What works in safety

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What works in safety. The use and perceived effectiveness of 48 safety interventions

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ABSTRACT

In the Netherlands, approximately 2.300 workers have a serious reportable accident at work every year, of which around 60 are fatal (Inspectie SZW, 2020; Bellamy et al., 2014). Safety practitioners employ many methods to improve occupational safety for workers within their companies. Interventions might, for example, be aimed at improving companies' overall 'safety culture', at the introduction of a safety management system (e.g. Robson et al., 2007), or at improving the compliance of workers to specific safety rules (e.g. Peuscher and Groeneweg 2012; Bryden et al., 2016). However, the effectiveness of many of those interventions remains largely unclear (Dyreborg et al, 2015). The Dutch National Institute for Public Health and the Environment (RIVM) has started a project with the ultimate goal of developing a database filled with effective safety interventions. Developers can submit their interventions using a fixed protocol. To support this project, we developed a survey, which was sent to all members of the Dutch Society for Safety Science (NVVK). In the survey, we used a list of 48 predefined descriptions of common interventions. Respondents could indicate whether they made use of these common interventions and the extent to which they considered these effective. The survey thus provided an extensive overview of the use and perceived effectiveness of 48 specific safety interventions. In the future, these insights can support the development and testing of more effective safety interventions.

1. Introduction

In the Netherlands, approximately 2.300 workers have a serious reportable accident at work every year, around 60 of which are fatal (Inspectie SZW, 2020; Bellamy et al., 2014). The (in)direct consequences of fatal and non-fatal work-related accidents for victims, organisations and society have been documented extensively. Examples are loss of life, lost working years and lost productivity, and the agony of victims and the grief of their direct family (e.g. Pedersen, Nielsen & Kines, 2012).

Safety practitioners employ different interventions to improve safety within their companies. Such interventions have been defined in different ways. Robson et al. (2001), for example, define an intervention as "an attempt to change how things are done in order to improve safety. Within the workplace it could be any new program, practice or initiative intended to improve safety" (p. 1). Masi & Cagno (2015) define an occupational health and safety intervention as "an attempt to improve safety and health conditions in workplaces by means of targeted activities and initiatives." (p. 227). Another definition comes from Oyewole and colleagues (2010): "A safety intervention could be described as an attempt to alter or change how things are done in order to improve safety" (p. 585).

These definitions are different but clearly related, key elements appear to be that safety interventions are:

- Goal oriented (e.g. towards improving occupational safety).
- Systematic and intentional (e.g. programs, targeted activities).
- An approach which is aimed at changing routine(s) or any other aspect of work possessing a status quo, i.e. how work is usually done.

2. Safety interventions are varied and multifaceted

With respect to this project, we considered a requirement for

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changing routines or status quo aspects of work to be overly constraining. If an approach is continuous and embedded within the organisation it could, in our view, still be defined as a safety intervention, provided it is goal-oriented and systematic. We therefore define a safety intervention as: "an intentional effort to systematically improve 'safety' within a work organisation through a series of actions, measures and/or steps which are seen as related to each other".

Over the years, many interventions and intervention strategies aimed at reducing occupational injuries and deaths have been implemented and tested (Pedersen, Nielsen & Kines, 2012). Other interventions are aimed specifically at a specific domain of safety such as a hazard and operability (HaZOP) study focused on process safety (Kletz, 1999). Some techniques such as the bowtie method (e.g., De Ruijter & Guldenmund, 2016) can be applied more generally for improving process safety or for other (personal) safety risks (e.g., Bellamy et al, 2007). Interventions are diverse and can be focused on the organisation as a whole, for example interventions that attempt to improve the safety climate in an organization (e.g., Bronkhorst, Tummers and Steijn, 2018), or to improve the compliance of workers to specific safety rules (e.g., Peuscher and Groeneweg, 2012; Bryden et al., 2016), or that introduce a safety management system (e.g. Robson et al., 2007), or a safety and health program (Oyewole et al., 2010). Other types of interventions might be directed at specific groups (e.g., migrant workers (Caffaro et al., 2017)) or specific accident scenarios (e.g., the prevention of falls (Goh & Goh, 2016)).

Evaluating whether these interventions are indeed effective in improving safety is, of course, important (Pedersen, Nielsen & Kines, 2012). However, evaluations of interventions are difficult to carry out. In the normal daily practice of a company, interventions to improve safety "do not come in single, neat packages allowing clear before and after assessment of their effect on performance" (Hale et al., 2010, p. 1027–1028). In addition, effects may be relatively small, which requires a larger sample size and sample period than is commonly used (Hauer, 1997).

We note that many interventions have multiple desired outcomes. They may include different output measures directly related to safety, such as the number of accidents or the time absent from work (Hale et al., 2010). In addition, safety interventions may be related to other outcome measures such as workplace productivity (Robson et al., 2007) and/or intermediate variables such as reporting unsafe or dangerous situations (Hale et al., 2010), employee safety knowledge or safety climate (Robson et al., 2007).

The outcomes of an intervention are not only determined by the intentional characteristics of the approach which is undertaken, the intervention's 'working ingredients', but are also influenced significantly by other (contextual) factors (Nielsen & Miraglia, 2017). Moreover, it is almost never possible, or ethical, to randomly select companies or teams as case or control group (Pedersen, Nielsen & Kines, 2012). Several studies concerning safety interventions carried out in the construction sector also conclude that it is difficult to determine the effectiveness of safety interventions in this sector and that more or better research is needed (e.g., Lowe et al., 2020; Mullan et al., 2015; Van der Molen et al., 2018). Van der Molen and colleagues conclude from their systematic review that *"The vast majority of interventions to adopt safety measures recommended by standard texts on safety, consultants and safety courses have not been adequately evaluated"* (2018, p. 2).

Process evaluation studies have shown that many other factors than just the intervention can influence differences between the control and case groups (Nielsen et al., 2006). Many studies therefore emphasize that also contextual factors are crucial in understanding the effectiveness of an intervention (e.g., Abildgaard, Saksvik & Nielsen, 2016; Masi & Cagno, 2015; Nielsen et al., 2006; Pedersen, Nielsen & Kines, 2012, Robson et al., 2007*)*. Overall, we can state that studying safety interventions is challenging, as these are not defined unambiguously, are difficult to isolate and study within companies, are often multi-faceted and may work differently depending on (organisational) contextual factors. Despite these difficulties, many (safety) practitioners who work at companies still develop, adapt and implement many different safety interventions. In the present study we attempt to gain more insight into the experiences of these practitioners. This study aims to: (1) Identify the types of safety interventions implemented by practitioners; (2) Provide insight into the considerations of those practitioners when they choose to implement or select a type of intervention; and, (3) Assess the perceived effectiveness of these interventions.

3. Method

We carried out a survey to study which interventions Dutch safety practitioners implement in their companies and the extent to which they perceive these interventions to be effective. The development and administration of the survey was a collaborative effort of the Dutch National Institute for Public Health and the Environment (RIVM), TNO Leiden and Delft University of Technology.

The survey consisted of four main parts relevant for the current paper:

1. Inventory of interventions (What does your company do regarding safety interventions?)
2. Effect of the intervention (What intervention has improved safety in your company most?)
3. Aspects of the intervention strategy (e.g., Why do you choose one intervention over another?)
4. Examples of 'hits' and 'misses' (Describe an intervention that you would recommend to others and one you do not endorse?).

It is perhaps important to point out that we asked about safety interventions in general and not about interventions aimed at a specific safety area, like occupational safety or process safety, or specific safety outcomes, like spills or accidents. This way, we hoped to reach a broad range of safety professionals as well as collect information about the many types of interventions they used.

4. Participants

We administered the survey in cooperation with the NVVK, the professional body for safety practitioners in the Netherlands. NVVK-members mostly have a technical background but must also have competencies that allow them to cooperate effectively within a work organisation. The professional body emphasises those skills and defined core competencies for safety practitioners. For example, safety practitioners should be able to advice convincingly on matters of both content and process, should have reflective ability, should be able to carry out a critical analysis and be independent (Beroepsprofiel Veiligheidskundige, NVVK, 2018). The NVVK regularly sends email messages to all its members, which typically work as safety practitioners in, for example, safety departments, HR departments or as independent consultants. We invited all NVVK-members to participate in the survey, and indeed 297 members did participate (approximately, a 12 percent response rate). These practitioners work in many different sectors, with the majority working in industry (35 %), building and construction (9 %), and at public service organisations such as waterworks (8 %), with the remaining practitioners (48 %) working in a range of other sectors, such as healthcare, utilities and transport. Practitioners from the chemical industry operated at both the more strictly regulated SEVESO companies as well as non-SEVESO companies. A substantial proportion of the respondents (22 %) worked in companies where accidents were quite rare. Participants reported the so-called 'Lost Time Injury Frequency' (LTIF) statistic for these companies to be below 1 accident leading to days away from work per 1 million hours worked.

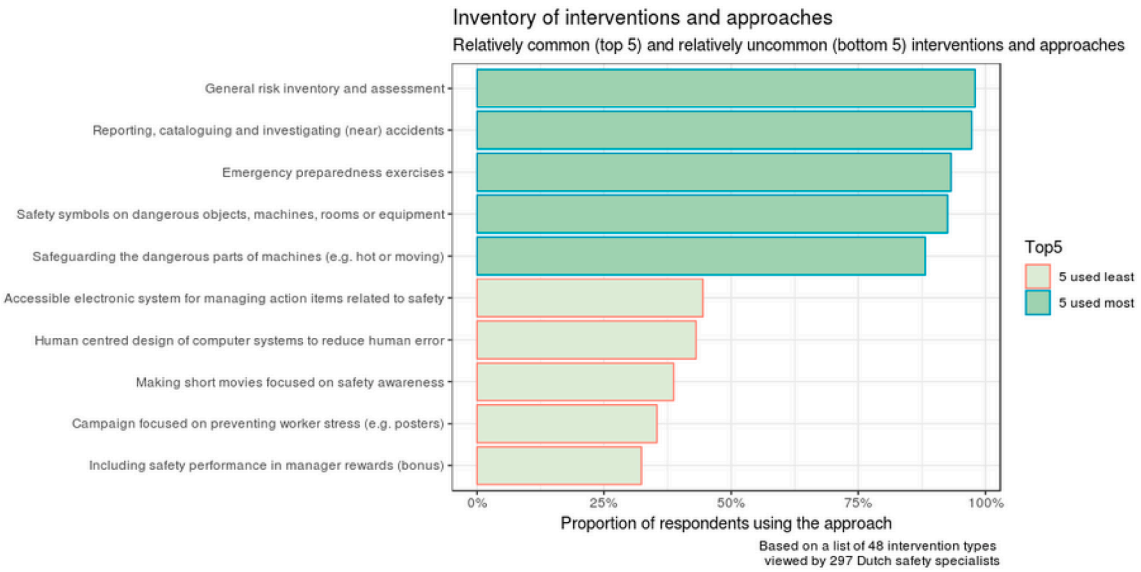

Fig. 1. Relatively common (top 5) and uncommon (bottom 5) interventions and approaches.

5. Survey development

We expected that safety practitioners would typically be using several different interventions and approaches at the companies where they worked. Therefore, we decided to develop a survey with a structured response format, which could help respondents to take a broad and comprehensive view on the interventions within their companies. Some open-ended questions were included as well in order to collect additional narrative descriptions of interventions. As a first step it was necessary to create a limited list of common types of interventions, developed by brainstorming with experts, with an additional round of feedback using a pre-test. We included an open-field response which allowed respondents to add information in case a particular type of intervention had been missing from the compiled list. After this process, the final list consisted of 48 different types of interventions. Each intervention type yields a broad description that could cover multiple similar implementations of interventions. The list contained intervention types relevant for process safety, personal safety or both. In general, the intervention types had in common that their goal was to improve overall safety, i.e. personal safety as well as process safety, within the company.

For each intervention type the respondents indicated whether they used that particular approach within their company (yes/no). In a later part of the survey, we again presented the intervention types respondents previously had indicated they did use in their company. From this (shorter) list they were asked to select the three interventions which they thought improved safety in their company most. The table in appendix A shows the list of 48 intervention types included in the survey as well as quantitative summaries of the main results.

In addition to the list of intervention types, we included some items that addressed aspects of the intervention strategy within the company. Specifically, the survey asked about reasons for implementing safety interventions; reasons for choosing a particular type of safety intervention; the development of a coherent plan for different interventions and the main goal(s) of the safety interventions. Another two items asked respondents to describe in free text a specific example of an intervention they would recommend to others and one which they would not recommend to others. Finally, we asked participants to provide some background information about the organisation they work for (such as, sector, size, and LTI) and some concluding questions that are not reported in this paper.

6. Analysis

We collected our data using a web-based survey. We computed descriptive statistics such as the proportion of respondents who indicated they use a particular intervention as well as the proportion of respondents who used a particular intervention and considered it most effective. Finally, the open text fields we analysed qualitatively.

7. Results

The respondents reported using 32 interventions on average. In the second column of the table in appendix A we show the proportion of all 297 respondents who made use of a particular intervention type. The proportion of use ranged between 32 % (‘Including safety performance in manager rewards (bonus’) and 98 % (‘General risk inventory and assessment’) for each intervention. Fig. 1 shows the interventions used most often (Top-5) and least often (bottom-5). In addition, 65 respondents provided additional ‘free text’ to the question whether they had missed any interventions in the list. Some of these responses contained unrelated information or additional clarification. Other responses generally gave a more specific description of an intervention, which could also be classified under an intervention type which was already in the list.

The proportion of practitioners who considered an intervention to be one of their ‘three most effective interventions’ is shown in the third column of the table in the appendix. The way in which we asked this question results in a skewed distribution of scores (only three intervention types could be selected). Therefore, we enriched the absolute percentages with a further analysis based on the relative ranking of both usage and perceived effectiveness. All intervention types we ordered based on the proportion of respondents using the intervention type and on the basis of the proportion of respondents using the intervention type and perceive it as particularly effective.

We divided the rank-ordered lists into three groups: high (rank 1–16), medium (rank 17–32) and low (rank 33 to 48). Next, we identified the interventions which were in the high and/or low group of both usage and perceived effectiveness. This resulted in four groups representing the extremities of relative use compared to perceived effectiveness. The first group included the interventions used relatively frequently and often perceived as effective (Hu-Hpe group), the second group included interventions used relatively frequently but rarely perceived as effective (Hu-Lpe), the third group included interventions

Table 1
Intervention types grouping based on relative frequency of use of intervention types and perceived effectiveness.

Intervention Type	Group*
Emergency preparedness exercises	Hu-Hpe
Employee safety training focused on cooperation	Hu-Hpe
Leadership training focused on safety roles	Hu-Hpe
Safety observations and inspections by trained staff	Hu-Hpe
Systematic scheduled discussion of safety issues within the company	Hu-Hpe
General risk inventory and assessment	Hu-Hpe
Task risk assessment	Hu-Hpe
Reporting, cataloguing and investigating (near) accidents	Hu-Hpe
Instructions on the safe use of substances, machines and equipment	Hu-Hpe
Procedure or method for reducing hazards at the source (inherent safety)	Hu-Hpe
Internal audit of SMS	Hu-Lpe
Visual markings on the work floor	Hu-Lpe
Safety symbols on dangerous objects, machines, rooms or equipment	Hu-Lpe
Providing site visitors with basic house rules	Hu-Lpe
Organising a safety day	Lu-Hpe
Campaign focused on improving employee safety behaviour (e.g. posters)	Lu-Hpe
Management of change procedures	Lu-Hpe
Accessible electronic system for managing action items related to safety	Lu-Lpe
Campaign focused on preventing worker stress (e.g. posters)	Lu-Lpe
Campaign focused on using personal protective equipment (e.g. posters)	Lu-Lpe
Managing lists of safety critical elements	Lu-Lpe
Human centred design of computer systems to reduce human error	Lu-Lpe
Using lessons from earlier project in work preparation	Lu-Lpe
Logging safety lessons after project completion	Lu-Lpe

* Groups shown are: 1. High use, High perceived effectiveness (Hu-Hpe); 2. Low use, High perceived effectiveness (Lu-Hpe); 3. High use, Low perceived effectiveness (Hu-Lpe); 4. Low use, Low perceived effectiveness (Lu-Lpe).

relatively rarely but often perceived as effective (Lu-Hpe), and the fourth group included interventions used relatively infrequenty and rarely perceived as effective (Lu-Lpe). In Table 1 the interventions included in these four groups are presented. The remaining groupings we did not consider further.

Table 1 shows ten interventions that are used relatively frequently and are perceived to be effective by their users as well (group Hu-Hpe, in Table 1). This includes safety training for employees and leadership, as well as the reporting, cataloguing and investigating of (near) accidents, systematic scheduled discussion of safety issues within the company and safety observations and inspections by trained staff. There are also interventions which are used relatively frequently but are simultaneously rarely perceived as particularly effective when compared to other intervention types (the group Hu-Lpe in Table 1). Four intervention types fall within this grouping: internal audit of the safety management system (SMS); providing site visitors with basic house rules; safety symbols on dangerous objects, machines, rooms or equipment and visual markings on the work floor.

Three intervention-types are used relatively infrequently (but are still common) and are perceived to be effective by their users (group Lu-Hpe, in Table 1): management of change procedures; organising a safety day and campaigns focused on improving employee safety behaviour. These intervention types are interesting targets for future research and implementation because they are perceived as effective by their users but are not yet commonplace. Finally, there are also seven intervention types which are used relatively infrequently and also not particularly well appraised by their users (Group Lu-Lpe). Examples include using lessons from earlier projects in work preparation; accessible electronic system for managing action items related to safety; managing lists of safety critical elements and human centred designs of computer systems to reduce human error.

We also asked respondents about the main reasons for implementing specific interventions. Respondents could choose up to three reasons out of seven. Fig. 2 shows the responses given. Legal requirements were clearly an important consideration as well as the fact that other organisations used a particular intervention. The importance of a legal requirement is also apparent in Fig. 1 and Table 1 as it shows that the intervention type most used is 'a general risk inventory and assessment' for which a clear legal requirement exists. This particular intervention type was also perceived as effective by a relatively large proportion of safety practitioners. Similar (partial) legal requirements exist for most intervention types which are used often – the use of particular safety symbols, for example, is also often required by (labour) laws. A relatively small proportion of practitioners perceive this intervention type, however, as effective.

When asked about their most effective interventions, the respondents show a clear preference. Fig. 3 shows a list of five interventions included most often in the 'Top 3' of the participating practitioners. As we can gather from Fig. 3 and Table 1, respondents have a clear preference for specific interventions, safety training for employees (56 %) and leadership training (35 %) are particularly noteworthy. The respondents could only choose up to three interventions which requires the safety practitioners to be quite choosy and select only those three interventions which they perceive as most effective. In other words, interventions that were not selected may not necessarily have been seen as ineffective, but just did not make to the Top 3. Many interventions from the original list were almost never considered to be the most effective by the respondents; e.g. information on hazardous machines (0 %), human-centered design of computer systems (1 %), or campaigns focused on PPE's (1 %).

The free text questions, which respondents used to describe interventions they would and would not recommend to others, were filled in by approximately 150 respondents providing over 300 detailed descriptions. Remarkably, one could say that one man's hit is another

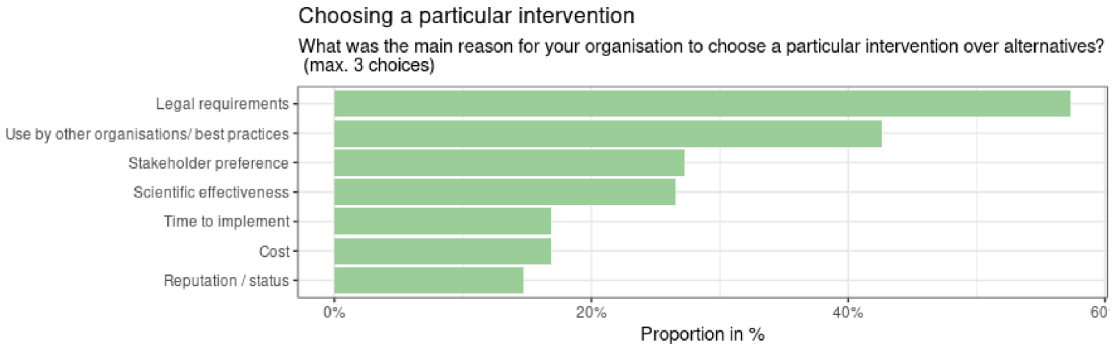

Fig. 2. Considerations when choosing a particular intervention.

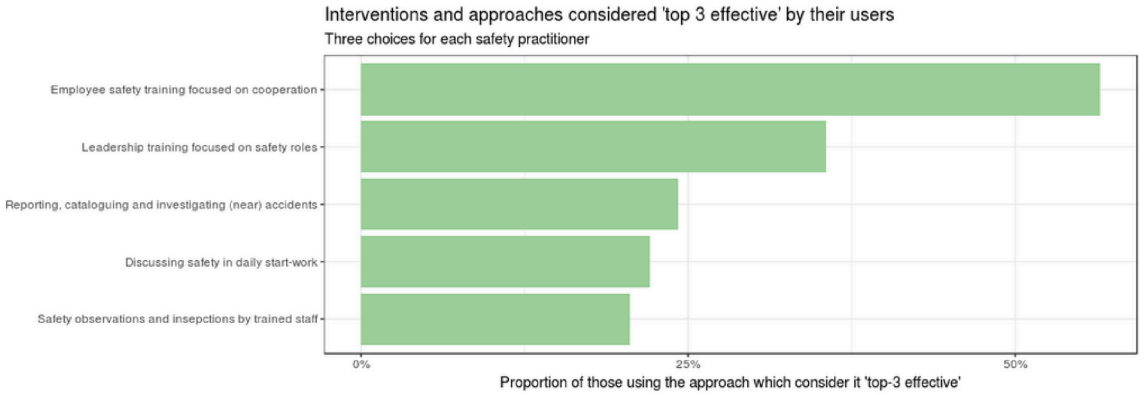

Fig. 3. Five interventions which are most often thought of as 'Top 3 effective' by their users.

man's miss. Intervention types mentioned as a main recommendation by one respondent could have a strong non-recommendation by another respondent. One respondent, for example, wrote: *"a well-executed LMRA. We use coaching to maintain a good quality LMRA and to keep improving it"*, whilst another respondent referring to the same type of intervention claimed: *"LMRA that uses tick-off boxes. With time employees know the patterns of the tick-off boxes without noticing the accompanying text anymore*". Similarly with respect to rules and procedures one respondent recommended *"define rules for safety and enforce those rules, in this way employees know what is unacceptable"*. At the same time another respondent gave a strong non-recommendation with *"trying to cover too much in procedures … and not involving the right people when making/ evaluating procedures. This can paralyse the organisation and harms safety rather than improving it"*.

It appears that the approach used for implementation as well as the conditions which are present exert a crucial influence in these examples. A further analysis of recurrent themes in the free text responses showed that descriptions of successful interventions often referred to the role of direct managerial involvement and the fostering of employee safety awareness. With respect to interventions that were not recommended, a 'culture of fear' or focusing overly on sanctioning were regularly mentioned. In addition, respondents did not recommend interventions conducted in a 'minimal' or 'simplistic' way and those which were perceived as overly reliant on administrative procedures.

8. Conclusion

This paper aimed to identify which interventions safety practitioners use, why they use them and how effective they perceive them to be. The study has shown that safety practitioners use a wide variety of intervention types. Ten intervention types have been identified that are used relatively frequently and are perceived to be relatively effective. This study provides a broad overview of the considerable variety of types of intervention which are commonly employed by this group. All intervention types offered were picked by the respondents and our analysis of the additional free text field did not indicate that we missed a major type of intervention.

The safety practitioners report that they select particular interventions often based on legal requirements and success stories from other companies. The evidence-base, status and costs are less important considerations. This reinforces the role of legislators in the promotion of certain safety interventions. Secondly, it shows that sharing best practices from other companies can help spread effective approaches.

9. Discussion

The safety practitioners in our survey have a clear preference for interventions which they think improve safety most, like employee training, management training and accident investigation. Many commonly used interventions are not considered particularly effective for improving safety or, at least, respondents did not include them in their 'top three'.

From previous research it has become clear that successful intervention programs consist of twice as many (separate) interventions as unsuccessful ones (Hale et al., 2010) and that a multifaceted intervention program seems to be the optimal choice (Bronkhorst et al., 2018). The Dutch safety practitioners that participated in this study apply this strategy as well. They indicate to use an average of 32 interventions in their companies when they can choose from a list of 48 intervention types.

Interventions could have either a high or low 'perceived effectiveness'. Intervention types with a comparatively high perceived effectiveness seem to be more active, future oriented and include more agency for and involvement by the safety professional themselves. Organising a safety day or employee safety training are examples of these types of interventions in which safety practitioners are typically actively involved. By contrast, interventions with a low perceived effectiveness seem to be more passive from the safety practitioner's perspective. For example, the use and presence of safety symbols or visual markings or providing visitors with basic house rules would appear to require less agency by the safety professional. The preferences of the safety practitioners are also in line with the overall development of the safety field moving from more technical interventions, to a focus on safety systems and more recently on safety behaviours, motivation and safety culture (see for example Swuste et al., 2022).

It should be stressed that this study reports perceived effectiveness and did not determine the actual effectiveness of the different types of interventions. In addition, the respondents could choose three interventions which obviously requires the safety practitioners to be selective. This makes the preferences of the respondents quite clear, but it also means that respondents could not select all the intervention types which they believe are effective. In addition, some intervention types may not be perceived as effective whilst they actually are, perhaps because they have existed for a long time (e.g. applying safety symbols to machinery) and are seen as obvious and basic.

To further analyse the results on both perceived effectiveness and the extent in which the safety interventions were used we ordered these by rank. We have used these rank-ordered lists to identify intervention types that show a comparative extreme on both the usage and the perceived effectiveness. As opposed to the relatively 'low-use' groups, the interventions in the comparably high-use groups are often also a (partial) legal requirement or industry standard. This is in line with the finding that legal requirements are the main driver for the choice of an intervention. This is especially important given the worrisome finding that scientific evidence only seems to play a minor part in the respondents' choice for a particular safety intervention. This raises the question whether current scientific knowledge is sufficiently available, accessible and usable in practice. To achieve this, future research could

Table 2
Intervention types, the proportion of respondents that use a particular intervention, the proportion of those users, which considered it one of their 'three most effective interventions'. The table is sorted from most used to least used by respondents.

Intervention Type	% Used	% Top 3 Most Effective
General risk inventory and assessment	98 %	10 %
Reporting, cataloguing and investigating (near) accidents	97 %	24 %
Emergency preparedness exercises	93 %	10 %
Safety symbols on dangerous objects, machines, rooms or equipment	93 %	1 %
Employee safety training focused on cooperation	88 %	56 %
Safeguarding the dangerous parts of machines (e.g. hot or moving)	88 %	5 %
Internal audit of SMS	86 %	3 %
Task risk assessment	86 %	10 %
Safety observations and inspections by trained staff	85 %	21 %
Individual certified safety training for employees	85 %	7 %
Instructions on the safe use of substances, machines and equipment	85 %	9 %
Procedure or method for reducing hazards at the source (inherent safety)	81 %	9 %
Systematic scheduled discussion of safety issues within the company	80 %	15 %
Visual markings on the work floor	79 %	0 %
Providing site visitors with basic house rules	77 %	2 %
Leadership training focused on safety roles	75 %	35 %
Placing information on hazardous machines	75 %	0 %
Defining and communicating short list of essential rules (life-saving rules)	73 %	8 %
External audit of SMS	73 %	3 %
Employee safety committee	72 %	5 %
A final safety check just before starting work (LMRA)	72 %	12 %
Gate instruction for suppliers and contractors specifying safety rules	72 %	2 %
Digital safety information (e.g. intranet)	71 %	1 %
Using a work-permit system	70 %	9 %
Sensors and alarms for process equipment	69 %	1 %
Lock-out tag out for safeguarding machines for maintenance	69 %	4 %
Maintenance based on technical state (preventative or predictive)	69 %	3 %
Human centred design of physical work environment to reduce human error	66 %	4 %
Collecting and sharing good practices	66 %	5 %
Discussing safety in a structured handover process	65 %	7 %
Discussing safety in daily start-work	64 %	22 %
Additional risk assessments (e.g QRA, HAZOP, FMEA, Bowtie)	64 %	6 %
Campaign focused on improving employee safety behaviour (e.g. posters)	62 %	8 %
Management of change procedures	57 %	12 %
Sanctioning individual employees for non-compliance	55 %	4 %
Including safety performance in employee rewards	55 %	4 %
Using lessons from earlier project in work preparation	54 %	3 %
Surveys focused on employee safety perceptions and experiences	53 %	6 %
Organising a safety day	52 %	12 %
Assessing safety performance when awarding projects to (sub)contractors	49 %	5 %
Campaign focused on using personal protective equipment (e.g. posters)	49 %	1 %
Logging safety lessons after project completion	47 %	1 %
Accessible electronic system for managing action items related to safety	45 %	2 %
Managing lists of safety critical elements	45 %	1 %
Human centred design of computer systems to reduce human error	44 %	1 %
Making short movies focused on safety awareness	39 %	4 %
Campaign focused on preventing worker stress (e.g. posters)	35 %	1 %
Including safety performance in manager rewards (bonus)	32 %	3 %

study the conditions under which the approach can be implemented successfully in practice to minimize the gap with practitioners. However, even such research might still fail to reach or influence safety practitioners. This is inherent to scientific publications; they may not be the channels safety practitioners use to get their information.

A more objective understanding of the effectiveness of interventions could benefit safety practitioners, although finding new ways of disseminating this information will be a challenge. A project is currently underway aimed at gathering descriptions of effective safety interventions in a central database. The project is run by the Dutch National Institute for Public Health and the Environment (RIVM) in cooperation with potential users. The ultimate goal of this project is to connect scientific knowledge about effective interventions with the practical experience of safety practitioners within an accessible structure. Moving from perceived effectiveness to evidence-based judgements can ensure a sound basis for furthering safety.

CRediT authorship contribution statement

Jakko van Kampen: Conceptualization, Data curation, Investigation, Writing – original draft, Writing – review & editing. **Marre Lammers:** Conceptualization, Writing – original draft, Writing – review & editing. **Wouter Steijn:** Data curation, Investigation, Writing – original draft, Writing – review & editing. **Frank Guldenmund:** Resources, Supervision, Writing – review & editing. **Jop Groeneweg:** Conceptualization, Supervision, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A:. Full list of intervention types

See Table 2.

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