

Coping mechanisms employed by Irish fire-fighters and association with stress and anxiety: A role for Critical Incident Stress Management?

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Abstract

Emergency services personnel experience high levels of stress daily (Minnie et al., 2015), with an individual's ability to cope with such stressful situations determined by their perception of stress, as well as the coping mechanisms they employ. The aim of this study was to investigate coping strategies employed by Irish firefighters and the association with perceived stress and anxiety levels. A further aim was to determine attitude towards CISM supports such as post-event Psychological Debriefing/ Defusing. A mixed method survey design (N=72) employing both the Coping Inventory for Stressful Situations (CISS) and the Depression Anxiety Stress Scale (DASS21) were completed by participants from a full time urban based station providing Emergency Medical Services, and five stations on 'retained' status. Participants were recruited through convenience sampling. Results suggested a moderate positive correlation between Stress and Avoidance and a weak positive correlation between Stress and Social diversion, Avoidance distraction, and Emotion orientated coping strategies. Qualitative analysis indicated that respondents relied on talking, colleague support, and recreational activity for stress management. The study concludes that stress management supports are necessary for workers in highly stressful environments, considering the reliance on less healthy forms of coping strategy.

Key words: Critical Incident Stress Management; Coping mechanisms; Firefighters Stress; Anxiety.

Introduction

Emergency services personnel experience high levels of stress on a daily basis (Minnie et al., 2015) with interventions such as psychological debriefing commonly

used as an intervention in the aftermath of a stressful or traumatic event (Mitchell, 1983a; 1983b). Research has previously established that high levels of stress and anxiety can have negative implications on an individual's cognitive functioning through poor memory retrieval and ability to function (Bryant et al., 2007; Biggs et al., 2010; Kehl et al., 2014). This has had significant implications for firefighters, affecting their personal health and relationships. Anxiety levels may increase in anticipation of an unpleasant future event, which firefighters are frequently exposed to. Several studies have asserted that the prevalent form of coping mechanisms firefighters use in these situations is 'problem-focused' coping, with Young et al., (2014), estimating that half of firefighters employed such strategies in their work. Other forms of coping strategy employed were also noted, with a third of firefighters using 'emotion focused' with a further 17% replying on both 'problem' and 'emotion orientated' strategies.

Critical Incident Stress Management (CISM) is a seven-step programme used by the Irish Fire Service to educate (e.g., through talks, handouts etc.), help build supports to manage stress (e.g., resilience), and generally support individuals. CISM is an integrated, multi-factor model approach aimed at providing individual and social support to reduce distress, consisting of components such as pre-crisis education on stress management, diffusion, Critical Incident Stress Debriefing (CISD), and follow up individual support if required (Regel, 2007). It has been reported however, that the working environment can affect the process through difficulties with management, heavy workloads and work rosters (Healy and Tyrrell, 2013).

In terms of use, CISM has been noted as effective in several highly pressurised work environments, such as, amongst soldiers who perform peacekeeping duties in dangerous environments (Adler et al., 2008), with police officers (Leonard and Alison, 2010), and with nurses (Herrema et al., 2020). Generally, CISM and debriefing was designed to create a structured approach for emergency workers who have experienced a critical incident. One such component, Critical Incident Stress Debriefing (CISD), was formulated in the 1980's, and was purposely designed for groups of individuals who have experienced the same traumatic event in order to alleviate distress experienced, and to provide psychological support and closure to the incident (Mitchell & Everly, 2000).

The aim of the current study was to explore current levels of stress and anxiety amongst common groups of Irish firefighters; firefighters who work at retained stations (i.e., stations which act on an on-call basis), firefighters who work in the sole capacity of firefighter at full time stations, and firefighters who act in a dual 'firefighter and paramedic' role at full time stations. Additionally, coping mechanisms among these groups were investigated in terms of association with stress and anxiety, with a qualitative analysis exploring attitudes toward critical incident stress management (CISM). Finally, factors such as length of service and age were explored for associations with these psychological factors.

Stress, anxiety and associated demographics: A review

Specific event types have been highlighted as being considerable stressors within the Emergency Services, such as incidents involving children, suicide of a colleague, and when the victim is known to the responder (Health Service Executive (H.S.E.), 2012; Alexander and Klein, 2001). As a result of such incidents firefighters can experience several stress related responses, including acute, episodic acute, and chronic stress, and post-traumatic stress disorder (PTSD). High levels of hyper-arousal can also result in anxiety, loss of an internal locus of control and a sense of helplessness; as well as physical ailments such as muscular pain, which is commonly experienced among firefighters (Sterud et al., 2011; Vaulerin et al., 2016). However, it has been reported that having social support may create a buffer towards stress by increasing resilience towards stressful situations (Udwin et al., 2000; Gibbs and Montagnino, 2007; Lee et al., 2013; Meyer et al., 2012). Notwithstanding, a recent meta-analysis by Fraess-Phillips et al., (2017) on stress and firefighters indicated that this area still remains under-researched, with conflicting results. Furthermore, studies have tended to focus more specifically on traumatic stress and PTSD than on general levels of stress among firefighters (e.g., Fraess-Phillips et al., 2017; Wagner et al., 2016).

Age has also been associated with higher stress levels, with research reporting that the age of the individual, the age the firefighter commenced service, and the length of service, influences stress levels (Fullerton et al., 2004). For length of service, research has reported a positive correlation with the ability to cope with stressful events, but more recent studies have noted that the ability to cope may be more specific to the level of stress and the coping strategy employed. Biggs et al. (2010) suggests that other extraneous variables such as early or historical exposure towards a stressful event may induce a stressful response, which may make a firefighter more susceptible to developing acute stress disorders after a particularly stressful experience. As a result of the limited and conflicting views on the effect of age and service length on firefighter stress and anxiety, research is needed to further investigate these socio demographic variables. Therefore, an aim of the current study is to explore this under researched area of stress and anxiety (see Fraess-Phillips et al., 2017) among both firefighters and FireFighter-paramedics.

The use of coping strategy among firefighters

Lazarus (1966) and Lazarus and Folkman (1984) identified how an individual will, through a primary appraisal process, decide if the stressful event is a threat to the individual, and will subsequently move to the secondary appraisal process or coping strategy to manage the stressful situation. Lazarus and Folkman (1984) categorised two styles of coping, namely problem focused coping and emotion orientated coping. Problem-focused coping involves an individual identifying the issue or situation and deciding how the source of the stress can be alleviated, whereas emotion-focused coping is centred on a strategy employed by the individual which does not address the actual situation itself, but centres around the individual's emotional response to the situation (Lazarus and Folkman, 1984).

With regard to an avoidance response, such coping styles have generally been included as part of emotion-oriented coping. Indeed, Parker and Endler (1992) noted that avoidance can have both person-oriented and task-orientated responses. and thus has been categorised as a separate coping strategy consisting of avoidance distraction and avoidance social diversion coping. Avoidance distraction coping occurs when an individual deflects their attention from the event or incident whereas avoidance social diversion coping involves turning to others during stressful times. Some research has highlighted that firefighters tend to employ problem-focused coping as opposed to avoidance-coping or emotion coping (Young et al., 2014; Chamberlin and Green, 2010; Wagner and Martin, 2012). Other studies have posited that a combination of coping styles may be employed, with Bryant and Guthrie (2007) reporting that, among trainee firefighters, a maladaptive (avoidance) self-appraisal could be considered a risk factor for an individual developing a more acute stress disorder such as PTSD.

As previously described, length of service may also impact the type of coping strategy employed to deal with adverse situations. Coping strategies can change over time, and through years of experience more effective strategies may further develop. Some researchers have posited the opposite however, where firefighters with more years on the job employed inefficient coping strategies (Nydegger et al., 2011). Again, the limited and contradictory findings on changes in coping mechanisms employed by firefighters, will be investigated in the current study with a specific aim on the association between employed strategy, stress, and anxiety, and whether such strategies employed are affected by service length. Therefore, another aim of the current study is to investigate the relationship between coping mechanisms employed by firefighters and levels of stress and anxiety. Length of service and the coping mechanism employed is also examined.

Coping and Critical Incident Stress Management (CISM)

The World Health Organisation (as cited by H.S.E., 2012) refers to a critical incident as "...an event out of the range of normal experience – one which is sudden and unexpected, makes you lose control, involves the perception of a threat to life and can include elements of physical or emotional loss" (p. 4). Commonly used interventions to such events, such as psychological debriefing, typically lasts between two to three hours and is typically conducted within 24 to 72 hours of a stressful incident (Mitchell and Everly, 1993). In comparison, methods such as defusing occurs within one hour up to four hours after the critical incident, which ranges from 30-60 minutes in duration. Both debriefing and defusing are group-based processes, allowing group members to communicate thoughts and emotions about a critical incident and receive support from colleagues. According to Robinson and Mitchell (1993), respondents who were debriefed reported that the stressful event had less of an influence on them both at post-debrief and indeed over time. Whilst some researchers support psychological debriefing after a stressful incident (Adler et al., 2008), others remain against it. The Cochrane Review (Rose et al., 2002; Van Emmerik et al., 2002) provided a more critical assessment of CISD, with some researchers arguing that it provided considerable distress for individuals

injured in an event (Bisson et al., 1997). However, some argue that these criticisms are flawed, with some studies including no baseline, or having timing, control group, and ethical issues. Other issues include a lack of appropriate training for those conducting the debrief, issues around the debriefing process itself, and a high rate of attrition (Robinson and Mitchell, 1993; Regel, 2007; Robinson, 2004; Campfield and Hills, 2001). Arce (2018) reported that debriefing was effective when implemented directly in the aftermath of a serious incident, and more crucially there were no indications that CISD was harmful to the participants. Moreover, a more recent review has suggested that frequent interventions did have a positive impact on the wellbeing of the participant through alleviating stress, with a noted increased improvement in sleep (Wild et al., 2020).

Jeannette and Scoboria (2008) conducted research on CISD and firefighters' highlighted preferences of intervention, including how the type of post-incident intervention implemented could depend on the severity of the event. Peer support and group discussion were favoured as the most desired forms of intervention, with combined individual counselling and CISD favoured in high intensity cases. Regarding social support, reassurance of worth from peers and family was especially important, enhancing resilience in stressful situations, and contributing to positive coping (Varvel et al., 2007; Crowe et al., 2017). This is perhaps more noticeable in areas where firefighters do not have a structured and consistent approach to deal with high levels of stress related incidents. Indeed, recent research conducted amongst firefighters in Saudi Arabia highlighted this as a key issue. Alghamdi et al. (2016) surveyed 219 firefighters with varying degrees of service (1 to 29 years). High levels of anxiety, depression and symptoms relating to PTSD were reported. The authors attributed this to the absence of a formal or structured intervention for firefighters in Saudi Arabia following a stressful or traumatic event, and potential stigma for accessing mental health services. Such repeated exposure to trauma has negative effects on the mental health of firefighters and further research is warranted in this area (Jahnke et al., 2016).

The coping mechanism of the individual may also lead to dissatisfaction with the outcome of CISD. Tran and North (2018) found that individuals who experienced more avoidance were more likely to report that they found CISD ineffective. It was noticeable that despite this, the individuals did recognise the importance and function of CISD and did favour this as an intervention for others. They reported that it was the individual's coping mechanism which influenced their ability to cope with the trauma and their response to the effectiveness of the CISD intervention.

The CISM model currently in place offers a multi-component approach and, at present, firefighters can engage in Critical Incident Debriefing or Defusing on a voluntary basis, however some previous research suggested that first responder debriefing or defusing should be mandatory for significant stressful events occurring within an occupational capacity (Ross-Adjie et al., 2007). The final aim of this research is to explore, through a qualitative approach, the views of firefighters with regard to CISM interventions, and whether other supportive strategies are also employed. A qualitative component to determine the effectiveness of CISM/Debriefing was used due to a lack of reviews of meta-analysis for quantitative

analysis in this area. It is envisaged that the qualitative component of this research will provide additional depth and context to respondents' answers regarding the effectiveness of CISM/ Debriefing process.

The Current study

The current study examines coping strategies employed by Irish firefighters and association with stress and anxiety. It was hypothesised that emotion-oriented coping would predict higher stress and anxiety levels among Irish firefighters. It was further hypothesised that avoidance coping would predict higher stress and anxiety levels. It was hypothesised that age and length of service would predict stress and anxiety levels in firefighters generally. It was further hypothesised that coping mechanisms adopted by firefighters would differ depending on length of service. In addition, qualitative analysis explored attitudes towards CISM among Irish firefighters.

Methods

Participants

Seventy-two firefighters (Male= 71, Female= 1) stationed in Ireland from six stations participated in this study. The research was conducted in one urban area which used an Emergency Medical Services (EMS) system. The EMS system consisted of individuals operating a dual role of firefighter/paramedic (n=27) and five retained stations worked solely in a firefighter role (n=45). Mean age of the group was 42.37 years (SD= 7.88) with age ranging from 23 to 57 years.

Design

This study consisted of a mixed method correlational design with cross sectional analysis between groups. The research employed non-probability convenience sampling. A questionnaire was developed using quantitative and qualitative open and close ended questions.

Procedure

All firefighters were on call at the time of completing the survey. The station officer was briefed that if they had to attend a call, the questionnaires could be taken with them to be completed later. Participants were briefed that the questionnaires contained items relating to stress and anxiety and how individuals manage stressful situations in addition to questions relating to CISM. Participants were informed that the last page of the questionnaire provided the numbers of useful helplines, and this was followed by an invitation to complete the questionnaire. Participants were reassured that responses were anonymous, and their participation was completely voluntary. In the interest of confidentiality, questionnaires could be completed in a location at the participant's discretion. No call out was received at the time of completing the questionnaires.

Measures

Participants were required to complete a battery of measures including the 'Stress' and 'Anxiety' subscales of The Depression, Anxiety and Stress Scale (DASS-21; Lovibond and Lovibond, 1996), the Coping inventory for Stressful Situations (CISS; Endler and Parker, 1999), and a series of demographic questions. Three qualitative questions related to Critical Incident Stress Management were also included.

There were a number of single item measures at the beginning of the questionnaire. This included Sex (Male or Female), Age (in years), and length of service, which was measured across four categories ('0-4 years', '5-9 years', '10-14 years', and '15 years plus'). They were also required to indicate their current role (Firefighter or Firefighter/Paramedic), whether they worked full-time or in a voluntary capacity, and in an 'Urban' or 'Small Urban/Rural based' station. Close ended questions were asked to provide additional information for descriptive statistics such as sex and longitude of service.

The Depression, Anxiety and Stress Scales-21 (DASS-21; Lovibond and Lovibond, 1996)

The DASS 21 scale is a 21 item scale with each item measured on a four-point Likert scale with values ranging from '0, the question did not apply' to '3, applied most of the time'. Participants were asked to determine how likely each of the posed questions had applied to them within the last seven days. The 'Stress' and 'Anxiety' subscales from the DASS 21 were used. The anxiety subscale of the DASS 21, consisted of questions such as, 'I was aware of dryness of my mouth' and the stress subscale, included questions such as, 'I found it hard to wind down'. Each of the sub-scales contained seven items. The Cronbach Alpha indicated excellent reliability for stress (.9) and anxiety (.86). These findings were supported by external research on reliability for the DASS 21 (Osman et al., 2012).

The Coping inventory for Stressful Situations (CISS; Endler and Parker, 1999)

The CISS consists of 48 items, with each item measured on a five-point Likert scale with values ranging from '1' to '5', where individuals specify how they react to stressful situations, from '1', not very much, to '5', very much. Participants rated how they engaged in certain situations when they experienced a stressful or upsetting experience such as 'Try to be with other people' or 'Watch TV'. The CISS also indicated excellent internal reliability with Cronbach Alpha readings for task orientated coping (.88), emotion orientated coping (.93), and avoidance coping (.89) (McWilliams et al., 2003). There are two subs-scales within the avoidance coping scale which are distraction coping and social diversion coping. Distraction coping provided very good internal reliability (.81), and an acceptable reliability measure for social diversion (.75) was reported.

Qualitative questions

Three additional questions around Critical Incident Stress Management were asked and the responses were analysed through inductive thematic analysis. The questions were:

1. "Critical Incident Debriefing and Defusing, (shortened version of CID) are both techniques used in the aftermath after a particularly stressful situation. Have you ever participated in a Critical Incident Debriefing or Defusing?",
2. "Do you believe that Critical Incident Debriefing OR Defusing should be mandatory after a particularly stressful situation? (Please circle your response). Can you please briefly explain".
3. "On a personal level, can you briefly describe what aspects of Critical Incident Stress Management techniques you engage in and/or find effective?"

Ethics

This study was reviewed and approved by the Dublin Business School Human Research Ethics Committee. A cover sheet was provided with the survey which invited participants to take part. This also included important information such as an outline of the survey, the contact details of the authors and important helpline numbers should any of the questions trigger negative feelings for the participants. Participants were advised that this was an optional survey and consent was formed by the completion and return of the survey. All participants were over 18 years of age. The questionnaires were stored securely, and the information was uploaded to a password protected computer.

Results

Demographic descriptives

Seventy-two participants took part in the study, with an average age of 42 years. Twenty-seven participants self-identified as having a dual firefighter/paramedic role, with 45 confirmed as firefighters in a sole capacity. A large proportion of participants (64.8%) had at least 15 years of service, with 22.9% having 10-15 years of service. Just over 12 per cent (12.3%) reported less than 10 years of service in the role.

Demographic differences in Stress and Anxiety among firefighters

Firefighter-paramedics ($M= 5.38$, $SD= 6.21$) were not significantly different to firefighters ($M= 6.73$, $SD= 4.89$) regarding stress scores, as measured by the Stress subscale of the DASS ($t= .32$, $df= 69$, $p= .315$). Similarly, Firefighter-paramedics ($M= 2.22$, $SD= 3.91$) did not differ from firefighters ($M= 3.45$, $SD= 4.3$) regarding anxiety levels, as measured by the Anxiety subscale of the DASS ($t= 1.21$, $df= 69$, $p= .229$). Skewness and kurtosis values for age (-.23, -.69), anxiety scores (1.74, 2.52) and stress scores (.84, -.05) were all within appropriate parameters of normality (Hair et

al., 2010). Regression analyses found that age did not significantly predict either stress ($F(1,68) = .003, p = .959$) or anxiety ($F(1,68) = .05, p = .828$) among firefighters generally. With regard to assumptions for Analysis of Variance, Levene's test indicated that homogeneity of variance was not violated for length of service on stress scores ($p = .557$) but it was for anxiety scores ($p = .025$). A one-way analysis of variance was conducted to measure whether stress and anxiety differed in terms of length of service. Skewness and kurtosis values for both stress and anxiety in each of the length of service categories did not exceed the parameters deemed unacceptable (Hair et al., 2010), apart from skewness in the 10-14 years category, which indicated levels higher than two (2.26). As a result of homogeneity of variance being violated, the significance value for anxiety was reduced to .01. Analysis found that length of service did not differ significantly for either stress ($F(3,66) = .62, p = .606$) or anxiety ($F(3,66) = .63, p = .596$).

Firefighters' coping strategies: Association with Stress and Anxiety

A regression analysis was conducted to measure specific coping strategies, as measured by the CISS, as predictors of stress and anxiety. Skewness and kurtosis values for all coping strategies, as measured by the subscales of the CISS, were all within -1 and 1, indicating appropriate parameters of normality (Hair et al., 2010). With regard to H1, Emotion Oriented coping was found to be a significant predictor of stress ($F(1,63) = 36.21, p < .001, \text{adjusted } R^2 = .35$) (Emotion Oriented, $\beta = .6, p < .001, \text{CI}(95\%) .16, .32$), suggesting that higher emotional coping predicted increases in stress levels. For H2, Avoidance Focused coping also significantly predicted stress ($F(1,63) = 10.26, p = .002, \text{adjusted } R^2 = .13$) (Avoidance Focused, $\beta = .37, p = .002, \text{CI}(95\%) .06, .26$). A regression was further conducted with Avoidance Distraction, which significantly predicted stress individually ($F(1,65) = 11.01, p = .001, \text{adjusted } R^2 = .13$) (Avoidance Distraction, $\beta = .38, p = .001, \text{CI}(95\%) .12, .48$), as did Social Diversion ($F(1,68) = 5.71, p = .02$). A multiple regression model was conducted with Avoidance Distraction and Social Diversion on stress, which was significant ($F(2,63) = 5.76, p = .005, \text{adjusted } R^2 = .13$). However, only Avoidance Distraction was a significant individual predictor in the model (Avoidance Distraction, $\beta = .38, p = .016, \text{CI}(95\%) .06, .54$) Task Oriented coping was not found to be a significant predictor of stress ($F(1,69) = 1.5, p = .225$). These results suggest that emotion and avoidance coping strategies predict stress levels, with higher stress attributed to greater use of such strategies. See table one for the coefficients between coping strategy and stress.

Table 1: Coefficients between predictor variables and stress

Coping Mechanism	B	SE	β	t	p
Emotion Oriented	.24	.04	.6	6.02	<.001
Avoidance focused	.16	.05	.37	3.2	.002
Avoidance Distraction	.3	.09	.38	3.32	.001

Social Diversion	.34	.14	.28	2.39	.02
Task Oriented	.08	.06	.15	1.22	.225

Table 2: Coefficients between predictor variables and anxiety

Coping Mechanism	B	SE	β	t	p
Emotion Oriented	.21	.03	.74	8.7	<.001
Avoidance focused	.11	.04	.34	2.84	.006
Avoidance Distraction	.23	.07	.38	3.29	.002
Social Diversion	.15	.11	.17	1.39	.169
Task Oriented	.03	.05	.08	.64	.527

With regard anxiety levels among firefighters generally, Emotion Oriented coping was a significant predictor ($F(1,64)= 75.61, p < .001, \text{adjusted } R^2 = .53$) (Emotion Oriented, $\beta = .74, p < .001, \text{CI}(95\%) .16, .26$). As with stress, total Avoidance Focused coping also significantly predicted anxiety ($F(1,63)= 8.04, p = .006, \text{adjusted } R^2 = .1$) (Avoidance Focused, $\beta = .34, p = .006, \text{CI}(95\%) .03, .18$). Avoidance Distraction also predicted anxiety ($F(1,65)= 10.82, p = .002, \text{adjusted } R^2 = .13$) (Avoidance Distraction, $\beta = .38, p = .002, \text{CI}(95\%) .09, .37$). Neither Social Diversion ($F(1,68)= 1.93, p = .169$) nor Task Oriented coping ($F(1,69)= .4, p = .527$) were found to be significant predictors. Similar to stress, Emotion and Avoidance Coping strategies predict greater anxiety levels among firefighters. See table 2 for coefficients related to coping and anxiety

Length of service and Coping strategy

For H3, a one-way anova was conducted to measure differences in coping strategy employed based on years of service. Levene's test was not significant with reference to these comparisons. Skewness and kurtosis values for all coping strategies, with regard to specific length of service categories, were all within the appropriate parameters of normality (Hair et al., 2010). Results suggested that years of service did not predict differences in coping strategies measured; Task Oriented ($F(3,67) = .37, p = .773$), Emotion Oriented ($F(3,62) = .35, p = .789$), Total Avoidance ($F(3,61) = 1.35, p = .266$), and Avoidance Distraction ($F(3,63) = 1.3, p = .284$).

Thematic Analysis of CISM responses

Thematic analysis was applied to participant responses regarding whether defusing/debriefing should be a mandatory part of the critical incident process of firefighter work. Four overarching themes were identified: Personal experience, Open communication, Social support and Awareness.

Theme 1: Personal experience

Some participants outlined the importance of individual experiences and needs being catered for within the scope of the critical incident process. For example, participant 61 reported that *"...some people find different things stressful. But the option should be there"*. In addition, participant 30 commented that such needs are *"...dependent on the incident and allowances should be facilitated to individuals who may require a different approach"*.

Participants highlighted the importance of an idiosyncratic approach, an environment where there were open lines of communication and a support network for the persons involved in the same incident, where they can freely express themselves, which is a critical element of CISM.

Theme 2: Open communication

The debriefing/defusing process facilitates the acknowledgement of certain emotions which may be experienced after an incident. In doing so, it enables the respondents to release thoughts or emotions and establish boundaries between their personal and professional life, and not allowing whatever occurs in their professional life to impact their personal one.

To illustrate, participant 38 refers to difficulties becoming detached from work when at home, one *"...can bring work stuff home, its not fair on family, so debrief is vital"*. Also, participant 20 comments on the importance of colleague communication, where *"...after a particularly stressful firecall its important to talk with crew and make sure any issues are dealt with"*.

Colleagues who have experienced the same stressful incident express the necessity to identify any issues and bring these to the fore. Indeed, fellow firefighters remark on the comradery and also the bond and social support they provide to each other during difficult times.

Theme 3: Social support

Participants found aspects of peer support particularly helpful. Participant 7 highlighted that, *"...just talking and reinforcing all was done that could be"*. Participant 9 also acknowledges that *"It helps others to realise that everyone can suffer the same"*. Furthermore, participant 16 described how *"It helps clear the mind, and reassures you that you are not alone"*. Social support allowed individuals the space to acknowledge their feelings with their colleagues *"...understanding its ok to be not ok"* (Participant 3) and provided a sense of reassurance from other crew members who experienced the same incident.

Theme 4: Awareness

Some respondents commented on how debriefing/defusing brings awareness to an individual, and how an event may result in longer-term mental health issues. For example, participant 36 emphasised that there can be implications if such a process

is not in place, where one can be significantly impacted by a critical incident. They commented that, after a serious fire incident, where a number of people were killed, "...my father...received no counselling and it caused him [sic] major problems later in life [sic]".

Respondents do acknowledge the function of CISM in providing an insight into their own individual thoughts, and emotions to process how a stressful, or even traumatic event may have impacted them.

Reported effectiveness of CISM

Table 1 below illustrates aspects of stress management which individuals find effective after a critical incident.

Table 3: Aspects of stress management participants engaged in

Themes	Frequency
Talking	18
Social Support of Colleagues	9
Recreational Activity	7
Nothing/Don't engage in any	7
Debrief/Defuse process	5
Experience Sharing	3
Drinking	3
Humour	2

Talking was the most frequently reported effective means of stress management, identified by 18 respondents. Furthermore, social support and recreational activity were also self-reported as effective. A point of possible concern was that the joint third most popular response was 'Nothing/Don't engage in any'.

A possible explanation for this may be that some firefighters rely on more problem-focused coping strategies which are associated with lower levels of stress. They may have felt that they did not need to actively engage in stress management techniques. Indeed, this may also be due to the CISM programme employed at the stations, where a supportive culture is in effect, and where individuals may feel supported to speak to each other about their emotions. This may be sufficient for some firefighters.

It is important to note that some participants did highlight further aspects of stress management, which would not be considered a specific part of the CISM process, such as alcohol consumption. However, the authors found this important to include as it was specifically employed by some respondents as a way to manage stress.

It must also be noted that there was a high rate of participants who did not answer this question, with only 27 out of a possible 72 participants responding, representing 38% of the total sample size.

Discussion

The aim of the current study was to investigate stress and anxiety levels among Irish firefighters and those in firefighter/paramedic dual roles, and relationship with coping strategy employed. It also set out to examine the roles of age and service length on coping strategy. Attitudes towards CISM programmes were also explored.

Firstly, results suggest no difference in stress or anxiety levels between those in firefighter/paramedic dual roles, and those self-identified as firefighters exclusively. When looking at firefighters generally rather than comparatively, higher stress levels were correlated with greater emotion-orientated or avoidance coping levels. Interestingly, Baker and Williams (2001) previously found that firefighters who reported high levels of work-related stress engaged more in problem-focused coping, which is in contrast with the findings of the current study. Regarding sub-styles of avoidance coping, the current study found a relationship between stress and social diversion, and stress and avoidance distraction, which does fit with previous findings. This is interesting, while avoidance coping may be effective in terms of short-term management, it may not be a healthy strategy to employ long-term. Indeed, those reliant on such coping styles may be predisposed to developing stress related disorders (Minnie et al., 2015). Similarly, findings suggest a relationship between anxiety and avoidance coping, emotion orientated coping and avoidance distraction. There was no relationship for anxiety and either task orientated or social diversion. One point to note is that this study used the Coping Inventory for Stressful Situations (CISS) as opposed to some of the more popular measures of coping, such as the Coping Orientation to Problems Experienced (COPE). Indeed, the COPE was employed by Nydegger et al (2011), who reported higher stress levels for older firefighters. The current findings did not find a similar trend, so it may be possible that the use of different measures accounts for the contrasting findings.

Findings further suggest no effect of age or length of service on stress or anxiety levels among firefighters generally, which contrasts with Fullerton et al. (2004), who noted that younger firefighters exhibit higher levels of stress, and Nydegger et al. (2011) who posited that higher levels of stress were observed for older firefighters. Differences were expected between these groups due to firefighters having to perform the dual role of firefighter/paramedic and thus exposed to a heavier or more stressful workload (Healy and Tyrrell, 2013). While this was not observed in the current study, this may have been affected by a comparatively low number of younger firefighters participating in the current study. Regarding length of service, Fullerton et al. (2004) had suggested that rescue workers showed lower levels of stress due to less years in the job, while Biggs et al. (2010) suggests that other extraneous variables may impact an individual's ability or experience of events, and even suggests that early prior experience could potentially trigger a stress reaction. This was not reflected in the current study. The current study suggests that

an individual's coping mechanism may impact their level of stress as opposed to age or years of service, though further research is needed to test this.

In the current study, no effect of length of service on coping strategies employed was found. Studies have shown that problem-focused coping was common amongst firefighters, while emotion-focused coping has also been observed (Minnie et al., 2015). It has been further suggested that this may change through experience (Leonard and Alison, 1999; Young et al., 2014). However, the current study fails to support these findings. While this was the case in this study, we previously mentioned that younger firefighters were not equally represented. Moreover, coping mechanisms may not be dependent on length of service, but are interchangeable. Specifically, the coping mechanism employed may depend on the critical event itself experienced by the individual. For example, someone may generally engage in problem focused coping, but for particular incidences, the individual may employ emotion focused strategies, or a combination of problem focused and emotion orientated responses. Further research is needed, particular with regards to firefighter coping strategy and association with experience, with more inexperienced and younger firefighters represented. The lifting of the employment moratorium will allow for such investigation.

Thematic Analysis Results

Analysis of CISM debriefing attitude suggested that open communication, personal experience and social support were major themes relating to the debriefing process. Previous research suggested that the debriefing/defusing process should be mandatory after a critical incident and has been well evidenced in its efficacy (Ross-Adjie et al., 2007; Arce, 2018). In the current study, respondents were supportive of the process, and had previous experience of the debriefing/defusing process. Many were complementary of the supportive environment, for bringing awareness of the critical incident and the impact this may have had. Open communication was identified as important, to facilitate the individual to express thoughts and feelings attributed to the incident. This was further supported by the aspects of CISM which participants engaged in on a personal basis or found effective in the immediate aftermath of an incident. Moreover, debriefing/defusing, according to the current study, provided a structured environment. For most incidents, analysis suggested that an informal talk amongst colleagues appeared to be sufficient. Indeed, Jeannette and Scoboria (2008) found how a variation to approaches depending on the severity of the incident was preferred amongst firefighters and the result from this thematic analysis is in line with this.

Strengths and limitations

The current study provides insight into coping styles employed by firefighters, an area where research has been somewhat negligible (Fraess-Phillips et al., 2017). Also, the mixed method approach, with quantitative analysis establishing coping strategy and association with current stress and anxiety coupled with qualitative analysis of attitude toward CISM, brings depth by identifying self-reported aspects of CISM that firefighters engage in, and find beneficial to them.

One point to note with the current study is the limited representation of participants in the inexperienced or younger firefighters' cohorts, as a result of a freeze on new recruits, which was in place at the time of data collection. A large majority of the participants had at least 10 years' experience, which caused a comparative imbalance. While variances between groups were comparable, and met the assumptions for reliable comparisons, this is still a point of consideration. Similarly, the group size for firefighters based in retained stations was less than those in the full-time stations. Larger and more comparable groups may help to establish more confidently if coping mechanisms or service length affects stress and anxiety when presented with repeated critical incidents over time. As research has previously established (Fullerton et al., 2004) age has been found to impact levels of stress. Also, the current study did not consider specific job-based factors which may differentially affect firefighters. For example, in urban areas, it may be that firefighters deal with a higher volume of calls. However, for retained stations in more rural environments, there may be less frequent calls, but hours may be more unsocial, with greater chance of calls involving people that are known.

For the qualitative component of the study, questions were left unanswered by a large proportion of respondents. Some factors, such as perceived length of the survey and the time of day may have affected response rate on these questions. Respondents from the retained stations were also visited in the evening time, after training sessions, so fatigue may have been a factor. Future research may address these concerns by considering questionnaire length and providing greater convenience for questionnaire completion.

While the lead author of the current study has been educated in the role of awareness of stress and stress management, and the importance of stress management for dealing with particularly stressful situations, it must be noted that an inductive interpretation of open-ended responses will be affected by the subjective experiences of the researcher. While efforts were made in the current study to ensure that pre-existing theoretical structures did not interfere with the validity of responses, for example by employing a systematic approach to interpretation, it is important to highlight the reflexivity of such an analysis.

Implications

This research provides insight in stress management programmes for firefighters, post critical incidents, and how an individual's coping style may affect their ability to manage the impact of critical incidents (Minnie et al., 2015). Understanding the impact of an individual's coping strategy on individual and repeated stressful events may be able to provide further insight on the effectiveness of structured and formal CISM programmes. For example, for someone using an avoidance-based coping strategy an idiosyncratic approach may also need to be considered. The authors hope that this research provides additional and more contemporary perspective in this important area and provides context for firefighters operating within the Irish Fire Service. Further research, however, is needed, particularly with younger and inexperienced firefighters and their ability to cope with stressful incidents and bringing awareness to the fire Services on the effectiveness of CISM amongst all

age and service level experience cohorts. As previously reported by Fullerton et al, (2004), disaster workers with acute stress disorders were over seven times more likely to develop symptoms in line with the diagnosis of Post-Traumatic Stress disorder at 13 months.

Awareness of an individual's own coping mechanism, such as avoidance distraction, can inform the individual and employer of why, in some cases, there may be reluctance to participate in mandatory debriefing and for the employer to provide additional individual interventions or follow ups after critical incidents. In the current study, it is suggested that emotion and avoidance focused coping was a significant predictor of stress. A respondent, who for example engaged in avoidance focused coping after a critical incident, may try to avoid or not favour the mandatory debriefing/ defusing process. Some respondents did indicate that they wished for such debriefing to be optional and not mandatory, though they were still in favour of the process. It could follow that the employer, by being aware of this viewpoint, can still provide a reasonable duty of care to their employee by providing individual interventions or follow ups after particularly stressful critical incidents.

Future Research

Moving forward, introduction and examination of CISM based models in areas where such a model is absent, and longitudinal studies of younger and/or inexperienced firefighters may provide further understanding on the medium to long term benefit of structured stress management programmes. Alghamdi et al. (2016) reported high levels of anxiety, depression, and PTSD among firefighters in Saudi Arabia who did not have formal or structured interventions following exposure to a stressful event. CISM programmes can contribute to lower levels of stress and anxiety as evidenced by this research.

Whilst this research supports CISM as an effective stress management technique, future research in the form of longitudinal studies with newer recruits examining stress/anxiety is necessary to further understanding in this area. Measuring employed coping mechanisms over their period of service and an exploration of whether employed coping mechanisms can change with age or experience would be recommended. Future research could also establish if an individual's coping mechanism and engagement with CISM can change with repeated exposure to critical incidents. In addition, investigation of psychological correlates of stress in locations where an Emergency Medical Service (EMS) based system was used in urban centres, would be an important extension of the current findings.

There is a paucity of research surrounding stress levels amongst firefighters with most research focusing on Post-Traumatic Stress Disorder and not general stress. The effectiveness of defusing and debriefing on firefighters has been somewhat conflicting with negligible research available. In the current study, several themes emerged from the qualitative analysis, particularly with regard to defusing/ debriefing. High levels of social support, personal open communication and awareness protect individuals against stress. A potential barrier for the effectiveness of defusing/debriefing, however, concerns individuals who engage in avoidance coping

strategies (Tran and North, 2018). In terms of mandatory debriefing/defusing, the results suggested that an idiosyncratic approach may at times be needed. This research is, nevertheless, supportive of the effectiveness of debriefing/defusing as part of CISM for as a formal and structured approach to serious incidents.

Conclusion

Qualitative analysis provides support for the use of CISM. The benefits of these have been previously discussed, such as participants commenting on the importance of having a sense of cohesiveness and support in their job. It is particularly beneficial for firefighters who may not have had prior exposure to stressful situations particularly in those situations where fatalities resulted. There were no significant results between persons who engaged in problem focused coping mechanisms and anxiety or stress, which may suggest that for firefighters who engage with this type of coping mechanism, CISM and debriefing is effective for reducing stress after critical incidents. The quantitative data provided an insight into the significance of stress and anxiety and the coping mechanism employed by the firefighter. To conclude, conflicting quantitative reviews of the success of CISM may suggest that a tailored approach for firefighters which considers the individual coping styles could, at times, be required. The current study further highlights the presence of particular coping styles and their association with stress and anxiety outcomes, while also considering how CISM can indeed play an important role in the management of such outcomes at an individual level.

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