A phenomenological study on psychological resilience of aircraft rescue and fire fighting professionals

İnan Eryılmaz[1] · Deniz Dirik[2,4] · Tugay Öney[3]

Abstract

The primary objective of this study is to investigate the specific aspects of psychological resilience among ARFF professionals. Utilizing a qualitative approach and collecting data from 11 ARFF professionals using semi-structured interviews, this study delves into an exploration of factors that contribute to psychological resilience among Aircraft Rescue and Firefighting (ARFF) personnel stationed at State Airports, a group operating under emergency circumstances within the aviation industry. The investigation reveals three overarching themes: micro-level personal factors, meso-level organizational factors, and macro-level environmental/societal factors. Key findings reveal that micro-level personal factors, including personality traits and individual coping mechanisms, significantly influence ARFF professionals' psychological resilience. Encompassing leadership quality and team dynamics, meso-level organizational factors have emerged as crucial contributors to resilience. Finally, macro-level environmental/societal factors, such as social support networks and the broader emergency preparedness context, have been identified as integral elements shaping psychological resilience. This qualitative approach, designed to capture the nuanced experiences and perceptions of ARFF professionals through a multi-level exploration of psychological resilience, extends its implications to the realms of aviation and emergency response. Micro-level considerations illuminate the significance of human resources-related decisions, such as recruitment and training, in fortifying ARFF professionals' resilience. Meso-level considerations provide evidence for the impactful role of leadership and effective safety measures in promoting resilience. Macro-level considerations underscore the importance of environmental design and spillover effects, such as family support, in shaping resilience. An understanding of the factors that contribute to psychological resilience may be directly transferable to the creation of support mechanisms and targeted interventions and may also be directly transferable to assist emergency response teams in the aviation sector.

✉ Deniz Dirik
deniz.ispirli@cbu.edu.tr

İnan Eryılmaz
inaneryilmaz@sdu.edu.tr

Tugay Öney
tugay38991167@gmail.com

[1] Department of Aviation Management, S?leyman Demirel University, Isparta, Turkey

[2] Department of Business, Manisa Celal Bayar University, Manisa, Turkey

[3] Aircraft Rescue and Fire Fighting, Turkish Land Forces, Isparta, Turkey

[4] İktisadi ve İdari Bilimler Fakültesi İşletme Bölümü, Şehit Prof. Dr. İlhan Varank Yerleşkesi Yunusemre, Manisa Celal Bayar Üniversitesi, Manisa, Turkey

Introduction

Resilience studies, as a burgeoning field within psychology, provide valuable insights into the mechanisms and strategies that a diverse range of individuals and communities can employ to foster adaptability and psychological well-being in the face of adversity (Butler et al., 2021; Hosseinian & Nooripour, 2019; Maunder et al., 2023). The ability to do so is particularly critical for individuals embedded in high-risk and high-stress environments or situations. Emergency response teams, including firefighters, healthcare personnel, and Aircraft Rescue and Firefighting (ARFF) professionals, routinely face traumatic and stressful experiences as part of their duties, involving life and property-saving

responsibilities (Declercq et al., 2011, p. 133; Murphy et al., 2004, p. 271). As such, psychological resilience emerges as a critical competency for these individuals when dealing with traumatic, stressful, and adverse situations, including disasters (Mao et al., 2019; Nooripour et al., 2021; Straud et al., 2018). Previous research provides support for the critical role of resilience for professionals whose primary objectives involve ensuring safety in the frontline, often under challenging conditions and in close contact with potentially traumatic events (Holland-Winkler et al., 2023). Resilience, defined as the ability to recover from and grow in the face of stressors, has been considered an essential psychological capacity in high-risk jobs such as firefighting in terms maintaining jobholders' mental, physical, and emotional wellbeing. Research suggests that firefighters with higher levels of resilience are better able to cope with and bounce back from traumatic occupational experiences, placing resilience among the required set of skills for professional effectiveness (Heydari et al., 2022a, b; Heydari et al., 2022).

However, there are multifaceted research findings as industry-specific characteristics and contextual factors influence personal, professional, and organizational expectations and experiences of psychological resilience (Nooripour et al., 2022). Research finds that firefighting and rescue operations impose substantial responsibility and workload on employees, leading to intense job-related stress (Cox & Tisserand, 2006; Mohune et al., 2018) and occupational risks (Straud et al., 2018). An emergency intervention results not only in increased physical fatigue but also leads to cognitive exhaustion, potentially culminating in ineffective decision-making and erroneous actions (Ahmed & Demirel, 2020; Burian et al., 2005; Nævestad et al., 2018). The heightened workload often creates a sense of urgency, adversely affecting individuals' capacity to make well-informed decisions. In the context of firefighting, where any decision and action can have life-threatening consequences, that is particularly significant given the association between high workload and time pressure, and fatalities among firefighting and rescue unit personnel (Rosmuller & Ale, 2008). On the other hand, research also finds that professionals working in units responsible for life and property safety often find their work not only physically demanding but also emotionally rewarding in that it provides a sense of meaning and empowerment rather than leading to psychological distress (Gist, 2007, p. 418). Shih and colleagues' study (2002, p. 654) finds that healthcare personnel involved in post-earthquake rescue activities in Taiwan felt happier because of the assistance they provided to survivors, and believed themselves to be stronger, more effective and better equipped for subsequent rescue operations. Similarly, research has revealed, contrary to the perception that firefighting is a challenging profession, that firefighters effectively cope with stress, resulting

in relatively high levels of psychological resilience (Zafer, 2016). Moreover, research has found that ARFF professionals exhibit higher levels of resilience after their professional training compared to their initial resilience capacity (Bogden, 2014), mostly because they become through training and experience, more cognizant and capable in facing complex and stressful situations. Given such diverse and occasionally conflicting findings across the literature exploring various facets of psychological resilience on critical professional groups, we argue that industry-specific investigations hold promise for yielding practical and theoretical insights. In this context, the purpose of the current study is to explore and understand the factors that shape, characterize, contribute to, and hinder psychological resilience of ARFF professionals from an individual perspective, which will in turn facilitate a better understanding of the phenomenon and help identify evidence-based mechanisms for promoting higher levels of resilience.

In the context of firefighting and rescue unit employees, who face a high risk of injury and even fatality in the workplace, literature currently lacks a comprehensive exploration of the role of resilience, a recognized psychological resource crucial for coping with adverse situations. This gap is particularly pronounced in the case of Aircraft Rescue and Firefighting (ARFF) personnel, who significantly differ from many other samples that the development literature focuses on, as these individuals typically lead physically and mentally healthy lives but routinely experience short-term intense challenges related to their work (Blaney et al., 2021). According to the job description by the Iowa Administrative Services, ARFF employees perform a range of critical tasks such as firefighting, rescue, salvage, fire prevention, and fire protection operations at joint-use military/civil airports, aiming to save people, aircraft, and facilities from fires (Iowa Department of Administrative Services, n.d.). This definition underscores the unique responsibilities and challenges faced by these professionals. In Turkey, they operate within the Civil Aviation General Directorate of Turkey, with their activities representing the last line of defense for aviation safety in emergency situations (Braithwaite, 2001). The Aircraft Rescue and Firefighting unit is tasked with responding to any aircraft accident or incident occurring at any airport or its immediate vicinity (Civil Aviation General Directorate, 2016). As individuals operating within a unique niche where the potential for crisis is inherent, ARFF professionals represent a unique population where resilience is likely to emerge as a critical asset and resource for individual well-being and professional effectiveness in responding to emergency situations.

Through interviews with ARFF professionals and employing a phenomenological approach to data analysis, we inquired participants' subjective experiences of

resilience, their capacity to recover from stress, positive adaptation, their perceptions of the ideal level of resilience for ARFF professionals as well as the primary factors contributing to and characterizing psychological resilience in this group. Using semi-structured questions, we aimed to uncover deeper insights from participants (e.g., Does thinking about possible emergency events before or during a mission make you uncomfortable? How would you describe your feelings while tackling an emergency with casualties? How do you cope with such negative feelings as, i.e., uncomfortable, nervous, anxious, panicked?). Data was analyzed to reveal multiple layers of resilience experience. To the best of our knowledge, this is the first study in Turkey's ARFF context to phenomenologically explore the resilience experience with the intention that *"understanding the factors or attributes that contribute to psychological resilience may be directly transferable to the prevention of pathogenic outcomes due to the stressful nature of work, and may also be directly transferable to assist those who develop pathogenic sequelae."* (de Terte & Stephens, 2014, p. 353).

Psychological resilience: conceptualization and definitions

Various definitions of the concept of resilience are available in the literature. Resilience is a successful adaptive response to high-risk situations (Fraser et al., 1999, p. 137), the capacity for individuals to effectively cope with significant transitions, challenges, or risks (Lee & Cranford, 2008, p. 213) and the process and outcome of successfully adapting to challenging or adverse life experiences by attuning to internal and external demands, through mental, emotional, and behavioral flexibility (American Psychological Association, 2012). These definitions underscore that "resilience" is typically used to describe individuals (or at other levels of analysis such as an organization, team, etc.) who adapt to extraordinarily challenging circumstances and achieve positive and unexpected outcomes even in the face of adversity (Fraser et al., 1999, p. 136). Resilient individuals are usually equipped with strong personality traits, mastery of appropriate coping strategies, and a network of support that stand out as key factors.

People display different responses in the face of unexpected adversities that push them out of their private spaces, and their sources of motivation for coping can change. An adaptive quality that can support individuals during periods of change is their resilience level. Psychological resilience has been a subject of research in various disciplines, including but not limited to organizational (Riolli & Savicki, 2003), educational (Gu & Day, 2007), and military (Palmer, 2008) fields. Although studies of resilience from various domains

indicate ambiguities in its conceptualization and measurement (Ahern et al., 2006), different conceptual foundations offer valuable insights as they provide theoretical boundaries that help researchers in the field determine the nature, direction, and validity of their individual inquiries. Psychological resilience refers to the process of overcoming adversity without succumbing to negative outcomes (Hunter, 2001, p. 172). It encompasses an individual's capacity for behavioral adaptation in the face of challenging and threatening life circumstances, as well as their outcomes (Masten et al., 1990, p. 426). Furthermore, it involves flexibility and the ability to rebound from adverse emotional experiences in response to shifting situational demands (Tugade et al., 2004, p. 1168). It refers to an individual's positive psychological capacity to "bounce back" from distress, uncertainty, conflict, failure, and even positive change, progress, and increased responsibility (Luthans, 2002, p. 702). Additionally, it refers to protective factors that alter, improve, or change an individual's response to certain environmental hazards that may lead to maladaptive outcomes (Rutter, 1987, p. 316). In essence, psychological resilience represents the phenomenon where resilient individuals can successfully "bounce back" from stressful experiences (Carver, 1998a, p. 249) through an optimistic approach to life and new experiences. Previous studies emphasize the stress-related response and coping aspects of psychological resilience, and they refer to positive emotions/emotion regulation capacities such as emotional intelligence as its concomitants (Tugade & Fredrickson, 2004, p. 321). As such, resilience emerges as a critical component of psychological and physiological wellbeing through its role in broadening the repertoire of individual responses, building personal resources, and enhancing coping capacity (Tugade et al., 2004).

While it may be challenging to offer a unified definition for psychological resilience, it is possible to relate this concept to risk factors, protective factors, and positive adaptation that emerges at the end of the process (Rutter, 1987, 1999). A risk factor is a characteristic that can be measured in a group of individuals or situations, and it predicts an adverse outcome in the future based on specific outcome criteria. Protective factors refer to the qualities of individuals or contexts that predict better outcomes under high-risk conditions (Herbers et al., 2021). The etymological root of the English word "resilience" originates from the Latin "resilio." Although the term was used in a mechanical sense to denote the elasticity of a material and to mean bouncing or springing back until 1970s (Lazarus, 1993), it has since then been employed to describe the ability of a system to adapt and return to their original state after being exposed to stress (Klein et al., 2003, p. 35). The term resilience has also been used in studies of child development to denote the adaptive capacity of children at risk for serious problems

due to their biological heritage and environmental disadvantages (Herbers et al., 2021). Yates and colleagues (2015) define resilience as a developmental process or a dynamic capacity to successfully adapt to challenges that threaten a system's functioning and development. They emphasize that resilience essentially requires individuals to recognize the unique strengths, vulnerabilities, and values of their cultures as well as their traditions and practices in the face of significant adversities or risks (Yates et al., 2015, p. 783). Resilience has been conceptualized as a trait, an outcome and a process (Hu et al., 2015). From a trait perspective, resilience is an integral part of personality, is mostly stable and persistent, and it inoculates a person against the adverse effects of traumatic experiences. From an outcome perspective, resilience is a behavioral competence, and behavioral manifestations of resilience are an outcome of broader social and cultural influences (Harvey & Delfabbro, 2004). From a process perspective, resilience is "a dynamic process wherein individuals display positive adaptation despite experiences of significant adversity or trauma" (Luthar & Cicchetti, 2000, p. 858). When conceptualized as a process, resilience emerges as a combination of factors that increase one's vulnerability known as promotive factors (i.e., risks, environmental hazards, negative life experiences) and factors that protect the individual against risks and adversities known as protective factors (i.e., positive emotions, support from family or community), and that both of those factors are likely to change across time and context (Luthar & Cicchetti, 2000). This implies that an individual may exhibit positive responses to adversity during one phase of their life but may not respond to stress factors in the same way during another phase (Fletcher & Sarkar, 2013, p. 15). Based on their experiences, competences and resources, individuals' resistance and reaction to adversity might change as resilience is a dynamic process of interaction between the person and environment, and it changes when conditions change (Rutter, 1987, p. 317). A process perspective also implies that resilience is not merely an avoidance of stressful experiences and as such, it differs from "coping" (Harvey & Delfabbro, 2004).

The title of a Harvard Business Review article (Achor & Gielan, 2016) reads "resilience is about how you recharge, not how you endure" which implies the difference between resilience and concepts like endurance, invulnerability, workaholism, and grit. In addition to debates on how resilience should be defined, there have also been significant discussions concerning its conceptualization before to illuminate the antecedents, outcomes, and core qualities of psychological resilience (Fletcher & Sarkar, 2012, 2013). Researchers have emphasized various inconsistencies and ensuing challenges in conceptualization and measurement in the mechanisms and composition of psychological

resilience (Davydov et al., 2010). Such diversity in definitions, conceptualization and measurement of resilience has also been associated with a lack of focus and overlap with concepts such as coping, adapting, withstanding, adversity and recovering from it (Maunder et al., 2023). In the current paper, we follow the conceptualization of psychological resilience as a positive frame of mind associated with behavioral outcomes (Tugade & Fredrickson, 2004).

In addition to still unfulfilled attempts to generate a uniform and universal definition and pursuit of unanimity in conceptualization, the endeavors into the operationalization and measurement of psychological resilience offer practical and theoretical insights such as (1) providing clinical evidence on the central factors for recovering and maintaining health, and (2) aiding in the selection of personnel to manage more challenging job activities (Friborg et al., 2005, p. 29) through predicting individuals' capacity for positive adaptation and overcoming adversities. An examination of protective individual and environmental characteristics in psychological resilience research is of significant importance for explaining why some individuals at risk demonstrate healthier adaptation and success in life compared to others (Herbers et al., 2021). Researchers' use of measurement tools such as the Resilience Work Scale by Winwood and colleagues (2013) consisting of seven different domains (e.g., living authentically, finding one's calling, maintaining perspective, managing stress, interacting cooperatively, staying healthy, building networks) or The Connor-Davidson Resilience Scale (2003) consisting of five different domains (e.g., personal competence, trust in one's instincts, positive acceptance of change, control, spiritual influences) or the Brief Resilience Scale (2008) consisting of six items (e.g., I tend to bounce back quickly after hard times, I have a hard time making it through stressful events, It does not take me long to recover from a stressful event, It is hard for me to snap back when something bad happens, I usually come through difficult times with little trouble, I tend to take a long time to get over set-backs in my life) suggests that research on psychological resilience incorporates different aspects to understand and explain multidimensional structure of the resilience phenomenon. A universal definition of the concept thus appears to be elusive (Winwood et al., 2013) and measures usually capture different aspects of resilience such as positive adaptation, bouncing back, recovery from stress, reducing negative outcomes, active coping, and thriving (Smith et al., 2008). Despite, the literature consistently aligns on the positive outcomes of resilience, considering it as a psychological capacity that should be cultivated, encouraged, and reinforced across various levels because *"many forms of stress and adversity exist in our workplaces and in our world, but those who cope successfully and function above the norm in spite of adversity*

have valuable knowledge to share." (Tusaie & Dyer, 2004, p. 4).

As definitions and measurements of resilience have varied, so have intervention strategies for increased levels of resilience. A tripartite model developed on a sample of high-risk occupation holders has treated resilience as an interaction of an individual's cognitions, behaviors, and environmental factors (de Terte et al., 2014), thereby seeking to dynamically employ strategies to develop individual resources in these aspects. Cognitive factors include optimism and adaptive coping; behavioral factors include adaptive health practices, and environmental factors consist of social support from colleagues. Collectively, a better understanding of one's emotions, maintaining positive expectations, better health practices such as eating well and physical exercise, and greater social support from colleagues are associated with lower levels of posttraumatic stress symptoms. A multidimensional model of resilience training for high-risk occupations is the LIFE model incorporating principal outcomes in basically four domains which are mind, body, culture, and society. Mind domain includes subjective outcomes such as coping and stress; body domain includes objective outcomes such as sickness absence; culture domain includes interpersonal relationships such as teamwork, and society domain includes broader outcomes such as job performance scores (Brassington & Lomas, 2021). Resilience training has been found to be almost always benefiting these principal outcomes for people in high-risk occupations, with the exception that it might not be very effective in the immediate aftermath of traumatic experiences and while individuals are still suffering posttraumatic stress disorder. In addition, some types of training programs are better aligned with some specific domains and more relevant for specific populations in terms of improving their wellbeing.

Previous research

The question of why some individuals are more prone to psychopathological issues while others maintain relatively good mental health has been a subject of inquiry. Psychological resilience emerges as a potential answer to this question, particularly in high-risk occupational settings like police officers, military personnel, and firefighters (de Terte & Stephens, 2014). Occupations in these fields are recognized as high-risk and stressful, involving tasks and responsibilities associated with traumatic experiences. Recent research has underscored the importance of resilience in coping with such traumatic experiences in high-risk occupations, prompting scholarly attention to the components of psychological resilience in various contexts.

The United States Fire Administration reported 1644 firefighter fatalities between 1990 and 2014 due to the demands of the job and the workload (Smith et al., 2018a). The National Institute for Occupational Safety and Health (NIOSH) data (*NIOSH Safety and Health Topic: Fire Fighter Fatality Investigation and Prevention Program*, 2021) indicates that an average of 80–100 firefighters lose their lives each year in the United States. This increase in mortality rates alludes to the significance of the work performed and the mounting workload. Additionally, firefighting and rescue unit employees frequently encounter life-threatening incidents, involving injuries. The probability of injury is linked to the number of fire incidents these professionals respond to. According to a report released by the National Fire Protection Association-NFPA in 2021 (Campbell & Hall, 2022), firefighting and rescue personnel in the United States, serving in communities with populations of 500,000 or more, experienced an injury rate of 62.9% in the year 2021. This data unequivocally illustrates the high incidence of injuries in relation to the volume of cases these professionals respond to on the fireground (Campbell, 2022).

Tugade and colleagues' study (2004) suggest that, unlike negative emotions that rarely offer benefits in life-threatening situations, there could be a process triggered by positive emotions, which can be measured through expanded thought-action repertoires. Therefore, they argue that positive emotions have a complementary effect and that these positive emotional experiences, by broadening cognitive scope and attention, not only reflect but also build psychological resilience over time (Fredrickson, 2001, p. 220). Based on a broaden-and-build theoretical framework of positive emotions and resilience (Fredrickson, 1998), they propose that individuals with high resilience can cope better with challenging situations than those with low resilience. Moreover, during a crisis, they may experience positive emotions, enhance their coping skills, and even teach others how to experience similar emotions.

According to a study conducted by Karampas and his colleagues on 395 Greek Military Academy cadets (2016), positive emotions significantly associated with higher levels of resilience, and resilience in turn strongly correlated with better psychosomatic health, conferring both physical and mental advantages as a strategic asset for coping with the Military Academy experience. Individuals with high resilience can experience positive emotions even in crisis and stressful situations, thanks to an ease of experiencing positive emotions (Tugade et al., 2004; Tugade & Fredrickson, 2004). As such, resilient individuals can recognize the benefits associated with positive emotions and harness them to their advantage when dealing with negative emotions and stressful encounters (Tugade & Fredrickson, 2002, p. 329). From a developmental science perspective, resilience

typically requires two important determinants, namely that individuals exhibit competence based on a set of behavioral expectations and that they should be significantly exposed to risks or adversities that will pose a substantial threat to achieving positive outcomes. As such, an examination of psychological resilience requires researchers to (1) define criteria or a method for describing positive adaptation or development, and (2) identify the presence of past or current situations that threaten positive adaptation. In this context, in studies of individual development, resilience is conceptualized as a phenomenon in which individuals exhibit positive adjustment and development despite experiencing or being exposed to adverse outcomes or conditions (Cutuli et al., 2018; Garmezy & Masten, 1986; Herbers et al., 2021; Masten et al., 1990). However, the difference if any in terms of individuals' resilience between being exposed to prolonged or chronic risk factors like poverty and brief or short-term risk experiences like an act of crime is not clear.

A study on a sample of firefighters in Washington (Sattler et al., 2014), a high-risk group regularly exposed to critical incidents, investigated the primary protective factors and risk factors associated with resilience or posttraumatic growth. The findings showed that risk factors include the number of years firefighting, burnout, occupational effort, and disengagement coping, each of which is positively associated with posttraumatic stress symptoms. Protective factors include critical incident stress debriefing attendance, posttraumatic growth, general social support, internal locus of control, personal characteristic resources, energy resources and condition resources, each of which is negatively associated with posttraumatic stress symptoms. Most of the participants reported having experienced posttraumatic growth. These findings suggest that firefighters can learn to be more resilient, through critical incidence experiences, social support, debriefing sessions, and by taking actions focused on conservation of energy and resources.

A focus-group study on firefighters in UK (Young et al., 2014) investigated the coping strategies used by members of this high-risk occupation. The study concluded that of the two basic coping mechanisms, problem-focused versus emotion-focused, the majority of coping responses employed by firefighters belonged to the problem-focused category, a third belonged to the emotion-focused category and the remaining represented a mixture of the two. Problem-focused coping mechanisms include practices such as concentration, increasing effort, and planning whereas emotion-focused coping mechanisms include relaxation techniques and positive reappraisal. The findings of the study show that firefighters are a group of job professionals deploying the most effective way of coping with a stressor, i.e., problem-focused in controllable situations and emotion-focused in uncontrollable ones. Findings also

point to the significant role of peer support and solidarity, availability of humor in conversations taking place in the station, the role of training exercises and simulated experiences acting as proxies for actual incidence. The researchers recommend, for increased levels of resilience building, that firefighters are adequately informed prior to an incidence, their roles are clearly defined, they are sufficiently supplied in terms of equipment and nutrition, experienced and novice firefighters are matched together, and there is post-incident conversation taking place among the firefighters.

A study on Polish firefighters (Ogińska-Bulik & Kobylarczyk, 2016) investigated the link between experiencing job-related traumatic events and post-traumatic growth, and the role of resiliency and stress appraisal in the process. The findings reveal that traumatic experiences lead to post-traumatic growth on average, but resiliency is only weakly associated with positive change in the aftermath of traumatic experiences. Additionally, resiliency is negatively related with appraisal of stress as a threat, meaning that firefighters with higher levels of perceived resiliency tend to evaluate stressful situations as relatively less harmful. As such, resiliency proves to be a protective factor against traumatic experiences by enabling individuals to return to their previous level of positivity or equilibrium. Although resiliency does not translate into growth, it might enable a cognitive processing of trauma experience and provide at least some form of immunity against its negative effects.

A longitudinal study of resilience on a sample of military personnel (Sudom et al., 2014) investigated the variations in characteristics underlying resilience over time, from recruitment to several years after enrollment. Findings revealed that resilience measured at the individual level remains relatively stable over an average time of seven years. However, the level of perceived social support and conscientiousness showed significant trends over time. Specifically, social support decreased for military personnel who were not deployed to a combat zone whereas those deployed were able to maintain their social support perceptions, consistent with the general literature that stressful experiences might lead to positive outcomes and growth. The study provides evidence that some facets of resilience are relatively stable as measured from a five-factor personality perspective whereas some aspects change through critical life experiences. The increase in conscientiousness of the military personnel is likely to be associated with the emphasis placed on this attribute in a high-risk professional environment and the powerful role of workplace in shaping personality.

Another study investigated the association between resilience, life satisfaction, gratitude, posttraumatic growth and stress symptoms on a sample of police officers following Hurricane Katrina (McCanlies et al., 2014). Findings reveal that increased levels of positive factors of resilience,

satisfaction with life and gratitude act as protective factors for some individuals and these strengths translate into lower post-traumatic stress disorder symptoms overall.

Hollnagel and colleagues' study (2015) suggest that resilience provides the flexibility and stamina for responding to a multitude of expected and unexpected conditions, such as changes and opportunities. Particularly in high-risk low-time environments like firefighting and emergency services, the nature of the work often entails that employees make hasty decisions in emergency response processes under pressure (Launder & Penney, 2023; Smith & Dyal, 2016, p. 452). While the high-pressure nature of emergency situations may sometimes lead to suboptimal decisions, Salminen and colleagues (2020, p. 465) argue that individuals with psychological resilience tend to exhibit high creativity in problem solving when faced with difficult circumstances, and are more sensitive to the possibility of encountering adversities. Furthermore, studies have suggested that firefighting personnel make critical decisions in ways that deviate from formal decision-making structures involving conscious assessment of alternatives in routine environments. Instead, their decisions are influenced by previous experience, situational cues, intuitions, and heuristics under emotional pressure (Launder & Penney, 2023).

In the context of the previous research that points to the significant benefits of resilience for individuals in high-risk occupations, this study aims to comprehensively assess the psychological resilience levels of ARFF personnel engaged in rescue and firefighting activities, hoping to advance theoretical understanding and offer practical insights into emergency contexts. Given the unique challenges faced by ARFF personnel who regularly encounter a wide range of expected and unexpected conditions, making critical decisions is an integral aspect of their job. Additionally, such emergency response teams' proper functioning, inherently nested in personnel psychology, is paramount for effective response operations (Heydari et al., 2022b; Heydari et al., 2022).

Method

Purpose

The main purpose of this study is to explore and identify the ARFF personnel's perceived levels of psychological resilience and understand their experiences through a qualitative study. Employing an inductive, qualitative research, this paper applies a descriptive phenomenological approach to understand the aspects of the resilience phenomenon through shared and common experiences of individuals (Padilla-Díaz, 2015). The phenomenological approach focuses on how individuals experience and perceive a particular phenomenon. Critical experiences and patterns of behavior such as psychological resilience vary across individuals, and the context plays a significant role in the process. Subjective experiences could be divergent, particularly in demanding work environments, where such variations might be more pronounced.

While challenging and risky situations are inherent to some workplaces, the degree to which individuals concentrate on problem-solving, strategies, and responses may differ. A core determinant of this variability is rooted in individuals' psychological resilience. Amid the uncertainties encountered in life and at work, psychological resilience assumes a crucial role in molding how individuals confront and navigate challenges. This influence significantly contributes to the heterogeneity observed in their problem-solving methodologies and coping mechanisms, emphasizing the relevance of psychological resilience across intricate dynamics of life. Resilience refers to the ability of individuals to overcome challenging and traumatic experiences and to resume their daily routine effectively in their aftermath (Hou et al., 2021). Assuming that most individuals have experienced at least one traumatic event in their lives (Bonanno & Mancini, 2008), an individual's response to such traumatic situations is probably related to their level of resilience, as informed by a range of factors including person-centered variables (e.g., child's temperament, personality, coping strategies), demographic variables (e.g., male gender, older age, higher education), and socio-contextual factors (e.g., supportive relationships, community resources). Furthermore, individuals face challenges in performing their jobs and fulfilling their job responsibilities. There is a higher intensity of anxiety and stress in professions directly responsible for the safety of individuals and property (Dipboye, 2018, p. 715). As a result, the likelihood of encountering psychological challenges and the difficulty in coping with them can be more pronounced for those in such professions (Heydari et al., 2022b; Heydari et al., 2022). Firefighting and rescue is considered a physically demanding occupation, involving routine tasks that expose individuals to various types of hazards. Acknowledged as a 'high-risk' profession, it encompasses both physical and psychological risks, with a high probability of encountering diverse dangers during routine job responsibilities (Kales et al., 2003, p. 3). A study with firefighting and rescue unit workers (Dalkıran, 1993), identified high levels of risk and stress in the tasks performed by team members. This finding underscores the necessity for individuals engaged in such risky and stressful professions to possess a dynamic ability that allows them to protect themselves and cope effectively with potential difficulties (Stewart et al., 1997, p. 22). Given that effectively managing any adverse situation enhances an individual's competency in dealing with future challenges,

and resilience plays a pivotal role in this process, resilience holds a significant place in the preparation, intervention, and recovery phases of any adverse situation (Goode et al., 2017, p. 182).

The study incorporates three stages including (1) a definition of the phenomenon, (2) constructing a model from collected data, and (3) structuring the data in an organized format. Focusing on individual actor expressions through a descriptive phenomenological approach (Williams, 2021), the current study seeks to explore, understand, and interpret subjective experiences rather than confirming them (Rennie et al., 2002) by adhering to a certain level of rigor and credibility that make the results as trustworthy as possible.

Design

Considering the nature of the research problem and the phenomenon at hand, the research design of the current study follows a phenomenological approach, aiming to reveal an existing phenomenon from the perspective of those who experience it and through their point of view (Teherani et al., 2015). Phenomenological approach is a qualitative research approach seeking to understand the essence of a phenomenon and the meaning of human experience by exploring it from the perspective of the main actors (Neubauer et al., 2019). The basic assumption underlying phenomenology is that truth can only be found in the individual lived experience, and individuals construct their own meanings through their subjective experiences and perceptions of the external world (Alhazmi & Kaufmann, 2022). Nested in an interpretivist paradigm, whose fundamental focus is on understanding the subjective world of human experience and interpreting one's environment (Guba & Lincoln, 1989; Kivunja & Kuyini, 2017), the study design is guided by relative ontology, subjective epistemology, and is inevitably informed by individual value judgments. In this context, we posit that individuals comprehend the world through the meanings they attribute to it, acting accordingly. People are situated in different contexts, and thus, it is acknowledged

that meanings are both multiple and variable. Individuals interpret the world based on their subjective experiences.

Semi-structured interviews are the most commonly used technique in qualitative research (Patten & Newhart, 2017). Interview format in qualitative research seeks to capture the subtle nuances of communication by using standardized transcription notations that record participants' pauses, emphases, and interruptions (Whalen et al., 1987, 1988). Interviews can take various forms, including face-to-face, group discussions, questionnaires, or telephone interviews, and can be conducted in real-time, short-term, or long-term formats, such as life history interviews (Fontana & Frey, 1994). Utilizing a qualitative research approach, face-to-face interviews were conducted with 11 ARFF professionals using semi-structured interview technique. Before the study began, ethics committee clearance was obtained from the Ethical Review Board of the first author's affiliated institution, numbered (Number: E-87432956-050.99-469117 and 22.03.2023). All interviews were conducted with informed consent, assuring participants of confidentiality and anonymity.

Participants and data collection procedure

Participants were selected through purposive sampling which is common for most phenomenological research. This choice aimed not at representing or generalizing to a broader sample but rather intentionally selecting a sample to gather more in-depth information on the topic. The primary criterion guiding participant inclusion rested on the potential for the richness of experience that would provide substantial and meaningful insights pertinent to the research topic. Considering that capturing diverse and profound perspectives will contribute to a more comprehensive exploration of the phenomenon of interest, we have deliberately chosen participants for their capacity to provide nuanced and in-depth insights into the subject matter (Moser & Korstjens, 2017). 11 ARFF personnel participated in the interviews.

The determination of the group size adhered to the principle of thematic saturation (Bengtsson, 2016) and data saturation was considered achieved when new themes and categories could no longer be formed, and participants began using similar expressions. Table 1 displays the demographic characteristics of the participants.

Before each interview, the interviewer (the second author of the study) provided a detailed explanation of the research purpose, received consent for recording the interviews, and assured the interviewee of full confidentiality. Interviewees were given the opportunity to confirm their right to refuse answering questions and withdraw from the study at any time during the interview. The interviews took place in Turkish in Istanbul /Turkey from May 2023 to August 2023.

Table 1 Participants' demographics

	f	%		f	%
Gender			Age		
Women	0	0	22–26	1	9,1
Men	11	100	27–31	5	45,5
			32–36	3	27,3
			37–41	1	9,1
Education			42 and above	1	9,1
High school	0	0	**Experience**		
Vocational school	0	0	Up to 3 years	0	0
Undergraduate	9	81,8	3–6	2	18,2
Master's/PhD	2	18,2	7–10	6	54,5
			11 and above	3	27,3

The interview location was determined in consultation with the participant. Open-ended questions were prepared to explore factors affecting firefighters' resilience. Interviewees were encouraged to provide detailed information about their individual experiences. The research form consisted of socio-demographic and open-ended questions. The interviewer had received emergency aircraft intervention training and participated in qualitative training courses regarding psychological resilience in emergency situations. The interviews lasted between 25 and 45 min on average. The subsequent questions served as conversation starters to delve into the factors influencing the resilience of ARFF personnel. Occasionally, participants were given the opportunity to express their thoughts and suggestions beyond questions, and based on these insights, some inferences were made within the scope of the study:

1. Does thinking about possible emergency events before or during a mission make you uncomfortable?

   Follow-up questions: What would you do to overcome feeling uncomfortable? / What are your recommendations for overcoming?

2. How would you describe your feelings while tackling an emergency with casualties?

   Follow-up: What would make you feel stronger? How do you recover from such negative emotions?

3. How do you cope with such negative feelings as, i.e., uncomfortable, nervous, anxious, panicked?

   Follow-up: Are you able to forget about these when you go home? Are you able to bounce back for the next day? Do your colleagues/team help you deal with them? Does you leader address or share your emotions?

4. How do you feel about yourself when faced with professional problems?

   Follow-up: Would you describe yourself as a strong and resilient ARFF professional?

5. Who do you think will support you in health or legal issues that you may encounter during a mission?

   Follow-up: Do you trust in your organization and leader to be there for you in times of need?

6. What are the essential qualities that ARFF personnel should have?

   Follow-up: Describe your ideal job specifications for an ARFF vacancy. Whom would you hire as a potential candidate if you were the recruiter?

7. What practical skills should an ARFF personnel have to perform their duties?

   Follow-up: Make a list of qualifications you would seek to develop in ARFF personnel after the recruitment through training, experience, role modeling, seminars, etc.

8. What attitudes are crucial while performing in an ARFF unit?

   Follow-up: What are the human qualities or characteristics that you take to be "a must-do" for an ARFF professional?

9. What are the roles of individual initiative versus team effort in ARFF emergency intervention?

   Follow-up: Which one should be prioritized in an ARFF job; individualism or collectivism? Which part of the following idiom describes ARFF tasks better; "Alone you go fast, together you go further" ?

10. What do you think about the influence of one's private life on professional performance from an ARFF unit perspective?

    Follow-up: Where do your family and friends stand in relation to your job? Are you able to spend enough time with them? What are their opinions of your professional endeavors?

Following the initial common questions, the participants were inquired further about their opinions with follow-up questions. The follow-up questions aimed to elicit more detailed responses and nuanced viewpoints from the participants, enriching and deepening the data collection process. This approach facilitated a thorough exploration of the participants' opinions, allowing researchers to delve deeper into the intricacies of their perspectives and gather a comprehensive understanding of their experience.

Credibility and dependability

The credibility of the study was established by allocating ample time for data collection and analysis. Findings were cross-referenced with previous research. Authors of the study continuously engaged in discussions to enhance their understanding of participants' experiences. The inclusion of seasoned professionals for data confirmation further enhanced credibility.

The dependability of the study was established by including two qualitative researchers in the research team and an additional layer of oversight was requested from a qualitative expert (a combination of expert control and peer review). A significant portion of the data analysis phase was allocated for identifying and extracting codes based on the perspectives of ARFF staff. Furthermore, the so-called bracketing process was meticulously employed (Tufford & Newman, 2012) to achieve academic rigor and minimize the impact of researchers' subjective viewpoints. A detailed account of each step of the research is presented for enabling and enhancing transferability.

Findings

This section includes the codes, categories, and themes derived from the interview data. The study utilized the Graneheim method (Graneheim & Lundman, 2004) for data analysis, consisting of coding, categorization, and interpretation phases. All interviews were recorded and transcribed verbatim. Each interview's audio recording was carefully listened to and transcribed, with the resulting texts then undergoing multiple reviews by the second author for getting familiarized first. Preliminary codes were derived through notetaking after identifying repeating statements in the text. The participants' experiences were then conceptualized under the scrutiny of the second author and with input from the co-authors. To ensure a thorough understanding of the concepts and to avoid superficial coding, the manual implementation of coding and categorization processes was done using traditional paper and pencil method during multiple discussion sessions among co-authors. The participants' statements were employed during preliminary coding, facilitating the identification of codes. Following this, codes were organized into categories and sub-categories based on convergence and divergence. They were then merged into three basic themes at micro-, meso- and macro-level of analysis. The identified codes, categories and themes are presented in Table 2.

Theme 1 micro-level personal factors

One of the leading themes, personal factors consist of individual factors influencing the psychological resilience of ARFF personnel including psychological/cognitive, physiological, and professional/occupational factors. The categories associated with this theme are elaborated below.

Psychological and cognitive factors

In aviation industry, where there is no room for error, psychological wellbeing and cognitive health are crucial for ARFF personnel to perform their duties safely. As such, mood, personality, and perceptual factors are among significant standards of performance. According to participant responses, the lack of specified mental attributes in ARFF personnel results in negative performance outcomes and evaluations in aircraft emergencies and accident scenarios. There is a high likelihood of death and injury in emergency situations. As such, stress levels are also likely to be elevated, exerting demands on perceptual factors and personality. These, in turn, create intense pressure on ARFF personnel. In line with this, respondents emphasize the importance of maintaining ideal level of cognitive health and psychological wellbeing for ARFF personnel—a crucial component of psychological resilience—for coping with such situations. Respondents have underlined their experience of stress, fatigue, anxiety, anger, coping with scenes of death and injury, grieving for colleagues' deaths, depression, post-intervention hope, mental preparation for the next incident. They have also alluded to the need for self-sacrifice for rescuing lives, spirituality, patience, strict adherence to instructions, composure, honor, fearlessness, self-confidence, and caution. They have emphasized that ARFF personnel need comparatively high levels of creativity, an ability to assess and judge unpredictable emergencies, be fully aware of indispensable principles such as safety measures, be willing to meet societal expectations, nurture mental resilience, and have strict adherence to aviation safety measures.

> I was in a rescue operation and saved a dead body. My hand got burnt during the operation. Everyone was running away, but I was running into the area. It was a huge blast. I do not get scared easily; I am cold blooded. But I panicked. I was thinking about what to do. (Participant 7)

> In my view, the foremost requirement for ARFF personnel in a high-stress environment is to remain calm. Since interventions in aircraft emergencies and accidents involve facing various risks with uncertain outcomes, maintaining composure requires a healthy

Table 2 Factors ınfluencing psychological resilience of arff personnel

Themes	Categories	Sub-categories	Sample Codes
Micro-level: Personal	Psychological and cognitive	Mood	Stress, fatigue, anxiety, anger, coping with scenes of death and injury, grieving for colleagues' deaths, depression, post-intervention hope, mental preparation for the next incident.
		Personality	Self-sacrifice for rescuing lives, spirituality, patience, strict adherence to instructions, composure, honor, fearlessness, self-confidence, caution.
		Perceptual factors	Creativity, the ability to assess and judge unpredictable emergencies, the principle of indispensability, meeting societal expectations, mental resilience, adherence to aviation safety measures.
	Physiological	Physical wellbeing	Musculoskeletal disorders, strength, stamina, limb loss, respiratory failure, heart health, sensory issues, occupational injuries.
	Professional/occupational	Professional KSAOs (knowledge, skills, abilities, and others)	Mastery of technical terminology, knowledge of modern firefighting and rescue equipment, mapping/navigation skills, up-to-date information, familiarity with aircraft, crew and passenger evacuation, preparedness for new hazards, time management.
		Experience	Practical scenarios, simulation experience, mentorship, coaching, learning-by-doing, blended learning, collaboration with other organizations for the transfer of knowledge and experiences.
		Job-related factors	Unexpected risks, job complexity, potential for backdraft/flashover, work fatigue, exposure to hazardous substances, anticipation of emergency alarms, long working shifts, racing against time.
		Ergonomic factors	Long and night shifts leading to sleep deprivation, lifting and moving heavy objects, carrying heavy equipment, PPE compatibility, equipment transport.
Meso-level: Organizational	Managers and leaders	Management performance	Command and control, coordination, leadership, ethical codes, ethical practices of superiors, collaboration with Air Traffic Control Services, adequacy of financial resources, refresher training programs, reporting unsafe conditions of aircraft, awareness, personnel shortages, benchmarking.
		Happiness and wellbeing	Psychological support, effective communication with superiors, regular health check-ups, financial and emotional assistance after death or injury, funding, hazards and risks, post-incident reporting, health and legal regulations, and guidelines.
	Colleagues	Colleagues 'competencies	Support from colleagues, the knowledge and experience of coworkers, effective peer communication, empathy, and coordination skills.
		Teamwork and workplace interactions	Protection of rights, psychological well-being of employees, team solidarity.
	Equipment	Station	Adequate rest environment, coding system, correct positioning of the unit for intervention, vehicle and personnel allocation, occupational health, and safety.
		Personal protective equipment	Appropriate equipment for the job, correct use of personal protective equipment, equipment maintenance and cleanliness, efficiency, ergonomic considerations, time and cost-effectiveness, effective intervention.
Macro-level: Environmental/Societal	External environment	Scene of accidents	Flight route, terrain conditions, meteorological conditions, types of aircraft, cartography, occupational health, and safety.
	Family	Family support and benefits	Family support, family-work issues, economic conditions, sources of motivation, insurance and retirement conditions, psychological and social support to the family in the event of injury or death.

mental state and perception. Additionally, sound judgment is crucial. (Participant 8)

Physiological factors

Another individual factor influencing the resilience of ARFF personnel is accounted to be physiological factors. Physiological factors encompass aspects such as physical strength and endurance, body mass index (BMI), fitness, speed, occupational diseases and injuries, musculoskeletal disorders, limb loss, respiratory failure, and heart health, among others to be explored. Physiological health is indispensable for an ARFF professional for performance effectiveness. The evacuation of the injured or the transportation of valuable items as well as rescue equipment necessitate muscle strength. Participant responses display that ARFF personnel with musculoskeletal disorders or physical ailments may struggle in performing their duties, posing risks not only to their own safety but also endangering the lives of individuals who need to be rescued.

> I believe sports activities are essential for ARFF personnel. It is crucial for both personal health and our job requirements. Someone with poor health cannot perform this job. For example, someone with a heart condition may experience a heart attack during any emergency. Our work requires strength, stamina, and fitness. Physical health is important both to avoid difficulties in using heavy rescue equipment and to safely transport the injured to secure areas. (Participant 2)

> Since we don't know what situation we will encounter, we might need to rescue an overweight casualty, or we might have to transport materials to a much farther place to do our job. For this, we need to be in good physical condition. (Participant 1)

Professional/occupational factors

The last sub-category within the micro-level personal theme has surfaced as professional/occupational factors, consisting of four sub-categories: professional KSAOs (knowledge, skills, abilities, and others), experience, ergonomic factors, and job-related factors (as presented in Table 2). Considering the diverse array of emergency response styles and experiences, the transmission of prior emergency experiences is crucial for discerning and implementing optimal strategies. Alongside this knowledge transfer, being well-versed in professional and technical terminology is likely to enhance the resilience levels of ARFF personnel.

Nonetheless, inadequacies in equipment and materials, a demanding shift system, and pertinent occupational hazards and risks emerge as pivotal elements at the professional/occupational level, exerting a negative impact on the psychological resilience and, consequently, the performance of employees. In addition to professional KSAOs (knowledge, skills, abilities, and others), experience has been deemed a significant aspect of resilience buildup. Respondents associated experience-building with practical scenarios, simulation experience, mentorship, coaching, learning-by-doing, blended learning, collaboration with other organizations for the transfer of knowledge and experiences. Job-related factors including unexpected risks, job complexity, potential for backdraft/flashover, work fatigue, exposure to hazardous substances, anticipation of emergency alarms, long working shifts, and racing against time have also been mentioned as factors to be prepared for. As compatible with those professional risks, responses have underscored potential ergonomic factors including long and night shifts leading to sleep deprivation, lifting, and moving heavy objects, carrying heavy equipment, PPE compatibility, and equipment transport.

> This job requires continuity and a lot of field experience. I have lots of training, experience, and valuable knowhow. I must continue doing my job (Participant 3).

> The nature of our work and the fact that we work for a specialized institution mean that we cannot receive these professional trainings just about everywhere. We have received various trainings on intervention methods for aircraft, rescue operations, ammunition, and even intervention methods for chemical and biological risks. (Participant 11)

> Waiting for the alarm bell to ring at any moment, our stressful shifts, and the serious dangers we may face undoubtedly cause psychological fatigue for us. However, although I am nervous before any mission or emergencies due to the geopolitical importance of the airport, knowing what to do with the training and drills I've received reduces my anxiety. (Participant 9)

Theme 2 Meso-level organizational factors

Another theme influential on psychological resilience of ARFF workers emerged as meso-level organizational factors. Among the organizational factors, sub-categories include managers and leaders, colleagues, and equipment. These factors are considered to have an impact on various

aspects of ARFF workers' performance, psychological well-being, and resilience while performing their duties. The sub-categories of the theme are listed below.

Managers and leaders

Management performance, and ARFF personnel' happiness and wellbeing have emerged as significant aspects of resilience building. While management performance has been associated with the effectiveness. Of command and control, coordination, leadership, ethical codes, ethical practices of superiors, collaboration with Air Traffic Control Services, adequacy of financial resources, refresher training programs, reporting unsafe conditions of aircraft, awareness, personnel shortages, and benchmarking; happiness and wellbeing has been associated with psychological support, effective communication with superiors, regular health check-ups, financial and emotional assistance after death or injury, funding, hazards and risks, post-incident reporting, health and legal regulations, and guidelines.

The ARFF personnel participating in the study express that coordination, collaboration, and awareness mechanisms necessary for ensuring work safety can be associated with managerial performance, and these in turn influence personnel wellbeing outcomes including regular health check-ups and the provision of financial and moral support in the face of adverse situations. From a leadership perspective and respondents 'point of view, the most significant authority and responsibility are vested in managerial decisions. Indeed, each link in the chain, from personal rights to appropriate interventions, is integral to a proper functioning in aviation industry. Overall, managerial factors are key to employee performance and resilience.

> If I encounter any physical or legal issues, I believe they will support me. For example, if my hand gets injured, I think both my colleagues and superiors will support me. If they don't support, I would become more hesitant when intervening again. After all, our work is a team effort. If the team doesn't trust each other or doesn't provide support, we can't do our job. Our job is essentially sacrificial. The more we support each other or are aware of the support we receive, the more we become attached to our work and act more sacrificially. (Participant 11).

> I think my organization can support me in every aspect. I believe my team leader will follow up on my rights from minor situations like injuries to more serious ones. I even think they will provide financial support to my family. This thought, of course, greatly reassures me. (Participant 3)

> I would feel terrible in case of litigation, I mean if my institution would turn against me. Any pressure like you should have done this and that would psychologically destroy me. I am not sure about receiving full organizational support in case of a crisis. They might even exert pressure. That would be really bad. (Participant 9)

Colleagues

Another category of the meso-level theme "organizational factors" influencing the psychological resilience of ARFF personnel is colleagues. Colleagues 'competencies encompassing support from colleagues, the knowledge and experience of coworkers, effective peer communication, empathy, and coordination skills are cited among significant peer-related factors contributing to resilience. Additionally, teamwork and workplace interactions like protection of rights, psychological well-being of employees, and team solidarity have emerged as complementary peer-related contributors.

In aviation ecosystems where the possibility of encountering an emergency or accident is constant, transferring knowledge and experiences gained from previous events can enhance the psychological resilience of ARFF personnel, creating a secure working environment. Moreover, the contributions of experienced ARFF personnel, especially in a practical application stage of trainings, are crucial for effective performance and passing on experiences to the next generation of colleagues. Working with experienced colleagues during interventions in potential aircraft accidents can also play a significant role in maintaining the freshness of knowledge.

> I am constantly learning new things from colleagues who started working before me. I also investigate regulations and documents related to our airfield. However, it's not entirely effective to continue just by reading documents. We also have practical work. In these practical activities, thanks to the information we obtain from experienced colleagues - different from regulations and documents - we psychologically relax with the thought 'we have done these things in a similar incident before' against incidents we might face. This, of course, is an important factor that increases our resilience and confidence. (Participant 4)

> In the midst of an incident, they should be able to think about the potential harm to their colleagues and use their judgments for decision-making accordingly. (Participant 8)

We draw conclusions from the experiences of ARFF chiefs who started working before us. In other words, by knowing the scenarios of possible emergencies, we strive to enhance our professional skills so that the likelihood of making mistakes is minimized. (Participant 11)

I am sure that my colleagues will be there for me as I will be for them if I am in hospital or court of law. That is how we work. Otherwise, none can be engaged or professionally continue doing this job. (Participant 10)

Equipment

The final category of organizational factors "equipment" consists of physical setup of the station including adequate rest environment, coding system, correct positioning of the unit for intervention, vehicle and personnel allocation, occupational health, and safety as well as access to personal protective equipment including appropriate equipment for the job, correct use of personal protective equipment, equipment maintenance and cleanliness, efficiency, ergonomic considerations, time and cost-effectiveness, and effective intervention. An availability of appropriate equipment and the strategic location of the station are pivotal factors for ensuring effective interventions. In the aviation industry, guaranteeing the health and safety of workers in diverse hazardous environments is crucial for the well-being of ARFF personnel before they might engage in the rescue of passengers and crew members. Nevertheless, the absence of anthropometric and ergonomic features in personal protective equipment, coupled with a lack of suitable waiting areas, can diminish the overall preparedness, competence, and effectiveness of interventions. Consequently, a decrease in the quality of equipment is likely to parallel a decline in psychological resilience.

I participated in the rescue operation from the aircraft. After carrying two pieces of equipment, I pulled out someone who had lost their life. Later, I rescued a child whose leg was severed. I injured my hand even more during the extraction from the aircraft. However, I was not afraid. I am calm. At that moment, if the personal protective equipment were not complete, I could have been more injured, and I could have even lost my life. Later, a helicopter came to help. It took the injured child to the emergency aid. The importance of equipment to extract a deceased or injured person

from the scene had an incredible impact on my tolerance and resilience in that adverse situation. (Participant 7)

Most of our job is about the proper use of right equipment. You are as good as your equipment, gear, and in-house capacity. That is why I take care of equipment, and study how to handle them according to the user manuals, videos, and guidelines during most of my free time. (Participant 8)

Theme 3 macro-level environmental/societal factors

Respondents have identified the final theme influencing the psychological resilience of ARFF personnel as environmental/societal factors, comprising two categories: external environment and family. Societal factors are acknowledged to impact the psychological resilience of ARFF personnel by embodying the social, ethical, and spiritual dimensions of their duties. The relevance of socially significant factors is considered indispensable for ARFF personnel actively engaged in preserving life, property, and conducting rescue operations. Participants assert a reciprocal relationship between receiving support from family and contributing to society, positing that the well-being and prosperity of families directly influence the intertwined dynamics of performance and motivation.

External environment

The circumstances surrounding accidents, including the flight route, terrain conditions, meteorological factors, types of aircraft, cartography, and occupational health and safety, directly influence ARFF operations. While the quality of ARFF personnel intervention is undoubtedly influenced by KSAOs, environmental factors are also critical, particularly terrain and meteorological conditions, impacting interventions in various ways. The existence of a runway and potential challenges posed by meteorological conditions during aircraft emergencies or accidents can significantly impact performance. In regions outside the airport or in challenging terrains, delays in responding to aircraft accidents are more likely, underscoring the importance of the environment as a factor influencing the resilience of ARFF personnel and potentially diminishing their intervention competence. The story by one of the respondents shows that a correlation between the quality of the runway and the well-being of ARFF personnel is plausible.

There was an aircraft accident. We started heading to the scene without waiting. Naturally, one gets excited,

after receiving the aircraft accident notification, we are supposed to be at the scene within two minutes. While heading to the scene, situational judgment is also necessary – what we will encounter and what we need to do. Of course, we move safely on the flight path when going to the scene. Since the flight path and runway were newly constructed, we arrived at the scene in less than a minute. We immediately intervened. If the runway were not newly constructed or if there were obstacles on the runway, we would have arrived at the incident site later. However, air traffic control reported through the radio that we had intervened in a timely and effective manner. Responding to the incident and making critical decisions in such a short time requires psychological readiness. After this incident, I gained experience, and I realized that I was calmer in the next incident. Otherwise, I wouldn't have this much experience." (Participant 6).

Family

The last category of societal factors influencing the psychological resilience of ARFF personnel is "family, including support and benefits. In the aviation sector, family serves as both a supportive element and a fundamental source of motivation for ARFF personnel, who act as guardians of human lives and property safety. Especially for ARFF personnel involved in emergency response and post-accident interventions, the perception that necessary support will be provided to their families in the event of death or injury, both before and after intervention, is directly influential on performance. Additionally, the family's awareness and understanding of the individual's work can be a precursor to psychological and emotional support. ARFF personnel also refer to a sense of sacredness about their duty.

> Given that performing rescue and firefighting activities from aircraft is not an easy task, I define my job as heroic. You are running towards a place where everyone else is running away from. Therefore, I consider my job sacred, and the fact that my family knows about my work is a psychological anchor for me. (Participant 5)

> When I think about my job, the concept of sacredness comes to mind. Being able to touch someone's life positively is a beautiful thing. Just as a physician feels happy and blessed when they save a life, I consider my job sacred when I save someone. I'm not doing the same job as an office personnel after all. (Participant 10)

> If I encounter a physical problem due to my job, it will disturb me psychologically, even if my family is aware of what I do. The thought that I may not be able to perform my sacred job again and the potential damage to the honorable perception of my job by my family would upset me. (Participant 3)

Discussion

Aircraft Rescue and Firefighting personnel are the frontline units that intervene in the event of an accident, both within and outside the airport premises. The nature of their work requires hard work and even individual sacrifice for the lives or valuable assets they may save. As such, psychological resilience emerges as a significant aspect of their job. Therefore, focusing on various parameters (external factors) and variables (internal factors) that may affect the psychological resilience of ARFF personnel is important for maintaining the sustainability of this unit, which serves as one of the safety nets of the aviation industry. In this study, the psychological resilience of ARFF personnel stationed at State Airports was analyzed using a semi-structured interview technique. The factors influencing the psychological resilience of ARFF personnel have been categorized into three overarching themes, namely micro-level personal, meso-level organizational, and macro-level environmental factors. Figure 1 displays this tripartite model.

On micro-level personal factors

The initial set of factors influencing the psychological resilience of ARFF personnel, the personal factors include psychological and cognitive, physiological, and professional/occupational aspects. This theme implies that the psychological resilience of ARFF personnel will be strong in an environment where individuals are physically fit, ergonomic conditions are met, and experiences are effectively shared.

Many ARFF personnel frequently encounter traumatic events due to the nature of their work. As such, cognitive wellbeing and mental health, personality, and perceptual factors have direct as well as indirect ramifications for the psychological well-being of personnel during stressful and traumatic situations. For ARFF personnel, who remain stationed with the possibility of an emergency anytime, the ability to navigate negative experiences such as stress and anxiety is paramount. This capacity is inherently related to personality traits (Carver & Connor-Smith, 2010). Previous research attests to the significance of mental health, the ability to manage anger, and making rational decisions in ARFF

Fig. 1 Tripartite model of psychological resilience in ARFF professionals
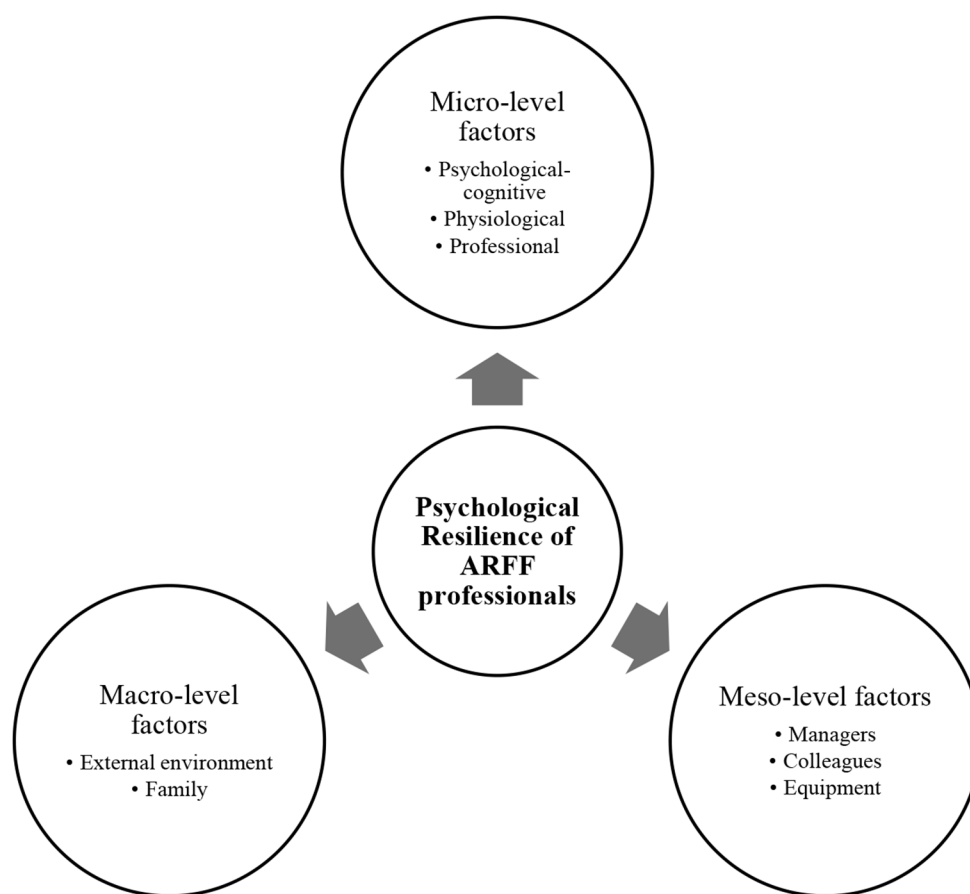
personnel instead of emotional decision-making in times of emergency (Heydari et al., 2022b; Heydari et al., 2022). Furthermore, the vital consequences of decisions made in emergency situations impose substantial pressure on personnel, requiring the adoption of a natural decision-making approach (Bayouth et al., 2013). In this context, higher levels of psychological resilience among ARFF personnel can serve as a protective factor, mitigating the emergence of negative psychological outcomes and the likelihood of adverse effects on their personal and professional lives.

Physiological wellbeing is another personal factor influencing the psychological resilience of ARFF personnel, as it is associated with the skills required to perform demanding tasks such as carrying heavy equipment for extinguishing and rescuing activities from aircraft, moving within or on a firefighting vehicle, and rescuing individuals with personal protective equipment. In addition to being free of any disease that might impair physical performance, physical fitness is considered a must-have for ARFF personnel. World Health Organization (2023) defines physical activity as "*any bodily movement produced by skeletal muscles that requires energy*". The respondents of the qualitative study have repeatedly highlighted the significance of physical activity for ARFF personnel. Physical activity, particularly

that which enhances overall well-being, reduces symptoms of depression and anxiety, and improves thinking, learning, and judgment skills, is crucial for ARFF personnel. Previous research underline that firefighters and ARFF personnel must maintain physical fitness for the effective execution of their firefighting and other duties in the service of public welfare (Dobson et al., 2013; Heydari et al., 2022b; Heydari et al., 2022; Lovejoy et al., 2015). Balancing the physiological wellbeing and the burden of working hours for ARFF personnel involves paying attention to ergonomic factors. These factors are relevant for reducing the physical burden on ARFF personnel's bodies in order to ensure effectiveness in rescue operations (Nowicki et al., 2018).

Finally, the transfer of experiences related to past hazardous situations and risks by experienced personnel is deemed important for the judgment of potential adverse situations in the future (Fechtner et al., 2017). The role of experience and expertise as well as their transfer to younger personnel in ARFF operations is highlighted in both recruitment and training of personnel as a key aspect of performance and resilience (Heydari et al., 2022b; Heydari et al., 2022).

On meso-level organizational factors

Meso-level organizational factors influencing the psychological resilience of ARFF personnel consist of managers and leaders, colleagues, and equipment. This theme suggests that a robust psychological resilience among ARFF personnel is fostered in an environment characterized by competent leadership, strong teamwork, and sufficient resources.

Respondents believe that giving due sensitivity to this factor is of paramount importance for ARFF unit personnel performance and resilience. Psychological resilience increases when management is associated with good command and control, coordination, leadership, following ethical codes, display of ethical practices by superiors, collaboration with Air Traffic Control Services in times of emergencies, adequacy of financial resources, regular refresher training programs, reporting unsafe conditions of aircraft, awareness, attending to personnel shortages, and benchmarking with best practices for improvement. Happiness and wellbeing improve when personnel are provided with psychological support, effective communication with superiors, regular health check-ups, financial and emotional assistance after death or injury, adequate funding, being informed and prepared about hazards and risks, post-incident reporting, literacy about health and legal regulations, and adequate guidelines. ARFF personnel enjoy higher levels of resilience when they receive support from colleagues, and when they can rely on the knowledge and experience of coworkers, effective peer communication, empathy, and coordination skills. Teamwork and high-quality workplace interactions contribute to team solidarity and wellbeing, which translate into higher levels of resilience. Finally, the provision of materials and a healthy workstation conducive to occupational health and safety incurs higher levels of resilience.

Particularly for personnel involved in rescue and firefighting activities, inadequacies in organizational factors can directly lead to loss of life and property compared to other professions. Previous research has identified that firefighting and rescue personnel who receive social support from colleagues or superiors, have a high locus of control, attend briefings after critical incidents, and possess longer job experience and education exhibit higher levels of resilience (Bayouth et al., 2013; Bernabé & Botía, 2015; Isaac & Buchanan, 2021; Sattler et al., 2014). In fact, some researchers (Onyedire et al., 2017) characterize firefighters having to work with inadequate materials, insufficient organizational resources, and untrained personnel as a national disgrace. Under-resourcing has been found to be a leading reason of line-of-duty deaths among US firefighters (Kunadharaju et al., 2011). The role of leadership in building a safety culture (Kang et al., 2016) has also been documented to be vital in firefighting environments. Research in other high-risk contexts such as mining and construction also provides evidence for the significant role of management commitment to safety in building psychological capital resources such as resilience (Ye et al., 2020) which contributes to enhancing safety behaviors (He et al., 2019).

On macro-level environmental/societal factors

External environmental factors including the circumstances of the work like flight route, terrain conditions, meteorological conditions, types of aircraft, cartography, occupational health, and safety and factors related to private life like family support, economic conditions, sources of motivation, insurance and retirement conditions, psychological and social support to the family in the event of injury or death influence ARFF personnel performance and psychological resilience. This theme implies that the psychological resilience of ARFF personnel will be strong in a structured work environment prepared in advance for potential emergencies and a supportive circle of family/friends/significant others.

Those environmental factors and family dynamics can be seen as directly impacting work safety and intervention. This also resonates with attempts to build more robust safety culture interventions in transport organizations in general (Nævestad et al., 2018). Industry-specific risks inevitably require industry-specific safety measures and critical competencies (Casey et al., 2022) and resources including resilience. While firefighting and rescue operations inherently involve high physical risks, they also encompass significant psychosocial risks. These psychological risks, such as occupational health and safety, or other environmental factors that facilitate the execution of the profession, affect both performance and psychology (Smith et al., 2017, 2018b). Work-family conflict and emotional exhaustion have also been reported to pose significant risks for firefighters' wellbeing (Wu et al., 2019). Previous research (Blaney et al., 2021) suggests that individuals engaged in firefighting and rescue activities find balance while coping with the emotional burden of critical incidents through a supportive private life (including a supportive spouse, friends, and family). Research (Heydari et al., 2022b; Heydari et al., 2022) also suggests that married personnel and those with a child are more sensitive to and cautious about the risks associated with their jobs. From a family perspective, Regehr and colleagues (2005, p. 432) have found that a prolonged period of absence from the family due to shifts and duties in firefighting and rescue activities, particularly for men, induces stress for all family members, especially children. As the emotional and instrumental needs of the family go unmet, some family members even express resentment towards the firefighter. However, the significance and sacredness of the

profession prevent spouses and children from complaining and reporting unmet needs to others, highlighting the family's awareness of the spiritual value attached to the work. The recognition of those aspects by management is significant for ARFF personnel and is considered an organizational debt to the personnel as well as to their families.
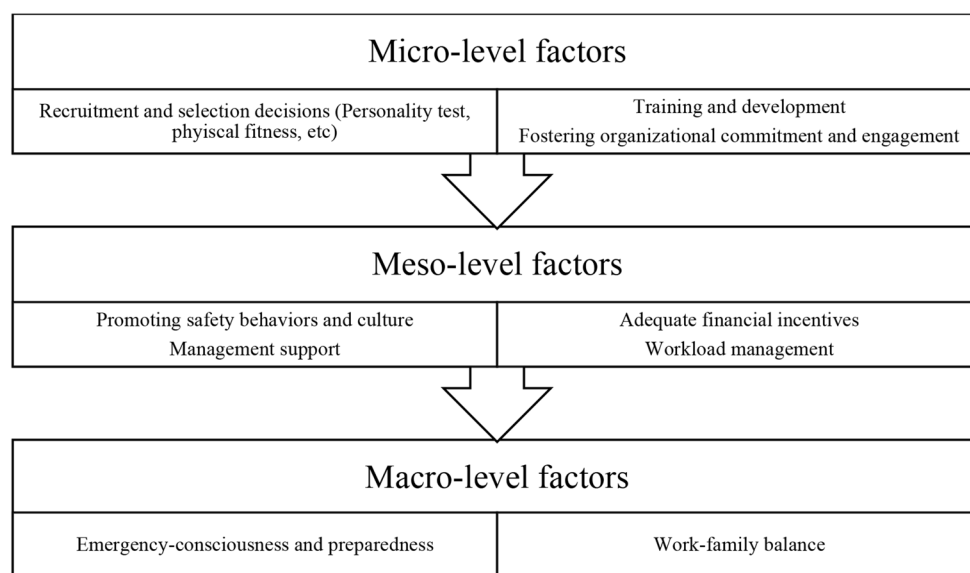
Conclusion and recommendations

ARFF personnel assume crucial responsibilities in responding to hazardous and unpredictable situations involving human loss and distress, requiring them to be psychologically resilient. These frontline professionals work in challenging circumstances characterized by limited resources, short decision-making spans, stress-inducing risks, and significant time constraints as well as uncertainties. As such, understanding the multifaceted factors that contribute to the resilience of ARFF personnel becomes vital for research and practical application.

The findings of the current study underscore the multidimensional nature of resilience for ARFF personnel, influenced by a plethora of factors across micro-, meso-, and macro-level of analysis. Previous research has also treated resilience as a multidimensional construct (Ledesma, 2014) consisting of domains such as cognitive, behavioral and environmental (de Terte et al., 2014) or mind, body, culture and society (Brassington & Lomas, 2021) or internal and external variables in resilience (Carver, 1998a). An evidence-based understanding of the confluence of factors affecting resilience capacity of ARFF professionals pave the way for identifying and designing protection, intervention, and additional strategies. Figure 2 displays a summary of practical recommendations.

Micro-level considerations, such as personality traits and physiological fitness, are identified as crucial during recruitment and selection. Reliable personality tests and thorough attention to the alignment of physiological fitness with job requirements are recommended. Providing comprehensive training programs encompassing physical, theoretical, practical, and resilience components before assigning critical responsibilities is essential. Recognizing the significance of demographic characteristics in shaping performance outcomes, supervisors are encouraged to implement blended learning programs that enhance practical experience and continually strategize to address the physical and psychosocial needs of ARFF personnel, fostering organizational commitment and bolstering psychological resilience. These findings, coupled with the literature on the role of human resource contents/processes and human resource strength (defined as "*a linking mechanism that builds shared, collective perceptions, attitudes, and behaviors among employees*") (Bowen & Ostroff, 2004, p. 206) can be used for understanding the role of HR policies on safety outcomes (Song et al., 2023).

On the meso-(organizational) level, ensuring the safety of station and operation buildings, cultivating a conducive workstation, and promoting a robust safety culture are found to be paramount. This finding contributes to the previous research on constituents of safety behaviors in particularly safety critical organizations where psychological capital resources including resilience have significant direct and indirect effects on safety outcomes (Jarle et al., 2012). In line with previous research findings that consolidate the positive role of employee perceptions of managerial commitment to safety outcomes on employee behaviors (Li & Griffin, 2022), the current study provides evidence for the significance of management commitment to employee

Fig. 2 Recommendations for resilience development in ARFF personnel

Micro-level factors	
Recruitment and selection decisions (Personality test, phiyscal fitness, etc)	Training and development Fostering organizational commitment and engagement

Meso-level factors	
Promoting safety behaviors and culture Management support	Adequate financial incentives Workload management

Macro-level factors	
Emergency-consciousness and preparedness	Work-family balance

wellbeing. Effective management performance, supportive team interactions, offering adequate financial incentives, and managing individual workload are identified as crucial organizational responsibilities in enhancing the resilience of ARFF personnel.

At the macro-(environmental) level, creating emergency-conscious work and living environments, even during non-operational periods, poses a challenge but is deemed essential. Providing social support to ARFF personnel and assisting them in managing work-family balance are recommended for sustaining resilience. Although these macro-level factors are more challenging to manage, they play a crucial role in creating an environment conducive to the psychological resilience of ARFF personnel. Previous research provides evidence for the significant role of work-family spillovers such the effect of parental workplace injuries on children's mental health (Turner et al., 2021), pointing to the need for considering the consequences of work about salient others such as family members.

In conclusion, addressing the diverse aspects of ARFF operational needs will be crucial for intervention effectiveness. Balancing the micro-, meso-, and macro-level considerations ensures a comprehensive approach that fosters psychological resilience and well-being among ARFF personnel, ultimately contributing to their overall effectiveness in responding to critical situations.

Limitations and future research

The current study is subject to various limitations that warrant consideration. Foremost, the working data has been collected from a purposively selected and specific group of ARFF staff, limiting the generalizability of the research findings and conclusions to this cohort. These psychological resilience outcomes should be used with caution in other areas of application or to a broader population of ARFF staff. Additionally, while the study provides valuable insights into the psychological resilience experiences of ARFF personnel, the subjective nature of the participant experience should not be overlooked. Factors such as the work intensity within the current work environment, recent or frequent exposure to unexpected natural disasters, accidents, fires, and other critical events might well play a crucial role. These might in turn significantly contribute to individual resilience experiences, shaping the intricacies of the research process. A recognition of and addressing these challenges will inevitably add a layer of complexity to the interpretation of research findings.

Additionally, previous research has identified different stages of resilience such as the *four-cycle phase to resilience* consisting of a deteriorating phase, an adapting phase, a recovery phase, and a growing phase (Ledesma, 2014).

Individuals might be at different stages in terms of their resilience experience and individual experiences might call for different interventions.

Moreover, the composition of the entire study group exclusively comprising male participants poses yet another limitation from a diversity perspective. Such underrepresentation of women raises questions about the generalizability of the results for a more diverse composition of ARFF personnel. Only a more inclusive study group would be capable of acknowledging the diverse experiences, perspectives, and coping mechanisms of female ARFF personnel, promising a broadly applicable net of findings. Therefore, future researchers should seek a more diverse and representative sample for extrapolating their results to a broader ARFF community, particularly those comprising female professionals.

Data availability The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval Ethical approval was waived by the Ethical Review Board of the Suleyman Demirel University in Turkey (Date: 22.03.2023 and Number: E- 87432956-050.99-469117). The data were collected on a voluntary basis through purposive sampling —a nonprobability sampling technique— and participants were granted confidentiality on behalf of their identity/information with a declaration of anonymity statement at the beginning of the questionnaire form. Informed consent was obtained from all individual participants included in the study.

Conflict of interests On behalf of all authors, the corresponding author states that there is no financial or non-financial conflict of interest among authors. All authors equally contributed to the study. The authors did not receive support from any organization for the submitted work.

References

Achor, S., & Gielan, M. (2016). Resilience is about how you recharge, not how you endure. *Harvard Business Review*. https://hbr.org/2016/06/resilience-is-about-how-you-recharge-not-how-you-endure.

Ahern, N., Kiehl, E., Sole, M., & Byers, J. (2006). A review of instruments measuring resilience. *Comprehensive Child and Adolescent Nursing*, *29*(2), 103–125. https://doi.org/10.1080/01460860600677643.

Ahmed, S., & Demirel, H. (2020). A framework to assess human performance in normal and emergency situations. *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems Part B: Mechanical Engineering*, *6*(1). https://doi.org/10.1115/1.4044791.

Alhazmi, A. A., & Kaufmann, A. (2022). Phenomenological qualitative methods Applied to the analysis of cross-cultural experience in Novel Educational Social contexts. *Frontiers in Psychology*, *13*, 785134. https://doi.org/10.3389/fpsyg.2022.785134.

American Psychological Association (2012). *Resilience*. https://www.apa.org/topics/resilience.

Bayouth, S. T., Keren, N., Franke, W., & Godby, K. (2013). Examining firefighter decision-making: How experience influences speed in process and choice. *International Fire Service Journal of Leadership and Management*, *7*, 51–60.

Bengtsson, M. (2016). How to plan and perform a qualitative study using content analysis. *NursingPlus Open*, *2*, https://doi.org/10.1016/j.npls.2016.01.001.

Bernabé, M., & Botía, J. (2015). Resilience as a mediator in emotional social support's relationship with occupational psychology health in firefighters. *Journal of Health Psychology*. https://doi.org/10.1177/1359105314566258.

Blaney, L., Wilde, D., & Hill, R. (2021). Transcending adversity: Resilience in volunteer firefighters. *International Journal of Emergency Services*, *10*(2), 161–176. https://doi.org/10.1108/IJES-10-2019-0055.

Bogden, J. (2014). Hardiness as a predictor of success for marine corps first responders in training. *ProQuest Dissertations and Theses*. https://www.mendeley.com/catalogue/f9c903f0-184f-36ba-85d2-332d625e3bbd/.

Bonanno, G. A., & Mancini, A. D. (2008). The human capacity to thrive in the face of potential trauma. *Pediatrics*, *121*(2), 369–375. https://doi.org/10.1542/peds.2007-1648.

Bowen, D. E., & Ostroff, C. (2004). Understanding HRM-firm performance linkages: The role of the strength of the HRM system. *Academy of Management Review*, *29*(2), 203–221.

Braithwaite, G. (2001). Aviation rescue and firefighting in Australia—Is it protecting the customer? *Journal of Air Transport Management*, *7*(2), 111–118. https://doi.org/10.1016/S0969-6997(00)00037-5.

Brassington, K., & Lomas, T. (2021). Can resilience training improve well-being for people in high-risk occupations? A systematic review through a multidimensional lens. *The Journal of Positive Psychology*, *16*(5). https://doi.org/10.1080/17439760.2020.1752783#.

Burian, B., Barshi, I., & Dismukes, R. (2005). The challenge of aviation emergency and abnormal situations. *NASA Technical Memorandum*, 1–21.

Butler, C. G., O'Shea, D., & Truxillo, D. M. (2021). Adaptive and Proactive Coping in the Process of Developing Resilience. In P. D. Harms, P. L. Perrewé, & C.-H. (Daisy) Chang (Eds.), *Examining and Exploring the Shifting Nature of Occupational Stress and Well-Being* (Vol. 19, pp. 19–46). Emerald Publishing Limited. https://doi.org/10.1108/S1479-355520210000019002.

Campbell, R., & Hall, S. (2022). *United States firefighter injuries in 2021* (pp. 1–16). National Fire Protection Association. (NFPA Research.

Campbell, R., & NFPA Research). (2022). *Firefighter injuries on the fireground* (. National Fire Protection Association. https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/Emergency-responders/ospatterns.pdf.

Carver, C. (1998a). Resilience and thriving: Issues, models, and linkages. *Journal of Social Issues*, *54*(2), 245–266 https://doi.org/10.1111/0022-4537.641998064

Carver, C. S., & Connor-Smith, J. (2010). Personality and coping. *Annual Review of Psychology*, *61*, 679–704. https://doi.org/10.1146/annurev.psych.093008.100352.

Casey, T. W., Hu, X., Kanse, L., & Varhammar, A. (2022). A tale of six climates: Reflections and learnings after the development of six industry-specific safety climate scales. *Journal of Safety Research*, *82*, 151–158. https://doi.org/10.1016/j.jsr.2022.05.006.

Civil Aviation General Directorate (2016). *Havaalanlarında kurtarma ve yangınla mücadele hizmetleri*. https://web.shgm.gov.tr/tr/kurumsal-yayinlar/5263-havaalanlarinda-kurtarma-ve-yangin-la-mucadele-hizmetleri.

Connor, K. M., & Davidson, J. R. T. (2003). Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). *Depression and Anxiety*, *18*(2), 76–82. https://doi.org/10.1002/da.10113.

Cox, T., & Tisserand, M. (2006). Editorial: Work & stress comes of age: Twenty years of occupational health psychology. *Work & Stress*, *20*, 1–5. https://doi.org/10.1080/02678370600739795.

Cutuli, J., Herbers, J., Masten, A., & Reed, M. G. (2018). Resilience in development. In *The Oxford Handbook of Positive Psychology* (3rd ed.). https://academic.oup.com/edited-volume/34277/chapter-abstract/290610819?redirectedFrom=fulltext&login=false

Dalkıran, M. (1993). *İtfaiye mesleğinden kaynaklanan gerilim nedenleri, önlemleri: İstanbul iline yönelik bir araştırma* [Yüksek Lisans Tezi, İstanbul Üniversitesi]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp.

de Terte, I., & Stephens, C. (2014). Psychological resilience of workers in high-risk occupations. *Stress and Health*, *30*(5), 353–355. https://doi.org/10.1002/smi.2627.

de Terte, I., Stephens, C., & Huddleston, L. (2014). The development of a three part model of psychological resilience. *Stress and Health*, *30*(5), 416–424. https://doi.org/10.1002/smi.2625.

Declercq, F., Meganck, R., Deheegher, J., & Hoorde, H. (2011). Frequency of and subjective response to critical incidents in the prediction of PTSD in emergency personnel. *Journal of Traumatic Stress*, *24*(1), 133–136. https://doi.org/10.1002/jts.20609.

Dipboye, R. (2018). Constructs and methods in employee selection. In *The Emerald Review of Industrial and Organizational Psychology* (pp. 675–738). https://doi.org/10.1108/978-1-78743-785-220181018.

Dobson, M., Choi, B., Schnall, P., Wigger, E., Garcia-Rivas, J., Israel, & Baker, D. (2013). Exploring occupational and health behavioral causes of firefighter obesity: A qualitative study. *American Journal of Industrial Medicine*, *56*(7), 776–790. https://doi.org/10.1002/ajim.22151.

Fechtner, H., Ismail, M., Schmuelling, B., & Saes, K. H. (2017). Evaluation and assessment of a novel training program for working on electric vehicles. *2017 IEEE Frontiers in Education Conference (FIE)*, 1–5. https://doi.org/10.1109/FIE.2017.8190708.

Fletcher, D., & Sarkar, M. (2012). A grounded theory of psychological resilience in olympic champions. *Psychology of Sport and Exercise*, *13*(5), 669–678. https://doi.org/10.1016/j.psychsport.2012.04.007.

Fletcher, D., & Sarkar, M. (2013). Psychological resilience: A review and critique of definitions, concepts, and theory. *European Psychologist*, *18*(1), 12–23. https://doi.org/10.1027/1016-9040/a000124.

Fontana, A., & Frey, J. (1994). Interviewing – The Art of Science. In *Handbook of Qualitative Research* (pp. 361–376). https://granolagradschoolandgoffman.wordpress.com/2014/10/28/fontana-a-and-j-h-frey-1994-interviewing-the-art-of-science/.

Fraser, M., Richman, J., & Galinsky, M. (1999). Risk, protection, and resilience: Toward a conceptual framework for social work practice. *Social Work Research*, *23*(3), 131–143. https://doi.org/10.1093/swr/23.3.131.

Fredrickson, B. L. (1998). What good are positive emotions? *Review of General Psychology: Journal of Division 1, of the American Psychological Association*, *2*(3), 300–319. https://doi.org/10.1037/1089-2680.2.3.300.

Fredrickson, B. (2001). The role of positive emotions in positive psychology. *American Psychologist*, *56*, 218–226. https://doi.org/10.1037/0003-066X.56.3.218.

Friborg, O., Barlaug, D., Martinussen, M., Rosenvinge, J., & Hjemdal, O. (2005). Resilience in relation to personality and intelligence. *International Journal of Methods in Psychiatric Research*, *14*(1), 29–42. https://doi.org/10.1002/mpr.15.

Garmezy, N., & Masten, A. (1986). Stress, competence, and resilience: Common frontiers for therapist and psychopathologist. *Behavior Therapy*, *17*(5), 500–521. https://doi.org/10.1016/S0005-7894(86)80091-0.

Gist, R. (2007). Promoting resilience and recovery in first responders. *Psychology of terrorism* (pp. 418–433). Oxford University Press.

Goode, N., Salmon, P., Spencer, C., McArdle, D., & Archer, F. (2017). Defining disaster resilience: Comparisons from key stakeholders involved in emergency management in Victoria, Australia. *Disasters*, *41*(1), 171–193. https://doi.org/10.1111/disa.12189.

Graneheim, U., & Lundman, B. (2004). Qualitative content analysis in nursing research: Concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today*, *24*(2). https://doi.org/10.1016/j.nedt.2003.10.001.

Gu, Q., & Day, C. (2007). Teachers resilience: A necessary condition for effectiveness. *Teaching and Teacher Education*, *23*(8), 1302–1316. https://doi.org/10.1016/j.tate.2006.06.006.

Guba, E. G., & Lincoln, Y. S. (1989). *Fourth generation evaluation* (p. 294). Sage Publications, Inc.

Harvey, J., & Delfabbro, P. H. (2004). Psychological resilience in disadvantaged youth: A critical overview. *Australian Psychologist*, *39*(1), 3–13. https://doi.org/10.1080/00050060410001660281.

He, C., Jia, G., McCabe, B., Chen, Y., & Sun, J. (2019). Impact of psychological capital on construction worker safety behavior: Communication competence as a mediator. *Journal of Safety Research*, *71*, 231–241. https://doi.org/10.1016/j.jsr.2019.09.007.

Herbers, J., Masten, A., & Reed, M. G. (2021). Resilience in development. *The Oxford Handbook of positive psychology* (3rd ed., pp. 117–188). Oxford University Press.

Heydari, A., Ostadtaghizadeh, A., Ardalan, A., Ebadi, A., Mohammadfam, I., & Khorasani-Zavareh, D. (2022a). Exploring the criteria and factors affecting firefighters' resilience: A qualitative study. *Chinese Journal of Traumatology*, *25*(2), 107–114. https://doi.org/10.1016/j.cjtee.2021.06.001.

Heydari, A., Ostadtaghizadeh, A., Khorasani-Zavareh, D., Ardalan, A., Ebadi, A., Mohammadfam, I., & Shafaei, H. (2022b). Building resilience in firefighters: A systematic review. *Iranian Journal of Public Health*, *51*(7), 1546–1558. https://doi.org/10.18502/ijph.v51i7.10088.

Heydari, P., Babamiri, M., Tapak, L., Golmohammadi, R., & Kalatpour, O. (2022). Weighing and prioritization of individual factors affecting the performance of industries firefighters. *Fire Safety Journal*, *127*, 103512. https://doi.org/10.1016/j.firesaf.2021.103512.

Holland-Winkler, A. M., Hamil, B. K., Greene, D. R., & Kohler, A. A. (2023). Strategies to improve physiological and psychological components of Resiliency in firefighters. *Physiologia*, *3*(4). https://doi.org/10.3390/physiologia3040045.

Hollnagel, E., Wears, R., & Braithwaite, J. (2015). *From safety-I to safety-II: a white paper*. https://www.researchgate.net/publication/282441875_From_Safety-I_to_Safety-II_A_White_Paper.

Hosseinian, S., & Nooripour, R. (2019). Effectiveness of mindfulness-based intervention on risky behaviors, Resilience, and distress tolerance in adolescents. *International Journal of High Risk Behaviors and Addiction*, *8*(4). https://doi.org/10.5812/ijhrba.93481.

Hou, W. K., Tong, H., Liang, L., Li, T. W., Liu, H., Ben-Ezra, M., Goodwin, R., & Lee, T. M. (2021). Probable anxiety and components of psychological resilience amid COVID-19: A population-based study. *Journal of Affective Disorders*, *282*, 594–601. https://doi.org/10.1016/j.jad.2020.12.127.

Hu, T., Zhang, D., & Wang, J. (2015). A meta-analysis of the trait resilience and mental health. *Personality and Individual Differences*, *76*, 18–27. https://doi.org/10.1016/j.paid.2014.11.039.

Hunter, A. (2001). A cross-cultural comparison of resilience in adolescents. *Journal of Pediatric Nursing*, *16*(3), 172–179. https://doi.org/10.1053/jpdn.2001.24180.

Iowa Department of Administrative Services. (n.d.). *Airport firefighter- human resources enterprise job classification description*. Iowa Department of Administrative Services. Retrieved September 27 (2023). from https://das.iowa.gov/media/2774/download?inline=.

Isaac, G., & Buchanan, M. (2021). Extinguishing stigma among firefighters: An examination of stress, social support, and help-seeking attitudes. *Psychology*, *12*(3). https://doi.org/10.4236/psych.2021.123023.

Jarle, E., Kathyrn, M., Larsson, G., Laberg, J. C., & Johnsen, B. H. (2012). Leadership, psychological capital and safety research: Conceptual issues and future research questions. *Safety Science*, *50*(1), 55–61.

Kales, S., Soteriades, E., Christoudias, S., & Christiani, D. (2003). Firefighters and on-duty deaths from coronary heart disease: A case control study. *Environmental Health: A Global Access Science Source*, *2*, 1–13. https://doi.org/10.1186/1476-069X-2-1.

Kang, R., Fu, G., & Yan, J. (2016). Analysis of the case of fire fighters casualties in the building collapse. *Procedia Engineering*, *135*, 343–348. https://doi.org/10.1016/j.proeng.2016.01.140.

Karampas, K., Michael, G., & Stalikas, A. (2016). Positive emotions, resilience and psychosomatic health: Focus on Hellenic Army NCO cadets. *Psychology*, *07*(13), 1727–1740. https://doi.org/10.4236/psych.2016.713162.

Kivunja, C., & Kuyini, A. B. (2017). Understanding and applying Research paradigms in Educational contexts. *International Journal of Higher Education*, *6*, 26. https://doi.org/10.5430/ijhe.v6n5p26.

Klein, R., Nicholls, R., & Thomalla, F. (2003). Resilience to natural hazards: How useful is this concept? *Environmental Hazards*, *5*(1), 35–45. https://doi.org/10.1016/j.hazards.2004.02.001.

Kunadharaju, K., Smith, T. D., & DeJoy, D. M. (2011). Line-of-duty deaths among U.S. firefighters: An analysis of fatality investigations. *Accident Analysis & Prevention*, *43*(3), 1171–1180. https://doi.org/10.1016/j.aap.2010.12.030.

Launder, D., & Penney, G. (2023). Towards a common framework to support decision-making in high-risk, low-time environments. *Journal of Contingencies and Crisis Management*, *31*(4), 862–876. https://doi.org/10.1111/1468-5973.12487.

Lazarus, R. (1993). From psychological stress to the emotions: A history of changing outlooks. *Annual Review of Psychology*, *44*, 1–21.

Ledesma, J. (2014). Conceptual frameworks and Research models on Resilience in Leadership. *SAGE Open*, *4*(3), 2158244014545464. https://doi.org/10.1177/2158244014545464.

Lee, H. H., & Cranford, J. A. (2008). Does resilience moderate the associations between parental problem drinking and adolescents'

internalizing and externalizing behaviors? A study of Korean adolescents. *Drug and Alcohol Dependence*, *96*(3), 213–221. https://doi.org/10.1016/j.drugalcdep.2008.03.007.

Li, K., & Griffin, M. A. (2022). Safety behaviors and job satisfaction during the pandemic: The mediating roles of uncertainty and managerial commitment. *Journal of Safety Research*, *82*, 166–175. https://doi.org/10.1016/j.jsr.2022.05.008.

Lovejoy, S., Gillespie, G., & Christianson, J. (2015). Exploring physical health in a sample of firefighters. *Workplace Health & Safety*, *63*(6), 253–258. https://doi.org/10.1177/2165079915576922.

Luthans, F. (2002). The need for and meaning of positive organizational behavior. *Journal of Organizational Behavior*, *23*(6), 695–706. https://doi.org/10.1002/job.165.

Luthar, S., & Cicchetti, D. (2000). The construct of resilience: Implications for interventions and social policies. *Development and Psychopathology*, *12*(4), 857–885. https://doi.org/10.1017/S0954579400004156.

Mao, X., Loke, A., Fung, O., & Hu, X. (2019). What it takes to be resilient: The views of disaster healthcare rescuers. *International Journal of Disaster Risk Reduction*, *36*(undefined-undefined). https://doi.org/10.1016/j.ijdrr.2019.101112.

Masten, A., Best, K., & Garmezy, N. (1990). Resilience and development: Contributions from the study of children who overcome adversity. *Development and Psychopathology*, *2*(4), 425–444. https://doi.org/10.1017/S0954579400005812.

Maunder, R. G., Rosen, B., Heeney, N. D., Jeffs, L. P., Merkley, J., Wilkinson, K., Hunter, J. J., Johnstone, J., Greenberg, R. A., & Wiesenfeld, L. A. (2023). Relationship between three aspects of resilience—adaptive characteristics, withstanding stress, and bouncing back—in hospital workers exposed to prolonged occupational stress during the COVID-19 pandemic: A longitudinal study. *BMC Health Services Research*, *23*, 703. https://doi.org/10.1186/s12913-023-09731-x.

McCanlies, E. C., Mnatsakanova, A., Andrew, M. E., Burchfiel, C. M., & Violanti, J. M. (2014). Positive Psychological Factors Are Associated with lower PTSD symptoms among police officers: Post Hurricane Katrina. *Stress and Health*, *30*(5), 405–415. https://doi.org/10.1002/smi.2615.

Mohune, P., Ratag, B., & Joseph, W. (2018). Hubungan Antara Beban Kerja dengan Stres Kerja pada Pekerja Unit Airport Rescue and Fire Fighting Di Bandar Udara International Sam Ratulangi Manado. *Fakultas Kesehatan Masyarakat Universitas Sam Ratulangi Manado*, 1–8.

Moser, A., & Korstjens, I. (2017). Practical guidance to qualitative research. Part 3: Sampling, data collection and analysis. *The European Journal of General Practice*, *24*(1), 9–18. https://doi.org/10.1080/13814788.2017.1375091.

Murphy, S., Johnson, L., & Beaton, R. (2004). Firefighters' cognitive appraisals of job concerns, threats to well-being and social support before and after the terrorist attacks on September 11, 2001. *Journal of Loss and Trauma*, *9*(3), 269–283. https://doi.org/10.1080/15325020490458381.

Nævestad, T. O., Hesjevoll, I. S., & Phillips, R. O. (2018). How can we improve safety culture in transport organizations? A review of interventions, effects and influencing factors. *Transportation Research Part F: Traffic Psychology and Behaviour*, *54*, 28–46. https://doi.org/10.1016/j.trf.2018.01.002.

Neubauer, B. E., Witkop, C. T., & Varpio, L. (2019). How phenomenology can help us learn from the experiences of others. *Perspectives on Medical Education*, *8*(2), 90–97. https://doi.org/10.1007/s40037-019-0509-2.

NIOSH safety and health topic: Fire fighter fatality investigation and prevention program. (2021). http://www.cdc.gov/niosh/fire/implweb.html.

Nooripour, R., Hosseinian, S., Hussain, A. J., Annabestani, M., Maadal, A., Radwin, L. E., Hassani-Abharian, P., Pirkashani, N.

G., & Khoshkonesh, A. (2021). How Resiliency and Hope can predict stress of Covid-19 by mediating role of spiritual well-being based on machine learning. *Journal of Religion and Health*, *60*(4), 2306–2321. https://doi.org/10.1007/s10943-020-01151-z.

Nooripour, R., Hoseinian, S., Vakili, Y., Ghanbari, N., Matacotta, J. J., Mozaffari, N., Ilanloo, H., & Lavie, C. (2022). Psychometric properties of Farsi version of the resilience scale (CD-RISC) and its role in predicting aggression among Iranian athletic adolescent girls. *BMC Psychology*, *10*(1), 142. https://doi.org/10.1186/s40359-022-00852-2.

Nowicki, T., Koszela, J., & L. Matuszelański (2018). Virtual reality environment to study the ergonomic features of firefighters' activity. *MATEC Web of Conferences*, *210*, https://doi.org/10.1051/matecconf/201821002050.

Ogińska-Bulik, N., & Kobylarczyk, M. (2016). Association between resiliency and posttraumatic growth in firefighters: The role of stress appraisal. *International Journal of Occupational Safety and Ergonomics*, *22*(1), 40–48. https://doi.org/10.1080/10803548.2015.1109372.

Onyedire, N., Ekoh, A., Chukwuorji, J., & Ifeagwazi, C. (2017). Posttraumatic stress disorder (PTSD) symptoms among firefighters: Roles of resilience and locus of control. *Journal of Workplace Behavioral Health*, *32*, 1–22. https://doi.org/10.1080/15555240.2017.1369885.

Padilla-Díaz, M. (2015). Phenomenology in educational qualitative research: Philosophy as science or philosophical science? *International Journal of Educational Excellence*, *1*(2), 101–110. https://doi.org/10.18562/IJEE.2015.0009.

Palmer, C. (2008). A theory of risk and resilience factors in military families. *Military Psychology*, *20*(3), 205–217. https://doi.org/10.1080/08995600802118858.

Patten, M., & Newhart, M. (2017). Understanding research methods: An overview of the essentials, tenth edition. *Taylor and Francis*, 1–338. https://doi.org/10.4324/9781315213033.

Physical activity. (2023, July 3). World Health Organization. https://www.who.int/news-room/fact-sheets/detail/physical-activity.

Regehr, C., Dimitropoulos, G., Bright, E., George, S., & Henderson, J. (2005). Behind the brotherhood: Rewards and challenges for wives of firefighters. *Family Relations*, *54*(3), 423–435. https://doi.org/10.1111/j.1741-3729.2005.00328.x.

Rennie, D. L., Watson, K. D., & Monteiro, A. M. (2002). The rise of qualitative research in psychology. *Canadian Psychology / Psychologie Canadienne*, *43*(3), 179–189. https://doi.org/10.1037/h0086914.

Riolli, L., & Savicki, V. (2003). Information system organizational resilience. *Omega*, *31*(3), 227–233. https://doi.org/10.1016/S0305-0483(03)00023-9.

Rosmuller, N., & Ale, B. (2008). Classification of fatal firefighter accidents in the Netherlands: Time pressure and aim of the suppression activity. *Safety Science*, *46*(2), 282–290. https://doi.org/10.1016/j.ssci.2007.06.029.

Rutter, M. (1987). Psychosocial resilience and protective mechanisms. *American Journal of Orthopsychiatry*, *57*(3), 316–331.

Rutter, M. (1999). Resilience concepts and findings: Implications for family therapy. *Journal of Family Therapy*, *21*(2), 119–144. https://doi.org/10.1111/1467-6427.00108.

Salminen, S., Perttula, P., & Puro, V. (2020). Psychological resilience and occupational injuries. *Psychology*, *11*(03), 461–466. https://doi.org/10.4236/psych.2020.113031.

Sattler, D., Boyd, B., & Kirsch, J. (2014). Trauma-exposed firefighters: Relationships among posttraumatic growth, posttraumatic stress, resource availability, coping and critical incident stress debriefing experience. *Stress and Health*, *30*(5), 356–365. https://doi.org/10.1002/smi.2608.

Shih, F., Liao, Y., Chan, S., Duh, B., & Gau, M. (2002). The impact of the 9–21 earthquake experiences of Taiwanese nurses as

rescuers. *Social Science and Medicine*, *55*(4), 659–672. https://doi.org/10.1016/S0277-9536(01)00194-0.

Smith, T., & Dyal, M. (2016). A conceptual safety-oriented job demands and resources model for the fire service. *International Journal of Workplace Health Management*, *9*(4), 443–460. https://doi.org/10.1108/IJWHM-12-2015-0073.

Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The brief resilience scale: Assessing the ability to bounce back. *International Journal of Behavioral Medicine*, *15*(3), 194–200. https://doi.org/10.1080/10705500802222972.

Smith, T., DeJoy, D., Dyal, M. A., & Huang, G. (2017). Impact of work pressure, work stress and work–family conflict on Firefighter burnout. *Archives of Environmental & Occupational Health*, *74*(4), 215–222. https://doi.org/10.1080/19338244.2017.1395789.

Smith, D. L., Haller, J. M., Korre, M., Fehling, P. C., Sampani, K., Porto, L. G. G., Christophi, C. A., & Kales, S. N. (2018a). Pathoanatomic findings associated with duty-related cardiac death in US firefighters: A case-control study. *Journal of the American Heart Association*, *7*(18). https://doi.org/10.1161/JAHA.118.009446.

Smith, T., Hughes, K., DeJoy, D., & Dyal, M. A. (2018b). Assessment of relationships between work stress, work-family conflict, burnout and firefighter safety behavior outcomes. *Safety Science*, *103*, 287–292. https://doi.org/10.1016/j.ssci.2017.12.005.

Song, K., Guo, M., Chu, F., Yang, S., & Xiang, K. (2023). The influence of perceived human resource strength on safety performance among high-speed railway drivers: The role of organizational identification and psychological capital. *Journal of Safety Research*, *85*, 339–347. https://doi.org/10.1016/j.jsr.2023.04.001.

Stewart, M., Reid, G., & Mangham, C. (1997). Fostering children's resilience. *Journal of Pediatric Nursing*, *12*(1), 21–31. https://doi.org/10.1016/S0882-5963(97)80018-8.

Straud, C., Henderson, S., Vega, L., Black, R., & Hasselt, V. (2018). Resiliency and posttraumatic stress symptoms in firefighter paramedics: The mediating role of depression, anxiety, and sleep. *Traumatology*, *24*(2), 140–147. https://doi.org/10.1037/trm0000142.

Sudom, K. A., Lee, J. E. C., & Zamorski, M. A. (2014). A longitudinal pilot study of Resilience in Canadian Military Personnel. *Stress and Health*, *30*(5), 377–385. https://doi.org/10.1002/smi.2614.

Teherani, A., Martimianakis, T., Stenfors-Hayes, T., Wadhwa, A., & Varpio, L. (2015). Choosing a qualitative research approach. *Journal of Graduate Medical Education*, *7*(4), 669–670. https://doi.org/10.4300/JGME-D-15-00414.1.

Tufford, L., & Newman, P. (2012). Bracketing in qualitative research. *Qualitative Social Work*, *11*(1), 80–96. https://doi.org/10.1177/1473325010368316.

Tugade, M., & Fredrickson, B. (2002). Positive emotions and emotional intelligence. *Emotions and Social Behavior*, 319–340.

Tugade, M., & Fredrickson, B. (2004). Resilient individuals use positive emotions to bounce back from negative emotional experiences. *Journal of Personality and Social Psychology*, *86*(2), 320–333. https://doi.org/10.1037/0022-3514.86.2.320.

Tugade, M., Fredrickson, B., & Barrett, L. (2004). Psychological resilience and positive emotional granularity: Examining the benefits of positive emotions on coping and health. *Journal of Personality*, *72*(6), 1161–1190. https://doi.org/10.1111/j.1467-6494.2004.00294.x.

Turner, N., Granger, S., Tucker, S., Deng, C., & Kelloway, E. K. (2021). Parents' work injuries and children's mental health: The moderating role of children's work centrality. *Journal of Safety Research*, *77*, 61–66. https://doi.org/10.1016/j.jsr.2021.02.002.

Tusaie, K., & Dyer, J. (2004). Resilience: A historical review of the Construct. *Holistic Nursing Practice*, *18*(1), 3.

Whalen, J., Atkinson, J., & Heritage, J. (1987). Structures of social action: Studies in conversation analysis. *Contemporary Sociology*, *16*(5), Article5.

Whalen, J., Zimmerman, D. H., & Whalen, M. R. (1988). When words fail: A single case analysis. *Social Problems*, *35*(4), 335–362. https://doi.org/10.2307/800591.

Williams, H. (2021). The meaning of phenomenology: Qualitative and philosophical phenomenological research methods. *Qualitative Report*, *26*(2). https://doi.org/10.46743/2160-3715/2021.4587.

Winwood, P. C., Colon, R., & McEwen, K. (2013). A practical measure of workplace resilience: Developing the resilience at work scale. *Journal of Occupational & Environmental Medicine*, *55*(10), 1205–1212. https://doi.org/10.1097/JOM.0b013e3182a2a60a.

Wu, T. J., Yuan, K. S., Yen, D. C., & Xu, T. (2019). Building up resources in the relationship between work–family conflict and burnout among firefighters: Moderators of guanxi and emotion regulation strategies. *European Journal of Work and Organizational Psychology*, *28*(3), 430–441. https://doi.org/10.1080/1359432X.2019.1596081.

Yates, T., Tyrell, F., & Masten, A. (2015). Resilience theory and the practice of positive psychology from individuals to societies. In *Positive Psychology in Practice: Promoting Human Flourishing in Work, Health, Education, and Everyday Life* (Second Edition, pp. 773–788). John Wiley & Sons Inc. https://www.mendeley.com/catalogue/a03a958e-ad47-3a32-b02d-cdc6d8562d74/.

Ye, X., Ren, S., Li, X., & Wang, Z. (2020). The mediating role of psychological capital between perceived management commitment and safety behavior. *Journal of Safety Research*, *72*, 29–40. https://doi.org/10.1016/j.jsr.2019.12.004.

Young, P. M., Partington, S., Wetherell, M. A., Clair Gibson, S., A., & Partington, E. (2014). Stressors and coping strategies of UK firefighters during On-duty incidents. *Stress and Health*, *30*(5), 366–376. https://doi.org/10.1002/smi.2616.

Zafer, M. (2016). İtfaiye çalışanlarında psikolojik dayanıklılık ve kendini sabotaj düzeylerinin incelenmesi: İstanbul İtfaiyesi örneği [Yüksek Lisans Tezi, Sosyal Bilimler Enstitüsü]. https://acikbilim.yok.gov.tr/handle/20.500.12812/671923.