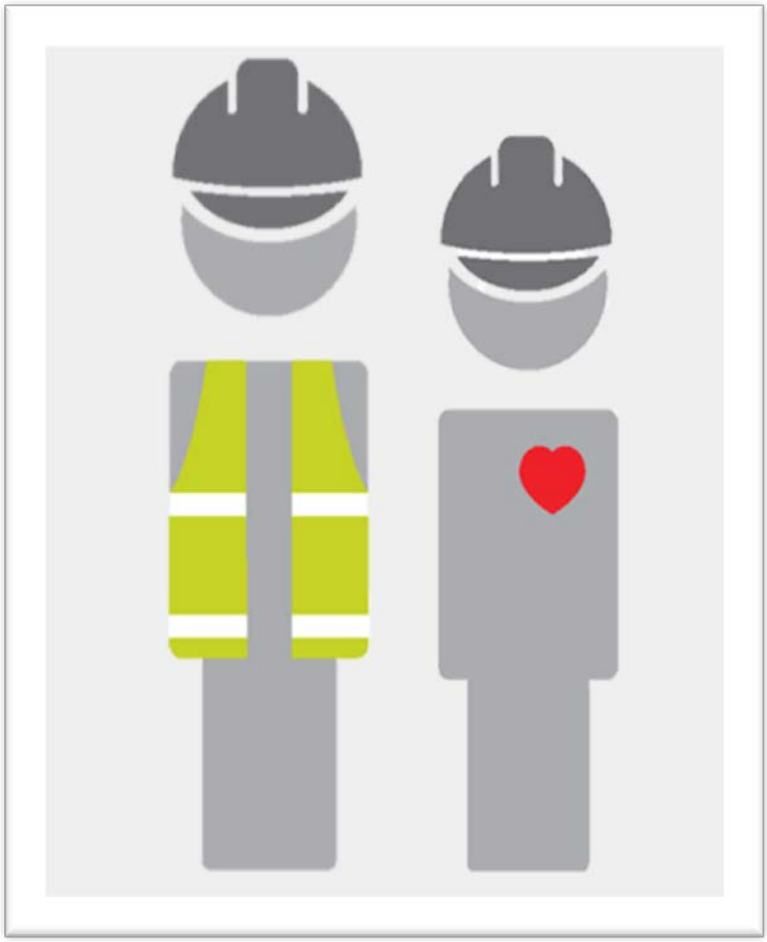
HUMAN BEHAVIOR AND SAFETY



TARMAC
A CRH COMPANY

EXECUTIVE SUMMARY

Different factors could impact safety compliance and accidents. According to Conservation of Resources Theory (COR), employees are motivated to protect their resources, so they are likely to conserve them by reducing their effort in complying with safety practices when put under pressure with work demands. This study examined whether stress, conscientiousness, emotional stability, sensation-seeking, risk attitude and safety climate impacted safety compliance. Twenty-one operatives were recruited. Participants were required complete a questionnaire at the end of every day, five days a week for three weeks, to examine daily fluctuation in their natural environment. Analysis of the results found that stress was significantly and negatively related to safety compliance. Conscientiousness significantly and positively predicted safety compliance. However, conscientiousness did not significantly interact with stress, suggesting that conscientiousness operatives were still likely to comply with safety practices, whether they were stressed or not. Emotional stability, sensation seeking, risk attitude and safety climate did not significantly predict safety compliance. There were a few limitations to the study, for example it had a small sample size and possible social desirability bias (which is the tendency of survey respondents to answer questions in a manner that will be viewed favorably by others, such as over-reporting "good behavior" or under-reporting "bad", or undesirable behavior).

This study has implications for the literature and for organizations. It is the first of its kind to explore whether COR fits as a theoretical framework to explain employees' safety compliance under stress. This provides insight into why employees do not abide to safety practices that are in place to protect them and others. Additionally, it informs organizations as to whether safety non-compliance occurs due to employees' need to conserve resources to meet other job demands in times of stress. Management can then facilitate employees' resources, such as providing regular breaks and enough time to complete projects, so they have sufficient resources for their tasks, and they do not forfeit their safety behavior.

CONTEXT

Accidents in the workplace are a major concern for organisations, and their antecedents are not yet fully understood. Currently, organizations rely on employees to obey health and safety guidelines and policy to avoid accidents. However, information from the House of Commons Library estimated that in the UK, 4.1 million working days were lost due to workplace injuries in 2015, and in 2014 workplace injuries cost individuals, the government and taxpayers around £4.9 billion (Tyler, 2016). This indicates that policy is not enough to protect employees from accidents alone, perhaps due to the difficulty in covering all possible incidences. Yet, instances that are acknowledged by safety policy still occur, suggesting that there are psychological factors that may impact safety. For example, organizations are starting to understand that developing strong safety climates may encourage positive safety practices by impacting employees' safety attitudes and awareness. Alternatively, safety practices could also depend on the individual, such as personality and stress. The literature is yet to establish a sound theoretical explanation of how, why and in what ways stress influences safety compliance. To address this notable gap, this study will apply Hobfoll's (1989) Conservation of Resources (COR) model to explain the interplay of stress and safety compliance, and the influence of safety climate and individual dispositions. The specific personality traits explored were sensation-seeking, emotional stability and conscientiousness, as the literature found these are the most consistently found criteria for risk-taking and counterwork behaviours, which may impact safety (Penney, Perry and Hunter, 2011; Barrick and Mount, 1991). The study will contribute new theoretically driven insights into individual safety behaviour and how it can be managed. Such understanding may help prevent workplace accidents and harm to employees, and providing potential cost and time-saving benefits for organizations, for example by reducing lost work time and investigation or litigation costs.

PREVIOUS RESEARCH

Stress and Safety

Safety practices can be effortful. At work, energy is also spent on pressures, such as numerous job demands, which can create stress. This can sway employees to save energy and avoid burnout by reducing the effort they put in to comply to safety practices set out by organisations. For example, stressed employees may minimalize efforts they put into their thinking processes in a hazardous environment, such as narrowing their attention and gathering negligible information of the situation, which can result in injury. Thus, accidents can occur from a lack of concentration. Sneddon, Mearns and Flin (2013) suggested in their study involving an oil company, that stress resulted in poor concentration and awareness of situations, due to an overload on the mind. A lapse in concentration and awareness can be forms of cognitive failure, which are attentional, memory and action-related mental lapses (Broadbent, Cooper, FitzGerald, & Parkes, 1982). Cognitive failure was associated with workplace accidents (Wadsworth, Simpson, Moss and Smith, 2003), which suggested that stress is likely to decrease employees' situation awareness, concentration and safe behaviour.

The Conservation of Resources Model (COR)

COR can be used as a theoretical framework to explain why stress may impact safety behavior. It is a model that appreciates coping and personal resources in the context of stress (Hobfoll, 1989). It suggested that people experience stress when their ability to retain, protect and build resources is threatened due to high job demands. Burnout occurs from perceived and actual resource loss and when resources are inadequate to meet demands (Hobfoll, 1988; Lee and Ashforth, 1996). Resources can include social support, time, work conditions, money, knowledge and physical items at work such as appropriate equipment. Individuals are motivated to protect these resources and minimalize their net loss. For example,

as concentration in safety practices is effortful, individuals may lower efforts when stressed to conserve their remaining resources. With regard to personal resources, Penney, Perry and Hunter (2011) found that [1]conscientious employees with [2]high emotional stability refrained from counter-work behaviours, such as time-wasting and withholding effort. These behaviours could relate to safety non-compliance and accidents. They theorised using COR, that conscientious and emotionally stable individuals are likely to invest their energy, attention and other resources towards behaviour that facilitates goal attainment, and waste less resources in regulating their anxiety. Those who were conscientious but had low emotional stability had few personal resources, and may engage in counter-work behaviours to conserve resources for other goals to alleviate strain. Therefore, traits can be beneficial in conserving other resources.

COR and Personality

Continuing from Penney et al, different personality traits can arguably make certain behaviours more or less effortful in a safety context. Conscientious individuals have a natural inclination to be persistent, avoid risks and pay attention to detail (Barrick and Mount, 1991). Moreover, it may be more effortful for individuals who are low in conscientiousness to concentrate on safe behaviours and practices when stressed and have accidents. This is because they are less inclined to pay attention, so more effort is required for concentration. Thus, it is predicted that conscientiousness will moderate the relationship between stress and safety compliance, where high conscientiousness will result in high safety compliance. This is because less conscientiousness individuals would need to put more effort and resources into concentrating in a risky situation, whereas conscientious individuals are more likely to avoid risks, pay attention and have more resources to dedicate to safety compliance.

Emotional stability may also have a relationship with stress and safety. For example, those emotionally stable may have less resources spent on emotion and anxiety, as they are more resilient (Barrick and Mount, 1991), and are able to put more effort and other

[1] Conscientiousness is the personality trait of being careful, or vigilant. Conscientiousness implies a desire to do a task well, and to take obligations to others seriously. Conscientious people tend to be efficient and organized as opposed to easy-going and disorderly.

[2] Emotional stable individuals less reactive to stress, are calm, less anxious, even-tempered and less likely to feel tense or angry – the opposite of being neurotic

resources towards safety compliance when stressed. Individuals who are less emotionally stable may also be more easily distracted by stressors, perhaps from rumination or may be more susceptible to cognitive failure and accidents (Hansen, 1989). Paul and Mati (2007) found that accidents were related to higher negative affectivity, which refers to a lack of emotional stability and the chronic experience of negative emotional states. It is predicted that emotional stability will impact safety compliance when individuals are stressed, as they have resources available for self-control and concentration, so are likely to be safety compliant.

Sensation-seeking may also impact the relationship between stress and safety compliance. Those high in sensation-seeking, which is when an individual desires novel and intense stimuli to feel sensations of excitement (Ball and Zuckerman, 1990), may need to put more effort into inhibiting these natural inclinations and exhibit self-control during dangerous situations. When these individuals are stressed according to COR, they may reduce their efforts in self-control to conserve their remaining resources, which could increase the chance of accidents. Sensation-seeking was mostly explored in relation to dangerous driving, adolescent risk-taking behaviour and in health behaviours (Dahlen, Martin, Ragan and Kuhlman, 2005; Kalichman, Johnson., Adair, Rompa, Multhauf and Kelly, 1994; Steinberg, Albert, Cauffman, Banich, Graham and Woolard, 2008), but understudied in the workplace. The present study would therefore add to the literature by exploring whether sensation-seekers are less safety compliant when stressed.

COR and Risk-Taking

On the other hand, individuals can be a risk-taker and not necessarily a sensation-seeker, where they may participate in risks for reasons other than to experience excitement. For example, they may feel forced into taking a risky decision, as they do not have the resources for alternative options, or their resources are under threat. Jordan, Sivanathan and Galinsky (2011) found that participants who experienced experimentally induced stress engaged in more risk-taking during a blackjack game compared to non-stressed participants. Additionally, they found that participants who held power that was unstable, and those who had stable powerlessness engaged in more risk-taking decisions than their opposite conditions. The COR model

could be applied by suggesting that participants took risks in an attempt to protect or increase their resources, such as power. This study was an experimental design and not in an organizational setting, so it had a good control of variables, but the situations were not real life for participants. People may behave differently when their decisions affect them outside the lab. Weber, Blais and Betz (2002) suggested that the degree of perceived risk can vary depending on situational characteristics, but individuals' attitude towards risk remained stable across situations. Most research suggests that people have risk-seeking or avoiding underlying attitudes, but Nicholson, Soane, Fenton-O'Creevy and Willman (2005) argued that traits and attitudes influence individuals' attraction to different risk situations. For example, a sensation-seeker looks for situations they find exciting and risk-adopters take risks if it is required by the situation, even though they would rather avoid risks. Therefore, individuals behave differently depending on their traits, attitudes and situations. The present study predicts that those who have risk positive attitudes are less safety compliant when they are stressed, as according to COR, they are more likely to risk-take with regard to self-control and safety practices to conserve their resources.

COR and Safety Climate

It is a possibility that safety climate could be an additional external resource for safety compliance. A safety climate reflects perceptions of safety related policies, procedures, rewards, values (Neal, Griffin and Hart, 2000). It also transfers the importance of safety to employees through management to encourage safety awareness, positive attitudes and behaviours. It creates social norms and valence of safety behaviours, and it gives employees the tools to perform these behaviours, such as standard procedures or safety equipment. These effects on attitudes, subjective norms and perceived behavioural control are then likely to lead to safe behaviour, according to the Theory of Planned Behaviour (Ajzen, 1991). This could explain Nahrgang's correlation between safety climate and employees' safety engagement. However, not all companies have a safety climate, and some research found that it does not always lead to employees' safety behaviour (Cooper and Phillips, 2004). This suggests that safety climate may

moderate the relationship between stress and safety compliance.

Summary

COR is a robust, testable and parsimonious model, and it fits well with this study's focus to understand the relationship between stress and safety behaviours, so it will be used for its framework. This project proposes that COR can be applied to explain why and how stress impacts safety compliance. It will assess the impact of conscientiousness, emotional stability, sensation-seeking and risk attitudes have on safety behaviours, as self-control and concentration are effortful behavioural mechanisms, when individuals are stressed. Safety climate will also be examined as a moderator between stress and safety behaviours, as it may provide additional external resources to help mitigate the effort of safe behaviours.

Hypotheses

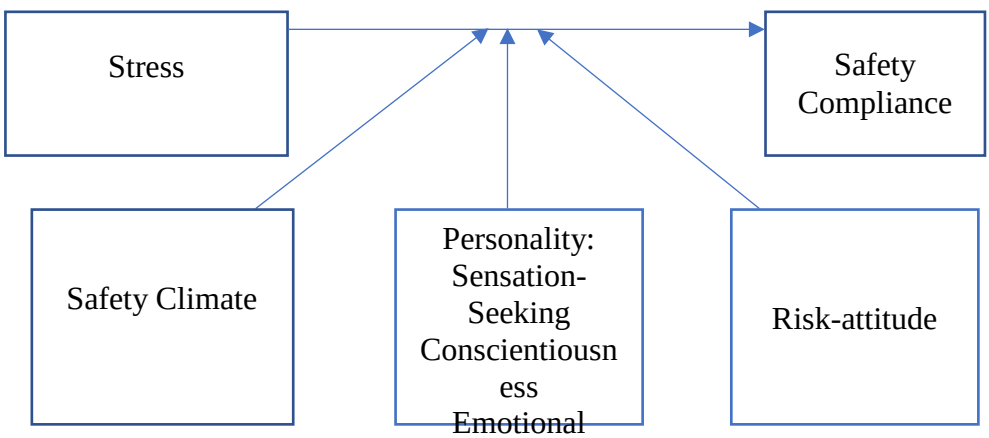
Hypothesis 1: Stress will be negatively related to safety compliance. When stress increases, safety compliance will decrease.

Hypothesis 2: Risk-attitude will moderate the relationship between stress and safety compliance. Those with a positive risk-attitude will have lower safety compliance.

Hypothesis 3: Personality, specifically conscientiousness, sensation-seeking and emotional stability, will moderate the relationship between stress and safety compliance. Those with low conscientiousness, low emotional stability and high sensation-seeking are less safety compliant when stressed.

Hypothesis 4: Safety climate will moderate the relationship between stress and safety compliance. Perceptions of a strong safety climate will increase safety compliance.

The model below shows the hypothesized predicted relationships between stress and safety compliance, with the moderating effects of safety climate, personality and risk-attitude.



Methods

Participants

Thirty-five employees were recruited for the study. The final number of participants was 21, due to drop out rates. This is considered to be a sufficient sample size to other repeated-measures, diary based studies (McNeish and Stapleton, 2016). McNeish et al suggested that as few as 12 participants at level-2 is sufficient, as long as the model has fixed effects, minimum parameters and no focal predictors at level-2, which the present study adheres to. All of the participants were on site operatives and male. Their age ranged from 22 to 66. The above demographic information was sent by the site managers for a basic sample description. Two sites were involved, one site had 17 participants, and the other had four participants.

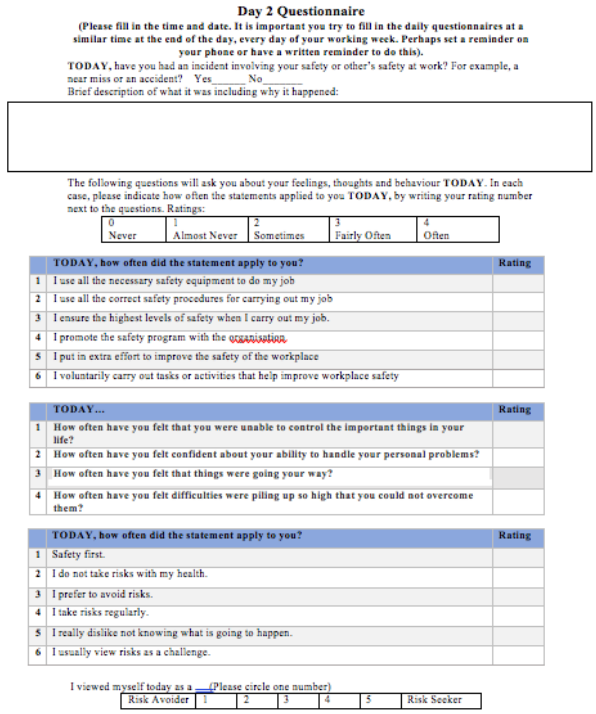
Procedure

This study used an experience sampling methodology. Participants were required to fill a survey at the end of every day for 15 days. This methodology was chosen to examine daily fluctuation in participants' natural environment, and to capture dynamic person-by-situation interactions as well as [3]between- and within-person processes (Uy, Foo, Maw-Der, Aguinis and Herman, 2009). This improves the validity of results and minimalizes [4]retrospective biases. Pencil and paper record sheets were used by the operatives. Conscientiousness, sensation-seeking and safety climate are stable variables, so participants completed these questionnaires once, at the beginning of their enrolment. They completed the stress, risk attitudes and safety compliance questionnaires at every entry. Participants were informed on the research objectives, that their

[3] Between person is the interest in how people vary from person to person. Within person is looking at how the same person varies over time and situations.

[4] Retrospective bias is when individuals, who are recalling a previous event, do not remember the event accurately due to change in attitudes or from memories decaying over time.

answers were anonymous and they could withdraw at any time.



Day 2 Questionnaire

(Please fill in the time and date. It is important you try to fill in the daily questionnaires at a similar time at the end of the day, every day of your working week. Perhaps set a reminder on your phone or have a written reminder to do this).

TODAY, have you had an incident involving your safety or other's safety at work? For example, a near miss or an accident? Yes_____ No_____

Brief description of what it was including why it happened:

The following questions will ask you about your feelings, thoughts and behaviour **TODAY**. In each case, please indicate how often the statements applied to you **TODAY,** by writing your rating number next to the questions. Ratings:

0 Never	1 Almost Never	2 Sometimes	3 Fairly Often	4 Often

	TODAY, how often did the statement apply to you?	Rating
1	I use all the necessary safety equipment to do my job	
2	I use all the correct safety procedures for carrying out my job	
3	I ensure the highest levels of safety when I carry out my job.	
4	I promote the safety program with the organisation	
5	I put in extra effort to improve the safety of the workplace	
6	I voluntarily carry out tasks or activities that help improve workplace safety	

	TODAY…	Rating
1	How often have you felt that you were unable to control the important things in your life?	
2	How often have you felt confident about your ability to handle your personal problems?	
3	How often have you felt that things were going your way?	
4	How often have you felt difficulties were piling up so high that you could not overcome them?	

	TODAY, how often did the statement apply to you?	Rating
1	Safety first.	
2	I do not take risks with my health.	
3	I prefer to avoid risks.	
4	I take risks regularly.	
5	I really dislike not knowing what is going to happen.	
6	I usually view risks as a challenge.	

I viewed myself today as a ___(Please circle one number)

Risk Avoider	1	2	3	4	5	Risk Seeker

Measures

All of the selected measures were validated by research and shown to have a high reliability. Stress and risk-attitude scales were answered on a 0 (never) - 4 (often) Likert scale. Personality, safety climate and safety compliance scales were rated as to how much the following statements applied to the participants, on a 1 (totally disagree) -5 (totally agree) Likert scale.

Stress: The Perceived Stress 4-Item Scale (Cohen, Kamarck and Mermelstein, 1983) was used. Items include '*In the last day, how often have you felt difficulties were piling up so high that you could not overcome them?'*

Risk-Attitude: The Risk Propensity Scale (Meertens and Lion, 2008) will be used to assess risk attitudes, which is a 7-item questionnaire. Items include '*I prefer to avoid risks*.' An additional item asked whether participants saw themselves as a risk avoider or risk seeker that day on a 5-point Likert scale.

Conscientiousness: The 10 conscientiousness items in the NEO-PI-R Scale (Costa and McCrae, 1992) was used. Items include '*I am always prepared*.'

Emotional Stability: The 10 items of Emotional Stability of the Measuring the 7 Factors Scale (Saucier, 1997) was used. Items include '*I get stressed out easily*.'

Sensation-Seeking: The Jackson Personality Inventory: Risk-Taking Scale (Jackson, 1994) was used, which is a 10-item questionnaire). Items include '*I enjoy being reckless'*.

Safety Climate: Two sections of The Safety Climate Measure by Williamson, Feyer, Cairns and Biancotti (1997) were used. One section was Positive Safety Practice,

which reflected the safety activity in the workplace. It had six items, for example *'our management supplies enough safety equipment'*. This section was chosen as items measured resources the company provides to encourage safety practices, as well as others' attitudes towards safety in the company. The second section chosen was Risk Justification, which measured the reasons behind why individuals worked unsafely or took risks that were considered the fault of the organisation. It consisted of 4 items including '*when I have worked unsafely it is because I need to complete the task quickly.'* It was decided not to use the full measure as the questionnaire needed to be as short as possible.

Safety Compliance: Neal and Griffin's (2006) six item Components of Safety Performance Scale was used, which assesses safety compliance and safety participation. Items include '*I use the correct safety procedures for carrying out my job*' and *'I voluntarily carry out tasks or activities that help to improve workplace safety.'*

Analysis

Hierarchical linear modelling (Snijders and Bosker, 2004) using fixed coefficients and random intercepts was applied to analyse the data. There were two levels of the data, where level-1 repeated measures data was used from employee's ratings each day of Stress and Risk Attitude [5](N = 315). This was nested within the individual participants (N=21) at level-2. Level-2 data was the personality variables and safety climate. Level-1 variables were person mean-centred to limit confounding effects from between-person variance (Bono, Glomb, Shen, Kim and Koch, 2013) including common method variance and social desirability (Dimotakis, Scott and Koopman, 2011). MLWiN Version-3 was used for the analysis (Rasbash, Browne, Healy, Cameron and Charlton, 2016). A forward-stepping procedure was adopted to prevent over-inflation of results (Hofmann, Baumeister, Forster and Vohs, 2012; Nezlek, 2003). In Step 1, the null model was created that included just the outcome variable (safety compliance), so to use as a basis to compare the model fit of the data when predictors are added. In Step 2, predictor variables were added. If the value for the predictor variables was significant at $p<.05$, the variable was retained. However, if the variable was not significant, it was removed and Step 2 was run again with a different predictor until the final model was

[5] 21 participants x 15 entries or days = 315 observations

reached, unless the variable was needed for the interaction term in Step 3. In Step 3, interaction terms were tested. In all steps, variables were entered as fixed coefficients (random intercepts only) to avoid reduction in power due to too many parameters included in a model (Kreft and deLeeuw, 2004). Improvement in fit at each step was assessed on improvements in chi squared from the final model represented in the previous step.

Results

Stress (γ_{ij} = -.52, p = .02) was significantly and negatively related to Safety Compliance. The fit of the model also significantly improved from the null model, which included Safety Compliance only, with a significant change in chi squared $\Delta\chi^2$ (1) = 27.85, p < .001. The first hypothesis was therefore met, whereby higher stress predicted lower safety compliance.

Risk-Attitude was not a significant predictor (γ_{ij} = .17, p =.43), and it was not significant in Step 3, suggesting it did not significantly interact with Stress (γ_I=1.01, p = .16). The chi squared change of the model was not significant $\Delta\chi^2$ (2) = 1.02, p = .60, indicating the model fit was better without Risk-Attitude. Therefore Hypothesis 2, that Risk-Attitude will moderate the relationship between Stress and Safety Compliance, was not met. Risk-Attitude was removed from the model.

Conscientiousness significantly and positively predicted Safety Compliance with a direct effect (γ_{ij} = 2.31, p =.01). However, in Step 3, Conscientiousness did not significantly interact with Stress (γ_I =1.09, p = .14), suggesting that it is not a moderator but a predictor on its own. The majority of the variance

was found in the Level-1 model ICC=.18, p<.01. The model fit significantly improved with a chi squared change $\Delta\chi^2$(2) = 5.86, p < .05.

Sensation-Seeking was then added to the model with Stress to form Model 4. Sensation-Seeking did not have a significant direct effect with Safety Compliance (γ_{ij} = -.89, p =.81), and it did not significantly interact with Stress (γ_{ij} = -1.36, p =.91). The model fit to the data did not improve with the inclusion of Sensation-Seeking ($\Delta\chi^2$ (2) = 5.45, p < .06).

Emotional Stability did not have a significant direct effect with Safety Compliance (γ_{ij} = 1.00, p =.16), and it did not significantly interact with Stress (γ_{ij} = -.77, p =.78). The fit of the model to the data did not improve ($\Delta\chi^2$ (2) = 1.97, p < .37.)

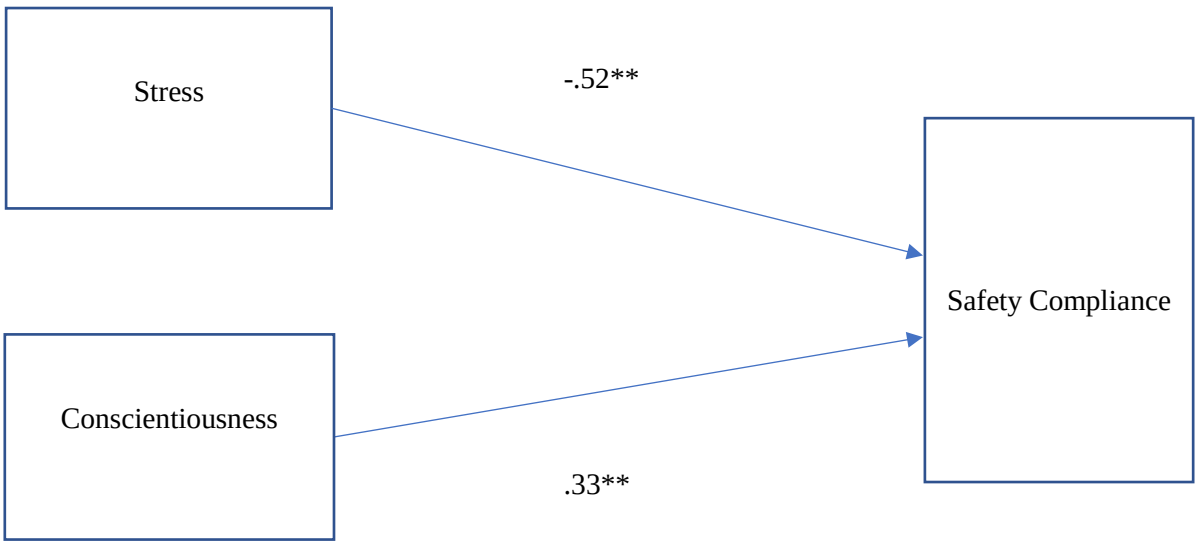
Safety Climate SP did not have a significant direct effect with Safety Compliance (γ_{ij} = .53, p =.30), and it did not significantly interact with Stress (γ_{ij}

= -.17, p =.57). The model fit to the data did not improve ($\Delta\chi^2$ (2) = 1.62, p < .45.)

Safety Climate RJ did not have a significant direct effect with Safety Compliance (γ_{ij} = .44, p =.33), and it did not significantly interact with Stress (γ_{ij} = -.96, p =.83), however the model fit to the data did significantly improve ($\Delta\chi^2$ (2) = 14.32, p < .01). This result was explored further to understand why it occurred, so another model was run, which included Safety Climate RJ as a predictor and Safety Compliance as an outcome, without the inclusion of stress. It was found that Safety Climate RJ did not have a significant direct effect with Safety Compliance (γ_{ij} = .03, p = .4).

This result evidenced the possible legitimacy of the first model with both Safety Climate RJ and Stress, as Safety Climate RJ was not significant in either model. It was then noted that in the first model, only 18 of 21 participants were used in the analysis due to missing data. Therefore, there is the possibility that the result occurred due to low power from the smaller sample size. As Safety Compliance RJ did not show to be a significant moderator of the relationship between stress and safety compliance, Hypothesis 4 was not met.

In conclusion, Stress and Conscientiousness were the only significant predictors of safety compliance. The final model (below) was concluded, where stress and



conscientiousness were significant predictors of safety compliance.

WHAT THE RESULTS MEAN

The findings of the present study revealed insights into the relationship between stress and safety compliance, and made new theoretical contributions to the literature on COR. The methodology allowed the observation and analysis of the dynamics of resource use and depletion in response to aspects on the job that creates stress, and therefore reducing the resources available for employees to comply to safety practices. Employees with higher stress levels were more resistant to comply to safety practices, compared to those who experience lower stress so Hypothesis 1 was met. Safety practices can be theorized by COR as being effortful, as they can require concentration and self-control. Employees also have to put resources towards and deal with other work demands and pressures, sometimes simultaneously. Employees are motivated to protect their resources, so they are likely to conserve their resources by reducing their effort in complying to safety practices when put under pressure with work demands. For example, they may reduce their concentration and awareness, hence resulting in cognitive failure and accidents (Sneddon et al, 2013; Broadbent et al, 1982; Wadsworth et al, 2003). This study confirms that COR could be a relevant theory to addressing why employees do not always comply with safety practices when they are stressed, even if such practices are in place to protect their wellbeing. From understanding the implications of COR, companies can help protect their employees and themselves, for example their reputation, by providing resources to employees for job demands and safety practices, which would reduce stress and pressure to conserve resources. Furthermore, management could take action when

employees appear stressed to prevent accidents from happening, such as discussing stressors and removing individuals from risky situations until their stress reduces. This would ensure they have more resources conserved for safety practices.

The aim of Hypothesis 3 of the present study was to see if these personality traits, specifically conscientiousness, emotional stability and sensation-seeking, gave or strained employees' resources when they were feeling stressed, and whether this would impact their safety compliance. COR suggests that resources can include personal resources, as they can help individuals be stress resistant (Hobfoll, 1985). Previous research had linked certain personality traits with risk-taking, counterwork behaviors and stress. Penney, Perry and Hunter (2011) theorized that those high in conscientiousness are likely to invest their energy, attention and other resources towards work goals, and less likely to perform counterwork behaviours. Barrick and Mount (1991) suggested they also have a natural inclination to be persistent, avoid risks and pay attention to detail. The present study's significant results were consistent with previous research findings and found that those low in conscientiousness are less likely to comply to safety practices. It could be suggested that as those with low conscientiousness have less of a natural inclination to be rigorous and pay attention to detail, more effort and resources may be required for concentration to comply to safety practices. It could also be the case that those who are low in conscientiousness may not be as able to naturally manage and distribute their resources as well as those who are highly conscientious, such as time, so in order to complete job demands they may short-cut safety procedures to conserve resources. Thus, they are more likely to put themselves at risk by not complying to safety practices.

Although conscientiousness predicted safety compliance, it did not significantly interact with stress. It appears that conscientious employees are more likely to comply to safety practices, whether they are stressed or not. Although Hobfoll's theory was mainly used to explain behaviour due to stress, it could still apply here. For example, it could be that those low in conscientiousness manage their resources less effectively (Kelly and Johnson, 2005), such as time. This means they may leave job demands until the last minute, so they still need to conserve resources from safety practices in order to complete work on time. This process could occur without employees feeling negatively stressed,

such as a potential work style that people with low conscientiousness could adopt. This theory is consistent with Yerkes-Dodson Law, where employees may feel pressure and 'good stress' from work demands so they adopt short-cut strategies, yet they may not rate themselves as feeling stressed in their questionnaire (Yerkes and Dodson, 1908). Therefore, safety compliance can be predicted by both stress and conscientiousness directly, as the two predictors do not interact with each other. This finding and theory could imply that organizations should consider hiring conscientious individuals for dangerous work to have a safer human capital, as they are more likely to have resources to comply to safety practices, whether they are stressed or not. However, as stress explained more variance than conscientiousness, it may be worthwhile for organizations to prioritize dealing with stressors in the workforce. It must be noted though, that as this was a small sample, it may not be generalizable and different results may occur with a larger population.

It was predicted that the trait emotional stability would also have a relationship with safety compliance and stress. According to COR, those low in emotional stability are likely to have less available resources, as many may be spent emotionally (Barrick and Mount, 1991). They may conserve resources in safety practices to be able to focus on job demands and stressors, which could increase attention lapses and distractibility (Paul and Maiti, 2007). The results did not meet the hypothesis, as emotional stability did not have a relationship with safety compliance or stress. It may be that conscientiousness could be a more influential trait with safety compliance compared to emotional stability, so those low in emotional stability but high in conscientiousness may still comply to safety practices, as they are able to manage their resources effectively. It could also be that the focus of worry for less emotionally stable individuals could vary and be related to work or health, so safety compliance may vary in importance to them, depending on their disposition. The questionnaire used did not distinguish this so it could be a possibility. Albeit, emotional stability was not found to be related to safety compliance and stress.

The hypothesis for the relationship between sensation-seeking, safety compliance and stress was also not met. It was theorized that as high sensation-seekers are naturally attracted to activities that elicit sensations of excitement (Ball and Zuckerman, 1990), they may need to

increase their efforts to exhibit self-control when in dangerous situations, hence making safety compliance effortful. When they are stressed, they may conserve their resources by reducing their safety compliance. There are several explanations as to why this relationship was not found in the present study. Firstly, it could be that this company is in the industry of construction, safety for their employees is a major concern as the possibility of injury or death is higher than other industries. Therefore, they are likely to be vigilant in their training or recruitment to hire individuals who do not take risks at work. Secondly, it could be that some employees may be sensation-seekers for recreational activities outside of work, but did not rate themselves as sensation-seekers in a work based survey. For example, one participant had written on their questionnaire that they had done bungee-jumping before, but he took safety at work very seriously. This is plausible as seeking excitement by not complying with safety practices could have a very real risk to self and other's health, whereas recreational activities have safety procedures in place by the companies who provide them. Thus, no relationship was found between sensation-seeking and safety compliance. No other study, to the researcher's knowledge, had explored sensation-seeking and safety practices, making this study unique. However, it also means that more research is required to fully understand this topic.

The present study also took into account risk-attitudes, as individuals may be more inclined to take risks, but may not necessarily be sensation-seekers. It was predicted that those who have a positive risk-taking attitude are likely to be less safety compliant when they are stressed. This is because disregarding safety practices is a risk, so those who have a positive risk-attitude may need to feed resources into refraining from risk-taking, and they may conserve these resources when they are stressed. In terms of Theory of Planned Behaviour, people's attitudes are important determinants of behaviour, hence risk-attitudes would seem important to take into account. However, the results from the present study found that the relationship between risk-attitude, safety compliance and stress was not significant, so Hypothesis 2 was not met. It may be that this company is vigilant in their hiring process to recruit individuals who are less likely to take risks onsite, due to the prevalent dangers. Attitudes could also be influenced by the organization's climate and training, as attitudes are more changeable that

traits and values. For example, the study was launched in Safety Week, so for the period of the study, individuals may not rate themselves as risk-takers. However, there is a debate in the literature as to whether risk-taking is a trait or a state that depends on the situation (Nicholson, Soane, Fenton-O'Creevy and Willman, 2005; Weber, Blais and Betz, 2002). Like sensation-seeking, there is very little research on the impact of risk-taking attitudes on safety, so there may well be a relationship in different samples.

Safety climate was predicted as another moderator between stress and safety compliance, as it could provide additional external resources to help employees engage in safe behaviours, even when they are stressed. Examples of resources could include social support, appropriate equipment and training. Both Safety Climate SP and RJ did not have a significant relationship with safety compliance and stress, so Hypothesis 4 was not met. As the participant number used in the analysis dropped to 18, it's possible that there was not enough power for a significant result. It could also be that the safety climate was more dynamic than originally thought (Cooper and Phillips, 2004), so it may be more appropriate to measure it daily, rather than assuming it was stable and measuring it once. The result gained is consistent with Cooper and Phillips' results, who found that safety climate scores did not necessarily reflect actual levels of safety behavior or safety performance, as there are numerous factors that impact safety behavior, such as stress as found by the present study, or colleagues' attitudes (Cobb, 1980). Cooper and Phillips suggested that multiple performance indicators might be useful to validate safety climate measures, as there are many behaviours that could be measured related so safety compliance. Furthermore, a different result may have occurred had the present study not restricted the safety climate measure to safety practices and risk justification. This finding and theory could have implications that it is more important for organizations to put effort into having a conscientious and low stressed workforce, rather than focusing on a stable safety climate.

Limitations

There were a few limitations. With regards to data collection, the study was launched at the company's bi-annual safety day conference during their 'Safety Week'. This could have impacted participants' results, where they may be more aware of safety practices after the increased exposure

to talks and emphasis of leaders on safety practices. Had the data been collected prior to safety week, there may have been more instances of safety non-compliance. Furthermore, the talk the researcher conducted during safety week may have primed employees' answers to the questionnaires, or ran the risk of increasing [6]social desirability bias (Gilovich, Griffin and Kahneman, 2002). However, the talk was also beneficial in helping participants understand the purpose of the study and increase participants, as they were asked to fill in the initial questionnaire after the talk.

Aside from the conference talk, social desirability could have impacted the study, especially as the questionnaires were self-report. The researcher had concerns of social desirability bias when meeting the employees at the safety conference. Operatives may have been concerned that management could have read their questionnaires, and so may have answered in a socially desirable way. Social desirability bias was limited as much as possible in the analysis, as Level-1 variables were person mean-centred (Dimotakis, Scott and Koopman, 2011).

There were some limitations in the data analysis. Even though the number of participants were sufficient for this study for Level-1 data in particular, which was analyzing the observations, more participants would have been beneficial for Level-2 data, which were analyzing between person variables. As the between-person analysis was restricted to a maximum of 21 participants, it may explain why some of the results were not significant. This was especially the case for safety climate RJ, where only 18 participants were entered into the model, due to some missing data. This may explain why the unexpected result occurred, where the model significantly fit the data better with safety climate RJ included, rather than just stress, even though both predictors and the interaction term were not significant. Although the sample size was deemed sufficient in the literature, this study could have benefited from a larger power for other significant results. It could also be possible that different results would have arisen had a full safety climate measure been used, rather than to select sections of the scale. It is recommended that if this study is to be repeated, that a full safety climate scale should be used.

[6] Social Desirability is the tendency of survey respondents to answer questions in a manner that will be viewed favorably by others, such as over-reporting "good behavior" or under-reporting "bad", or undesirable behavior.

Implications

This project adds to the literature as it is the first of its kind to explore whether COR fits as a theoretical framework to explain employees' safety compliance under stress, which provides insight into why employees do not abide to safety practices that are in place to protect them and others. Due to COR's simplicity, it would be easy for managers to understand it and incorporate it into their practice. For example, managers could explore what resources at work employees feel are stretched, whether these be physical like equipment or energies such as time. By adjusting the resource availability, the operatives may feel less stressed and increase their vigilance in safety practices. Alternatively, it may be useful to provide training to employees on resource management to reduce their stress, such as time management and priority setting. This would save money in the future, from increasing work time and reducing claims, by helping to protect employee wellbeing. Furthermore, it could inform selection strategies in organizations, when creating job analyses and when choosing traits to select in, due to possible implications of traits and attitudes on risk behaviour with regard to safety compliance. For example, it could be beneficial to hire those higher in conscientiousness for dangerous work, although studies with a larger sample, and samples in other industries should confirm this before solid conclusions can be drawn. Additionally, it informs organizations as to whether safety non-compliance occurs due to employees' need to conserve resources to meet other job demands, for example, in times of stress. Companies can then facilitate employees' resource conservation, such as providing regular breaks and enough time to complete projects, so they have sufficient resources for their tasks and do not forfeit their safety compliance.

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