes of the research. Attitudes were measured using three items. A sample item is: “It would be good for me to report errors at work”. Subjective norms were measured using three items. A sample item is: “Most people important to me think I should report errors at work”. Finally, three items were used to measure perceived control. A sample item is “Reporting errors at work will be easy for me to

do”. Cronbach alpha were .76 for attitudes, .78 for perceived control, and .77 for subjective norms.

Reasons. Items for measuring reasons for and reasons against error reporting were developed with the help of nurses in nominal groups and readings on the topic. To measure specific “Reasons for” error reporting, nurses were presented with the following statement first: “The Reasons FOR Reporting Errors At Work”. After this, nurses rated the degree to which each of the categories represented their reasons for reporting error in the workplace on 4-point scale (1 = “not a reason”; 2 = “a slight reason”; 3 = “a moderate reason”; 4 = “a strong reason”). Reasons for are listed in Table 7 (alpha = .71). “Reasons against” were prefaced with the following statement: “The Reasons Against Reporting Errors at Work”. Nurses rated the degree each of the categories represented a valid reason against error reporting. Reasons Against are listed in Table 8 (alpha = .88)

Control variables. Tendency and attitudes to forgiveness were included as control variables. Tendency and attitudes forgiveness were measured using Brown’ [24] scale, which is composed of ten items. Tendency to forgiveness was measured with a 4-item scale, which assesses the extent to which respondents are likely to experience forgiveness when they have been wronged by others. Attitudes to forgiveness were measured using a 6-item scale. Sample items are: “I tend to get over it quickly when someone hurts my feelings” (tendency to forgiveness); “It is admirable to be a forgiving person” (attitudes to forgiveness). Cronbach alpha coefficients were .78 for tendency to forgiveness and .72 for attitudes to forgiveness.

3. Results

Mean, standard deviations and correlations are illustrated in Table 1. The results partially support the path of hypotheses. To test the hypotheses, AMOS 18.0 with maximum likelihood estimation was used. We first tested the measurement model, and then the hypothesized linkages in the conceptual framework via structural equation modeling (SEM) [25]. Finally, bootstrap procedures for multiple mediation models described by Preacher and Hayes [26] were used to estimate the indirect association of reasons with intentions to report errors in the workplace at different levels of severity of error-related consequences.

Table 1. Correlations, means, and standard deviation

| | Mean | S.D. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|--|------|------|---|--------|--------|---------|---------|------|--------|---------|---------|---------|--------|-------|
| 1. Attitudes | 4.21 | .69 | 1 | .25*** | .36*** | .285*** | -.29*** | .04 | .20*** | -.04 | -.08 | -.11 | .00 | -.78 |
| 2. Perceived Control | 3.33 | .08 | | 1 | .21*** | .17** | -.23*** | .05 | .03 | .18** | .22*** | .18*** | .26*** | .13 |
| 3. Subjective Norms | 3.68 | .77 | | | 1 | .25*** | -.44*** | -.04 | .20*** | -.11 | -.25*** | -.28*** | .11 | .08 |
| 4. Reasons FOR | 3.03 | .43 | | | | 1 | .03 | -.04 | .08 | .04* | .11* | .01* | .08 | -.00 |
| 5. Reasons AGAINST | 1.76 | .63 | | | | | 1 | .02 | -.10 | -.27*** | -.27*** | -.33*** | .00 | .03 |
| 6. TTF | 2.92 | .77 | | | | | | 1 | .24*** | .01 | -.03 | .04 | -.01 | .18** |
| 7. ATF | 3.35 | .46 | | | | | | | 1 | -.04 | -.07 | -.08 | -.04 | -.08 |
| 8. Intentions not Serious Consequences | 2.60 | .91 | | | | | | | | 1 | .57*** | .38*** | -.01 | .05 |
| 9. Intentions Moderate Consequences | 2.36 | .91 | | | | | | | | | 1 | .61*** | -.07 | .00 |
| 10. Intentions Serious Consequences | 2.12 | .93 | | | | | | | | | | 1 | -.07 | .06 |
| 11. Age | 38.8 | 8.8 | | | | | | | | | | | 1 | .06 |
| 12. Gender | n.a. | n.a. | | | | | | | | | | | | 1 |

Notes: N = 188; *** p < 0.001; ** p < 0.05

3.1. Measurement model

The majority of latent variables in the model were fit with multiple single-item manifest indicators. We also tested the “reasons for” versus “reasons against” distinction. The principal components factor analysis using oblique rotation showed that a two-factor solution explained the largest portion of the reason data. The Eigenvalue for “reasons for” was 6.9 (23.02% of variance) and for “reasons against” was 3.38 (11.27% of variance). The measurement model indicated that the model was admissible (see Table 2).

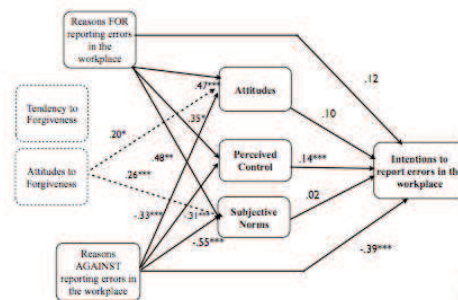
3.2. Structural equation model

To specify the hypothesized model, we fit paths in accordance with central hypotheses in behavioral reasoning theory. For Model I, which is related to the hypothesized conceptual model, goodness of fit indicated that the proposed model adequately represented the data ($\chi^2 = 1220,56$ $df = 701$; RFI= .71; TLI = .96; CFI=.92; RMSEA = .059). Hypothesis 1 was partially supported because only perceived control was significantly related to intentions to report errors in the workplace. Instead, attitudes and subjective norms were not significantly related to intentions to report errors in the workplace. Hypothesis 2 was not supported since ‘reasons for’ were not significantly related to intentions. Hypotheses 3 was supported since ‘reasons against’ were significantly related to intentions. Hypotheses 4 was partially supported because ‘reasons against’ contributed to the explanation of errors over and above global motives. Findings of the SEM are summarized in the Figure 2.

Table 2. Comparisons of structural equation models

| Model | χ^2 | df | GFI | RFI | TLI | RMSEA | CFI |
|---|----------|-----|-----|-----|-----|-------|-----|
| One-factor model | 2165.8 | 819 | .68 | .53 | .63 | .094 | .66 |
| Measurement model | 1710.94 | 805 | .91 | .68 | .89 | .069 | .84 |
| Latent method factor model | 1590.86 | 740 | .95 | .70 | .89 | .064 | .91 |
| <i>Conceptual model</i> | | | | | | | |
| Model I: Behavioral Reasoning linkages to error reporting | 1220.56 | 701 | .97 | .71 | .96 | 0.59 | .92 |

Notes: $N = 188$



Dashed arrows indicate path for control variables. In the figure only significant paths have been reported for control variables.

Figure 2. Findings

3.3. Mediation model

The bootstrap procedure to test for multiple mediators uses ordinary least square regression to estimate coefficients, and 1,000 bootstrap sample to construct confidence intervals for the indirect relationships. Table 3, 4 and 5 present point estimates and bias-corrected and accelerated bootstrap confidence intervals (BCa CI) based on 1,000 bootstrap samples, for both simple and multiple mediator models at different level of severity of error-related consequences (low, moderate, and high). Differently to what hypothesized, the results indicated that the effect of reasons against on intentions to report errors in the workplace are partially mediated by global motives only when the severity of error-related consequences is high rather than low or moderate. Instead, when the consequences of errors are not severe or moderately severe, the effects of reasons against on intentions are not mediated, which means that reasons against operate independently on global motives and intentions. Therefore, hypothesis H5 was not supported by data.

Table 3. Direct, total, and indirect effects of Reasons Against on Intentions to report error in the workplace through global motives when error-related consequences are not severe (path ab)

| Variable | B | S.E. | t | p |
|---|----------------|-------|---------|--------|
| <i>Reasons against to mediators (a paths)</i> | | | | |
| Attitudes | -.319 | .0771 | -4.1393 | .0001 |
| Perceived Control | -.305 | .0911 | -3.3566 | .0000 |
| Subjective Norms | -.546 | .0814 | -6.7196 | .0000 |
| <i>Direct effects of mediators on intentions (b paths)</i> | | | | |
| Attitudes | .0816 | .1031 | .7913 | .4298 |
| Perceived Control | .1569 | .0844 | 1.858 | .0547 |
| Subjective Norms | .0063 | .0965 | .0649 | .9484 |
| <i>Total effects of reasons against on intentions (c path)</i> | | | | |
| Reasons Against | -.3960 | .1028 | -3.853 | .0002 |
| <i>Direct effects of reasons against on intentions (c' path)</i> | | | | |
| Reasons Against | -.3774 | .1169 | -3.229 | .0015 |
| Bootstrap BCa 95% CI | | | | |
| | Point Estimate | S.E. | Lower | Upper |
| <i>Indirect correlation of work-family enrichment via mediators (bootstrap results)</i> | | | | |
| Total indirect | -.0185 | .0210 | -.0025 | -.0697 |
| Attitudes | -.0260 | 0.289 | -.0029 | .0350 |
| Perceived Control | -.1480 | .0506 | -.0026 | .0342 |
| Subjective Norms | -.0034 | .0006 | .0028 | .0615 |

BCa, bias-corrected and accelerated bootstrapping confidence intervals. Estimate based on 5,000 bootstrap samples. Model summary: R-sq = .0922; Adj R-sq = .0724; F = 4.64 (p < .05).

Table 4. Direct, total, and indirect effects of Reasons Against on Intentions to report error in the workplace through global motives when error-related consequences are moderately severe (path ab)

| Variable | B | S.E. | t | p |
|---|----------------|-------|---------|--------|
| <i>Reasons against to mediators (a paths)</i> | | | | |
| Attitudes | -.319 | .0771 | -4.1393 | .0001 |
| Perceived Control | -.305 | .0911 | -3.3566 | .0000 |
| Subjective Norms | -.546 | .0814 | -6.7196 | .0000 |
| <i>Direct effects of mediators on intentions (b paths)</i> | | | | |
| Attitudes | .0731 | .1021 | .7156 | .4752 |
| Perceived Control | .1216 | .0836 | -1.454 | .1476 |
| Subjective Norms | -.2120 | .0956 | -2.217 | .0278 |
| <i>Total effects of reasons against on intentions (c path)</i> | | | | |
| Reasons Against | -.5052 | .1028 | -4.812 | .0000 |
| <i>Direct effects of reasons against on intentions (c' path)</i> | | | | |
| Reasons Against | -.3755 | .1158 | -3.242 | .0014 |
| Bootstrap BCa 95% CI | | | | |
| | Point Estimate | S.E. | Lower | Upper |
| <i>Indirect correlation of work-family enrichment via mediators (bootstrap results)</i> | | | | |
| Total indirect | -.1297 | .0210 | -.0011 | -.0668 |
| Attitudes | -.0233 | 0.289 | .0018 | .0315 |
| Perceived Control | -.1842 | .0506 | -.0006 | .0273 |
| Subjective Norms | .1159 | .0209 | -.0001 | .0547 |

BCa, bias-corrected and accelerated bootstrapping confidence intervals. Estimate based on 5,000 bootstrap samples. Model summary: R-sq = .1227; Adj R-sq = .1035; F = 6.49 (p < .001).

Table 5. Direct, total, and indirect effects of Reasons Against on Intentions to report error in the workplace through global motives when error-related consequences are highly severe (path ab)

| Variable | B | S.E. | t | p |
|---|----------------|-------|---------|--------|
| <i>Reasons against to mediators (a paths)</i> | | | | |
| Attitudes | -.319 | .0771 | -4.1393 | .0001 |
| Perceived Control | -.305 | .0911 | -3.3566 | .0000 |
| Subjective Norms | -.546 | .0814 | -6.7196 | .0000 |
| <i>Direct effects of mediators on intentions (b paths)</i> | | | | |
| Attitudes | .0920 | .1007 | .9141 | .3619 |
| Perceived Control | .1800 | .0824 | -2.184 | .0002 |
| Subjective Norms | -.2011 | .0942 | -2.134 | .0341 |
| <i>Total effects of reasons against on intentions (c path)</i> | | | | |
| Reasons Against | -.3951 | .1020 | -3.873 | .0001 |
| <i>Direct effects of reasons against on intentions (c' path)</i> | | | | |
| Reasons Against | -.2595 | .1141 | -1.873 | .0641 |
| Bootstrap BCa 95% CI | | | | |
| | Point Estimate | S.E. | Lower | Upper |
| <i>Indirect correlation of work-family enrichment via mediators (bootstrap results)</i> | | | | |
| Total indirect | -.1356 | .0210 | -.0019 | -.0649 |
| Attitudes | -.0294 | 0.289 | -.0024 | .0305 |
| Perceived Control | -.1250 | .0506 | -.0003 | -.0296 |
| Subjective Norms | .1099 | .0209 | .0039 | .0622 |

BCa, bias-corrected and accelerated bootstrapping confidence intervals. Estimate based on 5,000 bootstrap samples. Model summary: R-sq = .0922; Adj R-sq = .0724; F = 4.64 (p < .05).

4. Discussion

The central aim of this paper was to investigate error reporting among healthcare providers using the theoretical framework of the behavioral reasoning theory. Results provided support for the theory. First, the findings support the behavioral reasoning linkages by showing that global motives are related to intentions. In particular, the findings show that perceived control has the greatest influence on intentions to report errors in the workplace over and above attitudes and subjective norms. Indeed, when individuals perceive that reporting errors is an easy thing to perform, they would be more likely to report them. This result is consistent with major literature on the topic [1,14], which argue that one of the greatest barriers to error reporting is the perceived

difficulty to report, related for instance to the absence of forms for reporting errors and the emotional burden associated with it.

Second, the results of this study highlight that context-specific reasons are independently related to intentions, which also demonstrate the incremental predicting validity of reasons over and above global motives [17]. In particular, the results show that 'reasons for' and 'reasons against' are both significantly correlated with global motives and intentions to report error in the workplace. However, only 'reasons against' are significantly related to intentions in the structural equation modeling; thereby suggesting that 'reasons against' are the strongest predictors of intentions to report errors in the workplace than 'reasons for'.

Finally, contrary to what hypothesized, global motives partially mediate the relationship between reasons and intentions only when severity of error-related consequences is high. This practically suggests that when the consequences of errors are not severe or moderately severe, individuals tend to quickly form their intentions by relying primarily on reasons relevant to the context rather than on attitudes, perceived control or subjective norms. Instead, when the consequences of errors are severe, individuals tend to form their intentions by relying on a complete processing of reasons and global motives underlying error reporting.

This paper provides a considerable theoretical contribution to error reporting and behavioral reasoning theory literatures. First, this paper is the only study that attempts to integrate behavioral reasoning theory, and thereby major intentional models, in an analysis of error reporting. So doing, it contributes to overcome a limitation of existing research that has paid scant attention to intentional models in the analysis of this behavior, with the exception of a single study focused on patients' perspective [see 18]

Behavioral reasoning theory is extremely useful because it allows considering arguments and counterarguments reasons associated with error reporting. This reflects the individual's assessment of costs and benefits indicated by Zhao and Olivera [6] as the most powerful cognitive mechanism influencing intentions to report errors, and that, in decision-making literature, have been shown to be highly influential in persuasion and behavioral change [27].

This study also contributes to behavioral reasoning literature by extending the application of behavioral reasoning theory to other fundamental behaviors in the workplace. To date, in fact, behavioral reasoning theory has been studied in association with a number of behaviors such as turnover [11], leadership decision-making [17], and work-family conflict [20]. The application of this theoretical paradigm to error reporting might indeed contribute to corroborate the predicting validity of this theory, and reinforce its role in the literature on intentional models.

Finally, this study contradicts recent models explaining individual behaviors, which assume that decision-making processes are simplified in critical circumstances. Specifically, recent models assume that individuals tend to form their intentions very quickly, without carefully evaluate all factors, but only relying upon critical and relevant reasons [22,23]. In the current study, reasons quickly shape intentions to report errors only when circumstances are not severe, i.e. when the consequences of errors are perceived as low or moderate. Instead, when circumstances are severe individuals tend to rely on a systematic processing of all information (reasons and global motives) before deciding if to report or not to report errors. A possible explanation for this result might lie in the nature of the behavior studied in comparison with other studies on decision-making processes. Error reporting is a specific behavior highly influenced by

emotions [6]. Zhao and Olivera [6] argued that negative emotions, such as anger, guilty, blame or shame may strongly influence error reporting, by increasing the weight of the negative part (costs or ‘reasons against’) of the trade-off evaluation. Hence, it is plausible to think that when a trivial error occurs, nurses tend to feel anger or self-blame due to the avoidable mistake. In this circumstance, nurses might tend indeed to rely on cognitive shortcuts rather than on more systematic reasoning in their decision if to report or not to report the error. Instead, when the error is serious, and might produce serious consequences for self and the others, individuals might tend to rely on a systematic processing of contextual-factors and global motives to take the final decision if to report or not report errors in the workplace.

The current research has interesting implications for management. A careful consideration of ‘reasons for’ and ‘reasons against’ may allow management to design more effective interventions to foster error reporting in the workplace. For example, the analysis of ‘Reasons for’ category in the current study reveals that on average (i) ethical concerns, (ii) worry for potential victims, (iii) moral obligations, and (iv) prevention for future errors are the most influential contextual factors leading nurses to the intentions to report error in the workplace (see Table 6).

Table 6. Reasons FOR Reporting

| | Reason | Mean | s.d. |
|-----|--|-------------|-------------|
| 1. | It helps avoid work errors in the future. | 3.77 | 0.56 |
| 2. | It is the ethical thing to do. | 3.68 | 0.68 |
| 3. | It helps us avoid more serious consequences. | 3.68 | 0.68 |
| 4. | I feel a moral obligation to report them. | 3.54 | 0.69 |
| 5. | It is beneficial for potential victims. | 3.62 | 0.77 |
| 6. | It is beneficial to my personal learning. | 3.41 | 0.85 |
| 7. | It is important for the organization. | 3.10 | 1.03 |
| 8. | It is beneficial to my self-concept. | 3.00 | 1.19 |
| 9. | It is beneficial to my professional reputation. | 2.99 | 1.06 |
| 10. | Lawsuits could occur if I do not report them. | 2.91 | 1.07 |
| 11. | There are a lot of errors occurring at work. | 2.75 | 1.10 |
| 12. | It is mandatory. | 2.72 | 1.25 |
| 13. | It helps alleviate my feelings of guilt. | 2.62 | 1.17 |
| 14. | It would prevent my supervisor or colleagues from getting upset. | 2.11 | 1.12 |
| 15. | My organization rewards people who report errors | 1.67 | 1.09 |

Table 7. Reasons AGAINST Reporting

| | Reason | Mean | s.d. |
|-----|---|-------------|-------------|
| 1. | We lack specific procedures and forms for it. | 2.08 | 1.17 |
| 2. | It could cause lawsuits. | 2.02 | 1.12 |
| 3. | My job or position could be at risk. | 1.91 | 1.10 |
| 4. | I do not know how to report them. | 1.85 | 0.97 |
| 5. | It would be emotionally difficult. | 1.84 | 0.96 |
| 6. | I do not know what should be reported. | 1.82 | 0.96 |
| 7. | It could be detrimental to my professional reputation. | 1.81 | 1.01 |
| 8. | My organization punishes people who make errors | 1.79 | 1.09 |
| 9. | It is detrimental for my self-concept. | 1.76 | 1.07 |
| 10. | I do not know if the error reporting is helpful. | 1.73 | 1.02 |
| 11. | We do not have many errors at work. | 1.74 | 1.00 |
| 12. | It would cause me extra-work. | 1.61 | 0.97 |
| 13. | It is unnecessary because the errors are insignificant. | 1.56 | 0.87 |
| 14. | It would take too much time. | 1.47 | 0.84 |
| 15. | I am not interested in reporting. | 1.44 | 0.86 |

Similarly, the analysis of “Reasons against” category corroborates the importance of perceived control among global motives in error reporting. Indeed, it is worth noting that on average the most relevant contextual ‘reasons against’ negatively related to

intentions to report errors in the workplace are (i) the lack of procedures to report errors, (ii) the fear of lawsuits, (iii) the risk for job positions, and (iv) the lack of knowledge on how to report (see Table 7).

The analysis of reasons practically suggests that organizational interventions aiming at encouraging error reporting should be primarily addressed to the introduction of forms/procedures to report errors. To testify the validity of this intervention, we briefly report the experience of an Italian public hospital located in the South of Italy (Public Hospital “Madonna delle Grazie”, Matera) that after the introduction of a dedicated form to collect errors (“Cartella Segnalazione Eventi”) has registered a boost in the number of errors disclosed by healthcare providers. The form was firstly introduced in the “emergency department” (Italian “Pronto Soccorso”) and it is divided in three parts: a demographic section where the operator can indicate self and victims’ information (the form can be also filled anonymously), an informative section where the operator indicates what happened, time, department where the error occurred, and the type of error (human, equipment, procedure), and a technical section where the operator can indicate the corrective interventions performed and expected consequences of the error. In this way, the hospital management has been able to discover that the majority of errors occur during the initial diagnostic visit in the emergency room, and that the majority of errors occur during the night shift. The introduction of the form was judged as extremely helpful for the hospital since it helped management to properly intervene on the reduction of the number of errors in the hospital, with detailed information on where to intervene and when.

However, the only introduction of procedures is a necessary but not sufficient condition to encourage error reporting. Indeed, it might be also beneficial to develop training program that may help employees to use these forms, through the development of written guidelines containing rules and organizational policies related to error reporting. To this end, because one of the most influential ‘reasons against’ error reporting concerns potential risks for the job position, we suggest that it might be suitable to indicate in the guidelines that reporting an error would not have any personal consequence on job security or professional career.

In addition, interventions aimed at fostering an appropriate error culture in the workplace are mostly welcomed. Existing literature highlights that even though the great organizational efforts in fostering an organizational culture grounded on the principle “error is human”, employees are still reluctant to report errors in the workplace [6]. The analysis of reasons suggest that more than relying on principles like “error is human” or “reporting error is mandatory” or “errors might cause lawsuits”, managers should emphasize the organizational culture principles like “reporting errors is ethical”, “it is the right thing to do”, “it is useful to prevent serious consequences”, and “it is beneficial for learning”. So doing, managers might enhance the feelings of moral obligations and ethics among healthcare providers, that are instrumental to stimulate error reporting.

The current paper has several limitations. First, it relies on cross-sectional data with measures collected in a single moment, which may raise some concerns regarding causality among the variables investigated. There is, therefore, a need to conduct further research with a longitudinal design that makes possible to track error reporting over time as well to examine the role of external constrains, such as time pressure or temporal orientation [17] in the decision to report or not to report errors in the workplace. Second, this study does not directly measure error reporting but only intentions to report. Even though intentions are a significant predictor of actual

behavior [15], further research is necessary to directly measure error reporting, by analyzing, for example, internal hospital records that are possible when electronic procedures to collect errors are activated.

Despite these limitations, the current research makes a significant contribution to error reporting research. It is one of the first studies that examine the potential antecedents of error reporting using the behavioral reasoning theory. Therefore, it provides a systematic examination of error reporting through the consideration of 'reasons for' and 'reasons against' as well as of individual global motives influencing intentions to report error in the workplace. So doing, this study provides a better understanding of cognitive mechanisms underlying this fundamental behavior in the workplace.

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