



# The impact of masculinity on safety oversights, safety priority and safety violations in two male-dominated occupations



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## ABSTRACT

**Background:** Although men have a higher risk of occupational injuries than women the role of masculinity for organizational safety outcomes has only rarely been the object of research.

**Aim:** The current study investigated the association between masculinity and safety oversights, safety priority and safety violations in two male-dominated occupations using both a trait-based and a norm-based approach to masculinity.

**Methods:** Questionnaires covering trait-based (Bem Sex Role Inventory, BSRI) and norm-based (Male Role Norms Inventory – Revised, MRNI-R) measures of masculinity, three safety-related context factors (safety leadership, commitment of the safety representative, and safety involvement) and three safety-related outcome factors (safety violations, safety oversights and safety priority) were administered twice 12 months apart to Danish ambulance workers ( $n = 1157$ ) and slaughterhouse workers ( $n = 920$ ).

**Results:** Although the level of masculinity differed, the same general pattern of associations was identified across the two study populations. A high score on the MRNI was associated with a higher level of safety violations and a reduced propensity to report safety oversights to supervisors. A high score on the BSRI masculinity scale was associated with a higher propensity to report safety oversights, while BSRI femininity was not associated with any of the safety measures.

**Conclusion:** Norm-based aspects of masculinity are suitable for analysing the association between masculinity and safety outcomes, whereas trait-based theories do not show strong associations with safety outcomes.

**Implications:** The association between norm-based masculinity and safety measures might be used in tailoring and developing new preventive measures that specifically address masculinity and male role norms.

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## 1. Introduction

Gender and particularly masculinity are somewhat under-researched within safety science, although the most risky and dangerous occupations often studied by safety researchers are inherently male-dominated, and most safety studies are conducted in workplaces where men are either highly over-represented or completely dominant numerically (Jensen et al., 2014). Although gender-segregated labour markets do not allow for a direct comparison, the statistics do indicate a relation between being a man

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and an increased risk of a work-related accidents (Smith and Mustard, 2004); for instance, men account for 96% of fatal accidents and 76% of non-fatal accidents in workplaces across Europe even though men only make up 54% of the workforce (Oortwijn et al., 2011). However, although masculinity might be an important concept for safety research because traditional masculine attributes, such as the suppression of emotions, 'men in charge' and recklessness can have an impact on the adherence to safety rules, risk-taking and safety performance (Harrell, 1986; Iacune, 2005), few studies have investigated the association between masculinity and safety outcomes in organizations.

When masculinity has been investigated within occupational safety research, it has primarily been used in Hofstede's notion of the concept relating to differences in the separation of emotional

gender roles in national cultures (Hofstede, 1984). Here, the evidence of the impact of masculinity on safety outcomes has been quite mixed, with Mearns and Yule finding that masculinity was a small but significant predictor of risk-taking behaviour (Mearns and Yule, 2009), Håvold finding contradicting results indicating that masculinity could be either good or bad for safety, depending on whether they used Hofstede's original country indexes or their own data (Håvold, 2007) and finally, neither Lu and colleagues nor Reniers and Gidron found evidence of masculinity leading to more human failures (Lu et al., 2012) or fatal work accidents (Reniers and Gidron, 2013) using Hofstede's measure.

However, Hofstede draws on a rather crude understanding of masculinity as the opposite of femininity, which has been criticized and challenged within masculinity research since the 1970s. One of the first and most prominent theorists to eliminate the bipolarity assumption regarding masculinity and femininity was Bem (1974), who argued that masculinity and femininity were distinct sex roles. She argues that masculinity and femininity are individually based constructs whose attributes have largely been clustered by culture through historical coincidences. Through their upbringing, children learn these characteristic/stereotypical attributes that differentiate males and females and behave accordingly. These attributes are measurable as rather stable personality traits where such traits as being ambitious, dominant and athletic are seen as masculine (Bem, 1974; Smiler, 2004). Relating to accidents, previous research on Turkish drivers utilizing Bem's theoretical framework found that femininity predicted positive safety outcomes, while masculinity was associated with negative safety outcomes, and moreover, an interaction effect between masculinity and femininity was identified in which a high level of masculinity was related to a high level of accident involvement when combined with low femininity (Özkan and Lajunen, 2005; Özkan and Lajunen, 2006).

Other theories of masculinity have been proposed in opposition to Bem's rather stable trait-based approach. Ethnomethodological (West and Zimmerman, 1987) as well as more radical poststructuralist (Butler, 1999) conceptions of gender stress that gender is not psychologically or biologically given but is a socially constructed, powerful yet principally unstable and variable category. This variability and the social construction of gender roles enables the existence of multiple – and possibly competing – masculinities, a theoretical perspective which is widely accepted among masculinity researchers today (Smiler, 2004). Connell (1995) argues that several types of masculinity exist, albeit in a hierarchical order. The most authoritative and legitimate type of masculinity is termed hegemonic masculinity. Although it exists only as a normative ideal, it disciplines how men practice gender in a powerful way as they strive to live up to this ideal both in their relations with women and in their relations with other men (Messerschmidt, 2012; Connell and Messerschmidt, 2005; Connell, 1995). In these approaches, the acquisition of gender roles is understood as a variable process that is strongly influenced by an individual's internalization of cultural belief systems holding expectations for men to conform to certain socially sanctioned masculine behaviours, so-called gender role norms (Levant and Richmond, 2007; Levant et al., 2007). Failing to conform to these gender norms – to not practice gender in a normatively correct way – is then met with usually informal but nevertheless sometimes harsh negative social sanctions (West and Zimmerman, 1987; Butler, 1999). Although an understanding of different and competing masculinities in a specific workplace can be a tool to comprehend potential challenges to work safety as well as understand organizational cultures (Jensen et al., 2014), only a few safety-related studies have used this dynamic approach to masculinity previously. For instance, a study of Australian miners has shown that it is possible to alter the dominating masculine

ideology towards being more safety-oriented (Abrahamson and Somerville, 2007), while a study of Newfoundland fish harvesters points at how masculinities shift due to changes in regulations and industrial contexts (Power, 2008). Finally, Swedish and British studies among fire fighters found informal hierarchies and generational differences in attitudes towards risk-taking (Olofsson, 2011; Baigent, 2001).

Thus, based on the little previous research conducted, it seems plausible that newer conceptualizations and approaches to empirical studies of different masculinities might be important for understanding safety outcomes in organizations. Masculinity could influence behaviour in many ways that would increase the individual's risk of being involved in accident. The wish to demonstrate physical strength might hinder the use of the correct lifting equipment, keeping a high work pace might come at the expense of safety concerns and self-reliance may keep workers from asking others to help them. Building on this, the aim of the current study is to investigate the association between masculinity, safety oversights, safety priority and safety violations in two male-dominated occupations using both a trait-based and a norm-based approach to masculinity. Our main hypothesis was that being more masculine (trait-based approach) or adhering to more traditional masculinity ideals (norm-based approach) would be associated with a lower priority of safety, more safety oversights and more violations.

## 2. Data and methods

### 2.1. Data

The paper is based on data from the cohort study entitled MARS – Men, Accidents, Risk & Safety – whose primary aim is to examine the impact of masculinity and gender identity on risk-taking behaviour, attitudes towards safety and occupational accidents. Data was gathered through questionnaires administered to the same all-male population twice approximately one year apart. To reduce the risk of inflated associations because of all of the variables being reported at the same time, the three safety outcome variables were taken from the second round of the study whereas all of the independent variables (contextual measures and measures of masculinity) were taken from the first round.

#### 2.1.1. Participants

The study used a case-based design, where the hypothesis was tested in two separate and distinct occupations: ambulance workers and industrial slaughterhouse workers. The logic behind the case-based design was that identifying similar patterns of associations in separate samples would strengthen the external validity of the findings.

The two occupations were chosen for three reasons: (1) both occupations are highly male-dominated with the share of female workers for both occupations below 30%, (2) the occupations represent two rather different images of masculinity. Ambulance workers denote men who help and rescue people in need of protection and sometimes have to take risks in order to save others, whereas slaughterhouse workers are involved in killing and cutting up animals, which relies on having physical strength and being able to tolerate harsh smells and other things that might be seen as dirty by other people (Ackroyd and Crowdy, 1990; Tracy and Scott, 2006), and (3) the occupations have very different work environments with ambulance workers being exposed to unpredictable, dynamic and inherently stressful situations with many emotional demands (Cydulka et al., 1989; Sterud et al., 2006; Hansen et al., 2012). In contrast, slaughterhouse workers have a much more controlled and regulated work environment, often in a very Tayloristic setup that involves a high work pace and repetitive, straining work throughout the day (Hasle and Moeller, 2007).

Thus, the work related safety risks also differ between the occupations. Factors related to patient handling, such as lifting in untraditional and awkward positions or getting wedged in, are the primary causes of injuries for ambulance workers. The primary risks for slaughterhouse workers relate to getting cut by knives and falls due to for instance slippery floors.

The study was approved by the Danish Data Protection Agency (Study No. 2010-41-4817).

**2.1.1.1. The sample of ambulance workers.** The ambulance workers who participated in this study all work at the largest ambulance service provider in Denmark, covering 85% of all Danish emergency calls. In total, 3888 employees (i.e., all full-time employees in the company's emergency services) covering 127 distinct emergency service stations across the country were invited to participate in the study between October 2010 and January 2011. The response rate for round 1 was 62%. Everyone who participated in round 1 and remained employed in March 2012 was invited to participate in round 2 (2427). The response rate for round 2 was 73%. For use in this paper, we included only male participants who indicated they were working as emergency ambulance personnel and who participated in both rounds of the study ( $n = 1157$ ).

**2.1.1.2. The sample of industrial slaughterhouse workers.** A random sample of 2500 male members of the largest union to organize industrial slaughterhouse workers in Denmark was selected. They worked at 28 different slaughterhouses spread out across Denmark and were invited to participate in the study in autumn 2011. In total, 1328 workers participated in round 1, yielding a response rate of 53%. Everyone who participated in round 1 and remained members of the union and was employed by a slaughterhouse in August 2012 was invited to participate in round 2 (1251). The response rate for round 2 was 74%. For use in this paper, we included only those who participated in both rounds of the study ( $n = 920$ ).

## 2.1.2. Measures of masculinity

**2.1.2.1. Gender orientation (Bem Sex Role Inventory, BSRI).** Bem's (1974) measure of psychological traits traditionally attributed to either men or women was included to measure aspects of the trait-based gender orientation of the participants. The participants were asked to indicate the extent to which particular personality traits applied to them. Nine items from the masculinity scale were included as a measure of the degree of instrumental gender orientation among the participants (BSRI masculinity, sample item: 'assertive'). Cronbach's Alpha ( $\alpha$ ) for the total scale was 0.82. Five items from the femininity scale ( $\alpha = 0.77$ ) were included to tap into the degree of expressive gender orientation among the participants (BSRI femininity, sample item: 'compassionate'). The items used in our study were included after a pilot test found these items to be the most suitable and the most discriminate between men and women in a contemporary Danish setting. Both scales were used as continuous variables in the analyses. High scores in the two scales indicates a high level of masculinity and femininity, respectively.

**2.1.2.2. Masculinity ideals (Male Role Norms Inventory – Revised, MRNI-R).** To measure the participants' norm-based adherence to traditional ideals of masculinity, we employed the Male Role Norms Inventory-Revised (Levant et al., 2007). The measure was translated into Danish and piloted prior to this study using a five-point scale in round 1 of the study instead of the usual seven-point scale. Sixteen items were selected from the four subscales after pilot testing ( $\alpha = 0.85$ ). Subscales and sample items: Extreme self-reliance: 'A man should be able to perform his job even if he is physically ill or hurt'; Aggression: 'Boys should be encouraged to

find means of demonstrating physical prowess'; Dominance: 'Men should be the leader of any group'; Restrictive emotionality: 'One should not be able to tell how a man is feeling by looking at his face'. In this article, we use only the total scale ranging from 0 to 64 (although none scored higher than 53), and it is used as a continuous variable in the analyses. A high score indicates a high level of adherence to traditional ideals of masculinity.

**2.1.2.3. Correlations between the three measures of masculinity.** An important assumption of our use of the three measures of masculinity is that they do not measure the same construct but indeed capture diverse aspects of the complex phenomenon of masculinity. To justify the use of all three measures, we calculated the correlations between the three measures, as seen in Table 1. No association was detected between BSRI masculinity and MRNI-R, and the association between BSRI Femininity and MRNI-R was rather weak, albeit highly statistically significant. There was a strong association between the two BSRI measures.

## 2.1.3. Safety-related outcomes and contextual measures

Three scales were used as outcome measures of safety behaviour and attitudes. 'Safety violations' ( $\alpha = 0.85$ ) were measured with three items taken from the general unsafe behaviour factor from the Offshore Safety Questionnaire (Mearns et al., 2003), describing the tendency to violate safety rules because it is perceived to be easier and quicker. Sample item: 'I ignore safety regulations to get the job done'. 'Safety oversights' ( $\alpha = 0.80$ ) were measured with three items covering reasons not to bring up safety issues with supervisors (Nielsen and Mikkelsen, 2007). Sample item: 'It is of no use to bring up safety issues'. 'Safety priority' ( $\alpha = 0.88$ ) was measured using three items covering the workers' adherence to safety rules. Sample item: 'I always follow the safety regulations'. The scales were coded such that high scores indicated a high level of violations/oversights/priority.

Three other scales measured safety-related contextual factors, which were used as confounders in the analysis. 'Safety leadership' was measured using four items covering the immediate supervisors' commitment to safety ( $\alpha = 0.89$ ) (Nielsen and Mikkelsen, 2007). Sample item: 'My immediate supervisor intervenes immediately if safety regulations are broken'. 'Safety involvement' was measured with a three-item scale covering whether workers perceived that they were sufficiently involved in safety issues ( $\alpha = 0.90$ ). Sample item: 'I am sufficiently involved in safety decisions'. 'Commitment of the safety representative' was measured with four items ( $\alpha = 0.95$ ). Sample item: 'My safety representative is very committed to safety'. The scales were coded such that high scores indicated a high level of leadership/involvement/commitment.

## 2.2. Statistics

To examine the association between the three different measures of masculinity and gender orientation and safety violations, safety oversights and safety priority, we used an ordinary least squares regression to model the associations. The variables were entered in two steps into three models – one for each of the three outcomes. First, the three measures of masculinity and gender

**Table 1**  
Correlations of the three measures of masculinity. Pearson's R.

	MRNI-R	BSRI masculinity	BSRI femininity
MRNI-R	1		
BSRI masculinity	0.02	1	
BSRI femininity	-0.17***	0.41***	1

\*\*\*  $p \leq .001$ .

orientation as well as the 6 safety-related measures were entered individually in order to obtain the bivariate association (model 1). Secondly, all variables were entered in order to mutually adjust for each other (model 2). For each of the fully adjusted models, the *R*-square is reported as a measure of the quality of the model. To test the interaction between the two BSRI measures of gender orientation previously identified by Özkan and Lajunen (2005; Özkan and Lajunen, 2006), the two variables were multiplied, and this resulting variable was included in the analyses. All analyses were performed using STATA12 (Stata Statistical Software: Release 12. College Station, TX: StataCorp LP; 2011).

### 3. Results

#### 3.1. Comparing participant characteristics from the two occupations

In Table 2, we compare the characteristics of the participants from the two subsamples. The age composition of the sample is identical, but the slaughterhouse workers are slightly more experienced at their jobs compared to the ambulance workers. From the table, we can see that slaughterhouse workers on average have more traditional ideals of masculinity but score lower on both BSRI masculinity and BSRI femininity scales.

Turning to the safety measures, we can see that in most respects, the two study populations report similar conditions. There is a tendency for the slaughterhouse workers to conduct fewer safety violations and safety oversights and have a slightly higher priority of safety issues. In regard to involvement in safety and the perception of safety leadership at their workplaces, the two groups report nearly identical conditions.

#### 3.2. Multivariate analyses of the association between masculinity and safety measures

Although the absolute level of the measures differs between the two occupations we see the same pattern of association between variables within the two samples. Thus, sample-specific contextual factors such as work environment and injury risks do not seem to influence the way in which measures of masculinity are associated with safety outcomes. Therefore, the two samples are combined in the remaining analyses.

In Tables 3–5, we can observe the association between masculinity and the three different safety-related outcome measures. First of all, it appears that the most consistent association we find

**Table 3**

Associations between *safety violations* (at t2) and gender orientation at t1. Ordinary least squares regression.

	Model 1 (bivariate association)	Model 2 (fully adjusted)
<i>Sociodemographic</i>		
Age	−0.089 (0.007) <sup>***</sup>	−0.090 (0.007) <sup>***</sup>
<i>Measures of gender identity</i>		
MRNI-R	0.111 (0.008) <sup>***</sup>	0.106 (0.009) <sup>***</sup>
BSRI masculinity	0.006 (0.010)	0.007 (0.011)
BSRI femininity	−0.022 (0.018)	0.000 (0.020)
<i>Safety-related contextual measures</i>		
Safety involvement	−0.122 (0.023) <sup>***</sup>	−0.028 (0.032)
Safety leadership	−0.155 (0.020) <sup>***</sup>	−0.094 (0.024) <sup>**</sup>
Commitment of safety representative	−0.059 (0.018) <sup>*</sup>	0.125 (0.023) <sup>***</sup>
<i>Safety-related outcome measures</i>		
Safety oversights	−0.164 (0.026) <sup>***</sup>	−0.114 (0.032) <sup>***</sup>
Safety priority	−0.188 (0.028) <sup>***</sup>	−0.208 (0.034) <sup>***</sup>

Adjusted *R*-Square for model 2 = 0.086.

<sup>\*</sup> .05 > *p* > .01.

<sup>\*\*</sup> .01 > *p* > .001.

<sup>\*\*\*</sup> *p* ≤ .001.

is between the norm-based measure of traditional masculinity ideals (MRNI-R) and lower levels of safety: the participants who adhere more to the traditional masculinity ideals are more prone to violate safety regulations because of sheer convenience. In addition, scoring high on MRNI-R reduces the propensity to report safety oversights to supervisors. These associations are consistent even after adjusting for the contextual safety measures from round 1.

For the two trait-based BSRI measures, the results are more arbitrary – only the BSRI masculinity scale is unequivocally associated with higher levels of reporting safety oversights, although the association is in the opposite direction and not as strong as that of MRNI-R.

Generally, the BSRI measure of femininity shows no association with safety outcomes. Although Table 5 shows that it is bivariately associated with reporting safety oversights, this association is attenuated when adjusting for the adherence to traditional masculinity ideals and BSRI masculinity. Thus, our results do not replicate previous studies that found that femininity predicted positive safety outcomes (Özkan and Lajunen, 2006, 2005). In addition, the

**Table 2**

Characteristics of study population of male Danish ambulance and slaughterhouse workers at baseline. *n* = 2077.

		Ambulance workers ( <i>n</i> = 1157)	Slaughterhouse workers ( <i>n</i> = 920)
		Mean (SD)	Mean (SD)
<i>Sociodemographic variables</i>			
Age	Range: 17–69	42.4 (11.1)	43.0 (10.8)
Seniority (in years)	Range: 0–44	17.6 (11.3)	19.5 (11.1)
<i>Measures of masculinity and gender orientation</i>			
MRNI-R	Range: 0–53	17.6 (9.4)	20.2 (10.5)
BSRI masculinity	Range: 5–54	34.0 (7.4)	31.5 (9.4)
BSRI femininity	Range: 2–30	21.3 (4.0)	19.3 (5.0)
<i>Safety-related contextual measures</i>			
Safety involvement	Range: 0–12	7.0 (2.9)	6.7 (3.8)
Safety leadership	Range: 0–16	8.6 (3.6)	9.2 (4.5)
Commitment of safety representative	Range: 0–16	11.7 (4.2)	11.0 (4.8)
<i>Safety-related outcome measures</i>			
Safety violations	Range: 0–12	6.1 (3.2)	5.1 (3.7)
Safety oversights	Range: 0–12	8.8 (2.7)	7.4 (3.3)
Safety priority	Range: 0–12	9.0 (2.5)	9.6 (3.0)

**Table 4**  
Associations between *safety priority* at t2 and gender orientation at t1. Ordinary least squares regression.

	Model 1 (bivariate association)	Model 2 (fully adjusted)
<i>Sociodemographic</i>		
Age	0.026 (0.005)	−0.002 (0.006)
<i>Measures of gender identity</i>		
MRNI-R	−0.022 (0.006)	0.005 (0.006)
BSRI masculinity	−0.003 (0.007)	−0.028 (0.008)
BSRI femininity	0.044 (0.014)	0.034 (0.015)
<i>Safety-related contextual measures</i>		
Safety involvement	0.169 (0.018)***	0.048 (0.021)
Safety leadership	0.158 (0.015)**	0.094 (0.018)**
Commitment of safety representative	0.191 (0.013)***	0.137 (0.017)**
<i>Safety-related outcome measures</i>		
Safety oversights	0.079 (0.020)**	−0.041 (0.024)
Safety violations	−0.221 (0.017)***	−0.210 (0.018)***

Adjusted R-Square for model 2 = 0.091.

\*\* .01 > p > .001.

\*\*\* p ≤ .001.

**Table 5**  
Associations between *safety oversights* at t2 and gender orientation at t1. Ordinary least squares regression.

	Model 1 (bivariate association)	Model 2 (fully adjusted)
<i>Sociodemographic</i>		
Age	0.048 (0.006)*	0.054 (0.006)*
<i>Measures of gender identity</i>		
MRNI-R	−0.140 (0.007)***	−0.144 (0.007)***
BSRI masculinity	0.093 (0.008)***	0.070 (0.009)**
BSRI femininity	0.130 (0.016)***	0.050 (0.017)
<i>Safety-related contextual measures</i>		
Safety involvement	0.258 (0.020)***	0.151 (0.026)***
Safety leadership	0.270 (0.017)***	0.186 (0.019)***
Commitment of safety representative	0.225 (0.015)***	0.089 (0.019)**
<i>Safety-related outcome measures</i>		
Safety priority	0.065 (0.026)**	−0.054 (0.029)*
Safety violations	−0.121 (0.020)***	−0.091 (0.021)***

Adjusted R-Square for model 2 = 0.153.

\* .05 > p > .01.

\*\* .01 > p > .001.

\*\*\* p ≤ .001.

interaction term between BSRI masculinity and femininity is not statistically significant in any of the analyses (data not shown).

Overall, we find mixed support for the hypothesis that differences in how men practice gender are associated with their safety behaviour and thus possibly their level of work injuries as the norm-based measure of masculinity (MNRI-R) but not the trait-based (BSRI) measure is associated with safety outcomes in different ways.

### 3.3. Multivariate analyses of the safety-related context and outcome measures

Finally, the three tables also confirm some of the associations that are already well known in the safety literature. For all three

outcome measures, safety leadership plays a positive role: being in a workplace where the immediate supervisor reacts promptly to safety issues and clearly prioritizes safety lowers the level of safety violations while simultaneously increasing the priority of safety and the propensity to report safety issues to management. The same is true for the impact of the employees' own safety representatives in regard to reporting behaviour and safety priority. However, in regard to violations of safety regulations due to convenience, the association is reversed when adjusted for all of the other safety measures.

## 4. Discussion

The aim of the current study was to investigate the association between masculinity and safety oversights, safety priority and safety violations in two male-dominated occupations using both a trait-based and a norm-based approach to masculinity. The study found mixed support for our main hypothesis. While adhering to more traditional masculinity ideals, measured with the norm-based MRNI-R, were associated with more safety violations and a reduced propensity to report safety oversights to the supervisor, we do not find such associations with the trait-based measure of masculinity and femininity. As we find some support for our main hypothesis within both groups of participants, it might seem contradictory that when comparing across the two samples, the slaughterhouse workers are on average more traditional than the ambulance workers yet also behave safer and have safer attitudes. However, at least two plausible explanations of this can be offered. First of all, the slaughterhouse workers are in a much more supervised and controlled environment than the ambulance workers, so their behavioural flexibility might be limited. Secondly, many of the work tasks performed by slaughterhouse workers include sharp knives, thus they are at immediate risk of hurting themselves if they are not cautious.

The results also showed unexpected findings. It is surprising that the BSRI masculinity scale shows a positive association with reporting safety oversights (Table 5). Further analyses of this showed that the association is driven by the items in the BSRI masculinity scale that has to do with assertiveness and having leadership qualities, whereas the traits of being athletic, risk-taking and dominating are not associated with reporting safety oversights. Thus, attributing characteristics to oneself such as being more assertive and having leadership abilities is associated with drawing supervisors' attention to safety issues. Therefore, one possible explanation of why the association between the MRNI-R and the BSRI masculinity scale is in the opposite direction in regard to safety oversights is that while having more traditional masculinity ideals lowers one's preference for reporting safety issues (perhaps because this would mean showing weakness or admitting failure, which stands in contrast to the ideals of masculinity one believes in) having a more instrumental gender orientation could be interpreted as having the ability to stand up against management in situations where there are problems with safety in the workplace. This interpretation is in line with previous research focusing on the importance of assertiveness in getting workers to bring up safety issues (Menzel and Gutierrez, 2010; Shrestha and Menzel, 2013). This highlights that although focus primarily has been on the negative safety consequences of masculinity, some aspects of masculinity might also be beneficial for safety.

Another unexpected finding was that commitment of the safety representative was positively related to violations of safety regulations (Table 3). Further analyses show that the reversal from model 1 to model 2 appears when including the other safety measures in the model. This finding is somewhat unexplainable. It might just be a statistical artefact, or it might be a consequence of 'confounding bias', i.e., that the inclusion of the other safety measures

in the model represents over-adjustment because these measures lie on the causal pathway linking the commitment of the safety representative and safety violations.

#### 4.1. For the many or the few?

Although the associations we find between norm-based masculinity and safety outcomes are consistent across samples, only a small minority subscribes to very traditional masculinity ideals in our sample. Scores below 32 on the scale indicate that the respondents disagree with these ideals and because the average for both groups is 20 or below this indicates a high degree of distance to these ideals. However, this is not an unusual or unexpected result, as the original validation of the MRNI-R also showed a high degree of distancing from the traditional masculinity ideal in some populations (e.g. European Americans) (Levant et al., 2007) and the study was done in a Danish context where it can be argued, that the gender equality regimes of the Scandinavian welfare states have entailed that the dominating masculinities are not in concordance with the traditional male role norms (Christensen and Jensen, 2014). This might indicate that there is a need for further development of the measures of masculinity ideals in terms of a new revision of the MRNI-R that is better able to measure other types of masculinities. However, in the current study it is the relative differences between respondents and not the absolute level that is of interest in the analyses. Although the majority does not agree with the norms, the results still show that the more the respondents agree (or the less they distance themselves from them) the more prone they are for violating safety regulations and the less inclined they are to report safety oversights to supervisors. This also entails that, even though the majority of the population does not agree with the traditional masculinity norms, the potential preventive benefit of a masculinity-based approach to safety is not limited to this group. Although, the minority that subscribes to very traditional masculinity ideals might be persons on which the traditional approaches to safety have little or no effect, and a masculinity-based approach might thus represent a novel way to have an impact on these persons. As mentioned above, a previous study about Australian miners shows that such an approach is feasible (Abrahamson and Somerville, 2007). But even if men do not adhere to the traditional masculinity norms, they may still take these societal norms into account when performing their jobs (Connell and Messerschmidt, 2005; Messerschmidt, 2012; Connell, 1995), which might be at odds with organizational health and safety initiatives (Ely and Meyerson, 2010). Therefore, a masculinity approach can be used in both a high-risk and a population-based prevention strategy.

#### 4.2. The 'added value' of a masculinity approach to prevention

Although some aspects of traditional masculinity ideals, such as risk-taking, are directly related to safety outcomes (Turner et al., 2004) it is important to note that masculinity is more than just risk-taking, and that the associations seen in the present study are not driven by risk-taking alone. For instance, the MRNI-R measure used does not include any risk-taking items. This also makes sense from a theoretical perspective. Risk-taking might be part of the traditional masculine ideals, but not all types of masculinities include risk-taking. And, as stated in the introduction, several aspects of masculinity (e.g. self-reliance, physical strength), might have an impact on safety outcomes. Furthermore, the importance of incorporating a perspective on masculinity into preventive measures is underscored by the fact that it still has an association with safety outcomes after controlling for well-known safety-related contextual factors such as safety leadership.

The insight offered by masculinity research is that by using a broad masculinity approach instead of a narrow focus on for instance risk-taking, we might be able to better understand why preventive efforts fail and identify underlying factors that needs to be taken into account when planning preventive measures. For instance, the introduction of technical aids such as lifting equipment, might not only be understood as eliminating risks, but also as restricting workers in expressing their masculine identities. This may cause unexpected resistance and a lower level of adoption of safe work practices. One possible masculinity-based strategy to avoid this would be by ensuring that there were alternative – and safe – ways for workers to express their masculine identities, for instance by being able to master technical (lifting) equipment.

An important aspect to consider, when discussing a masculinity approach to prevention in organizations, is that the organizational context constitutes a unique setting in which the inherent power structure and cultural influences might be able to impact individuals' behaviours and perceptions. Thus, the organizational context might prompt deviations from the traditional masculine scripts, as has been seen within, for instance, high-reliability organizations, where men are encouraged to readily concede physical limitations and admit mistakes (Ely and Meyerson, 2010). In reality, Ely and Meyerson (2010) argue, based on case studies of two oil platforms, that these organizations have succeeded in promoting cultural practices that encouraged men to let go of conventional masculine scripts and changed how men performed masculinity. This was achieved through safety initiatives directing men away from the goal of proving their masculinity and orienting them instead toward goals that were incompatible with upholding a traditional masculine image. They identify the promotion of collective goals, a decoupling of masculine traits and definitions of competence, and a learning orientation toward work as the key cultural components driving this change. Based on this, it seems plausible that organizational initiatives can have an impact on how masculinity is performed in the organization and thus have a preventive effect.

#### 4.3. Masculinity approaches compared to accident proneness and safety climate

Looking at the two approaches to masculinity used in the study from a broader safety science perspective reveals similarities to more established theories. The trait-based approach and the norm-based approach to masculinity are compatible with approaches from general safety research, where the trait-based approach resembles the theories of accident proneness, while the norm-based approach has similarities with climate-based theories of accident prevention. The support for the effectiveness of these approaches has been mixed. Generally, accident proneness, originally envisioned as a preventive strategy in the early 20th century, has not had much success, but instead a long and troubled history that has led to sparse results with inconsistent, contradicting and inconclusive empirical evidence. Although meta-analyses show that accidents are not randomly distributed in the population, this result might not be caused by specific personality traits, as studies seldom control for the individuals' risk exposure or situational moderators, such as working conditions and safety climate (Clarke and Robertson, 2008; Iverson and Erwin, 1997; Visser et al., 2007). Furthermore, meta-analyses find no strong effect of personnel selection as a prevention strategy (Guastello, 1993) and no strong relationship between personality and work accidents (Clarke and Robertson, 2008). Likewise, similar to the norm-based approach to masculinity, safety climate can be understood as socially constructed because it emerges as a group-level property through shared cognitions and social consensus (Zohar, 2010). The climate informs workers on how they are expected to

act under different circumstances, reflecting the cultural scripts of the norm-based theories of masculinity. Although there is no general consensus on a definition of safety climate, and the literature has been plagued by conceptual ambiguity (Flin et al., 2000; Guldenmund, 2000), meta-analyses have identified some common ground and reveal that safety climate is a robust predictor of safety performance (Clarke, 2006; Christian et al., 2009). Thus, it can be argued that on the general level, the two theories of masculinity used in this study build upon some of the same components that have previously been used to develop prevention strategies within safety research. In addition, our results, showing that the norm-based approach to masculinity shows a closer association to safety behaviours and attitudes than the trait-based approach, are parallel to results from previous safety research showing no strong support for the trait-based accident proneness approach, while the norm-based safety climate approach has shown more effectiveness.

#### 4.4. Strengths and limitations of the study

The current study has multiple strengths. In a generally under-researched area, this has been the first study to empirically test the association between two different approaches to masculinity and safety outcomes. This study is based on a large all-male sample from two different male-dominated occupations, which both presented satisfactory response rates. Furthermore, it utilizes a longitudinal design where dependent and independent variables were measured at different time points. The external validity of the results is strengthened by the fact that we see the same pattern of association between measures of masculinity and safety outcomes in the two occupations. Although both occupations are highly male-dominated they differ substantially on important contextual factors such as work tasks, injury risks and work environment. This indicates that the identified associations might generalize to other occupations as well. Whether the associations also are valid in other national cultures, where the adherence to traditional male role norms is higher, is of course an empirical question as differences in other national culture factors such as power distance might influence the associations. However, there is no indication in our data that they should not hold true. Finally, the study is based on well-proven masculinity measures that were validated through pilot testing prior to the study.

However, there are also some limitations. First of all, although we observe an association between masculinity and safety outcomes, we have not linked masculinity to occurring accidents. However, other studies have shown an association between the safety-related outcome measures used in this study and accident occurrence (Nielsen and Mikkelsen, 2007; Mearns et al., 2003). The issue of selection bias is also relevant, although the study had a satisfactory response rate. While the ambulance workers almost represented a population sample, the slaughterhouse workers were recruited through the largest union to organize industrial slaughterhouse workers in Denmark. Although a random sample of male union members was drawn for inclusion, we do not know whether union slaughterhouse workers are more or less safety-oriented than non-union slaughterhouse workers. However, because the level of unionization is generally high in Denmark and particularly high within industrial slaughterhouse workers, a potential selection bias might not be of importance. Finally, the skewed distribution on MRNI-R indicates that while this instrument had a high internal consistency, the actual score might not be calibrated correctly for a Danish setting, which may not be surprising given the large differences between gender role norms including masculinity ideals in Denmark as part of the Scandinavian welfare states and the United States (Morgan, 2002).

#### 4.5. Implications

On the practical level, the association that we have shown between norm-based masculinity and safety measures in two male-dominated occupations might be used in tailoring and developing new preventive measures that specifically address masculinity and male role norms. However, although descriptive case studies have shown that such approaches might have some merit (e.g. Ely and Meyerson, 2010; Abrahamson and Somerville, 2007), such initiatives that intentionally incorporate masculinity have yet to be developed and empirically tested. As suggested above, one approach would be to provide alternative and safe ways for workers to express their masculine identities.

On the theoretical level the results indicate the potential fruitfulness of safety research for developing and further revising theories based on male norms and ideals. Following some of the arguments in this article, two aspects in particular may be fruitful to pursue: First, the changes and diversities in masculinity ideals and norms that have taken place within the last three decades must be integrated in the theoretical framework. Second, theories about masculinity and safety must be able to include contextual variations at different levels of analysis: on the macro level (for instance, differences in normative understandings of what constitutes proper masculinity in different national contexts), on the meso level (for instance, different occupations), and on the micro level (for instance, the various masculinity positions available at a specific workplace).

#### 5. Conclusion

This study indicates that in particular theories based on the norm-based aspects of masculinity are suitable for analysing the association between masculinity and safety outcomes in workplaces, whereas trait-based theories do not show strong associations with safety outcomes. Future studies need to test masculinity-based approaches to prevention and further investigate the link between masculinity and occurring accidents, while not forgetting the possible positive safety effects of some aspects of masculinity (e.g. assertiveness and leadership qualities). Furthermore, whether the results of the current study can be generalized to other industries (both male-dominated and not) and countries needs to be investigated.

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