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A Model of First-responder Coping: An Approach/Avoidance Bifurcation

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Abstract

The work of first responders is fraught with numerous stressors, ranging from potentially traumatic critical incidents to institutional strains. The severity and pervasiveness of these difficulties prompt a necessary consideration of the coping methods employed by first responders. The present study developed an empirical model of first-responder coping strategies, based upon a nationally representative survey sample of 6240 first responders. Participants were drawn from Swedish first responders in the following occupations: coast guard, customs control, military, emergency medical services, fire department and police services. In the final model, exposure to stress related to well-being through several indirect paths that in sum accounted for the original direct relationship between these constructs. These several indirect paths were classified theoretically as either approach or avoidance coping behaviours or subsequent health outcomes. In general, approach coping behaviours were related to better well-being; and avoidance was related to a decrease in the outcome. The size of the present sample, as well as the diverse nature of the included first responders, suggests that the resulting model may offer a unique insight into potentially adaptive pathways for first-responder coping.

Keywords

first responder; coping strategies; job stress; health promotion

First responders are broadly defined as the professions called upon in the face of an accident, emergency or disaster to protect the lives, property and overall safety of nearby citizens. First-responder research predominantly targets police officers (e.g. Andersen et al., 2015; Arnetz, Arble, Backman, Lynch & Lublin, 2013), firefighters (e.g. Bryant & Harvey, 1995), search and rescue personnel such as those in National Guard services (e.g. Brandt, Fullerton, Saltzgaber, Ursano & Holloway, 1995), ambulance personnel (emergency medical technicians and paramedics; e.g. Weiss, Marmar, Metzler & Ronfedlt, 1995) and military

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Conflict of interest

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personnel (Sutker, Corrigan, Sundgaard-Riise, Uddo & Allain, 2002). Although the specific nature of the tasks assigned to these offices is widely discrepant, all are united by the highly demanding nature of their work (Penalba, McGuire & Leite, 2009) and their routine exposure to both physical and psychological stressors (e.g. Galloucis, Silverman & Francek, 2000; McCaslin et al., 2006). First responders are quite aware of the danger they may find themselves in and often describe a sense of being unappreciated by the public they serve, experience frustration from the burden of working with poorly maintained or outdated equipment and endure excessive work hours (Haugen, Evces & Weiss, 2012; Liberman et al., 2002).

These job stressors exert a heavy toll. First responders are at an elevated risk for adverse mental health outcomes including depression (Cardozo et al., 2005; Fullerton, Ursano & Wang, 2004), psychosomatic complaints (Chang et al., 2003; Morren, Yzermans, Van Nispen & Weveres, 2005), chronic fatigue (Morren et al., 2005; Spinhoven & Verschuur, 2006) and post-traumatic stress disorder (Fullerton et al., 2004; North et al., 2002). In addition to emotional disturbances, job stress among first responders has been linked with cognitive difficulties and increased alcohol use (Gross et al., 2006; Stewart, Mitchell, Wright & Loba, 2004), increased risk for suicide, spousal abuse and poorer quality of life (Harpold & Feemster, 2002; Stinchcom, 2004; Dowling, Moynihan, Genet & Lewis, 2006).

The severity and pervasiveness of these difficulties prompt a necessary consideration of the coping methods employed by first responders. Although coping is a multifaceted and complex process, it is often conceptualized as an attempt to address the stressors of one's life that exceed existing resources (Lazarus & Folkman, 1984), thereby reducing the psychological or emotional consequences that might arise from the experience of these stressors (Snyder, 1999).

Coping strategies have been defined as involving two primary self-regulatory techniques (Fauerbach et al., 2009): approach strategies (e.g. confronting a situation or one's reaction to a given stimulus) and avoidance strategies (e.g. attempts to avoid conversing about a stressful experience). Research involving coping strategies has traditionally been conducted in civilian and non-clinical samples, although recent research has suggested that this same basic division may be applicable to first responders as well (e.g. Anshel, 2000; Dowdall-Thomae, Gilkey, Larson & Arend-Hicks, 2012). Approach coping strategies reflect a direct effort at recognizing and processing aversive physical or psychological stimuli (Krohne, 1996).

Approach strategies aim to provide a sense of mastery over one's stressors by increasing one's knowledge, identifying alternate strategies, facing emotional experiences and challenging maladaptive patterns of thought or behaviour (Affleck & Tennen, 1996; Davis, Nolen-Hoeksema & Larson, 1998).

Contemporary research suggests that an approach-based processing of difficult or traumatic events is a beneficial undertaking, even though such processing requires that one face the emotions, memories and bodily sensations that can elicit painful reactions (Hayes, Luoma, Bond, Masuda & Lillis, 2006). Avoidance of such thoughts and emotions may prohibit the

individual from adopting more adaptive perceptions by preventing disconfirming evidence from being recognized or explored (Barlow, 2000), thereby hampering the emergence of new learning experiences (Hayes et al., 2006).

Conversely, avoidance coping is undertaken as a means of not provoking threatening feelings by avoiding the stimuli that trigger such feelings (Anshel, 1996; Roth & Cohen, 1986). Use of avoidance coping strategies among those exposed to significant stressors is highly variable, and research has indicated that this strategy may ultimately result in greater pathology (Marx & Sloan, 2005) and a decreased responsiveness to positive environmental stimuli (Litz, Orsillo, Kaloupek & Weathers, 2000). If coping energy and efforts are conceptualized as a finite resource, then the investment of significant resources to suppression and avoidance may hinder efforts to engage in pleasurable activities, cultivate a mindful and present-focused demeanour and recognize one's innate strengths (Ehlers & Clark, 2000; Hayes et al., 2006; Kashdan, Breen & Julian, 2010).

Avoidance coping may also take the form of substance use, as such substances can serve to blunt the effect produced by ongoing stressors. Indeed, the excessive intake of alcohol to help reduce stress and improve psychological well-being is a common strategy among first responders (e.g. Dietrich & Smith, 1984). Unfortunately, the consumption of alcohol as a means to cope with stress has been associated with alcoholism, obesity, marital conflict, low self-esteem, emotional dysregulation, depression, poor sleep, chronic fatigue and reduced quality of work performance (Peele, 1991; Roskies, 1991).

The effectiveness of these contrasting strategies is complex and varies based upon the individual, the stressor context (e.g. chronic or acute) and the specific coping strategies employed (Kashdan & Rottenberg, 2010). Furthermore, an individual can utilize both strategies to confront their difficulties, and flexibility in the application of coping strategies may be critical (Park, Chang & You, 2015). In short, interpretation of the extant literature on coping is not entirely straightforward (Schuettler & Boals, 2011; Weinberg, Gil & Gilbar, 2014). Nonetheless, the literature seems to suggest that avoidance strategies, when used in isolation or when applied too rigidly, result in poorer mental health than approach strategies (Anshel, 2000; Brown & Campbell, 1994; Joseph, Murphy & Regel, 2012; Littleton, Horsley, John & Nelson, 2007; Suls & Fletcher, 1985).

Yet not all significant coping strategies can be neatly categorized as being purely approach or avoidance based. The importance of social support, for example, has become increasingly recognized. In a meta-analysis conducted by Viswesvaran, Sanchez, and Fisher (1999), a review of 68 studies identified a triune effect of social support on experienced work stress. Increased social support led to lower levels of experienced distress, attenuated the severity of experienced stressors and moderated the relationship between work stress and experienced strain (Halbesleben, 2006). Prati and Pietrantonio (2010) conducted a meta-analytic review of 37 studies investigating the connection between perceived social support and mental health among first responders specifically, finding that among this population, the mental health benefits of social support were significant.

Similarly, research has consistently demonstrated that exercise is associated with improved mood, physical health and life satisfaction (Farmer, Locke, Mosicki, Larson & Radloff, 1988; Meyer & Brooks, 2000). Stress and trauma can lead to a decrease in these critical health behaviours (Assis et al., 2008), a relationship that has also been established among groups with frequent trauma exposure (e.g. Koss, Koss & Woodruff, 1991; Schnurr & Spiro, 1999; Waigandt, Wallace, Phelps & Miller, 1990). Some theorists posit a direct relationship between exercise and coping, citing the former's ability to increase one's psychophysiological tolerance, thereby dampening the effect of the experienced stressors (for a review, see McAuley, 1994).

The effective use of coping strategies can yield significant benefits. Despite the alarming rates of critical incident exposure among first responders, many report experiencing a sense of growth following exposure to difficult events (Tedeschi & Calhoun, 2004). This finding has been identified as 'post-traumatic growth' and offers an important avenue to better understand the benefits of one's coping style. Tedeschi and Calhoun (1996) described post-traumatic growth as a process of emerging from a traumatic experience with a new perspective and attitude regarding one's life. There are a myriad of benefits to experiencing post-traumatic growth, with individuals commonly reporting an increased appreciation for life, a renewed interest in strengthening personal bonds, a feeling that one's life is a gift, increased motivation to achieve or establish life goals or a new or strengthened sense of spirituality (Kashdan & Kane, 2011). Yet by definition, these opportunities for growth are initiated by the same set of events that may serve as the source of distress, pain and functional impairment (Tedeschi & Calhoun, 2004).

The relationship between post-traumatic growth and coping styles is a complicated one. Evidence supporting an approach-oriented strategy is found in research indicating that if an individual is unwilling to address their emotional reactions, it is difficult for such reactions to be overcome and ultimately provide a source of growth (Kashdan & Breen, 2008; Kashdan, Morina & Priebe, 2008). Conversely, other research has indicated that avoidance strategies may form a component of an overall coping strategy (e.g. Fauerbach et al., 2009) or serve as an effective short-term strategy (Roth & Cohen, 1986). According to these theories, avoidance coping can be an opportunity for the individual to avoid a hyper-focus on difficulties and symptoms and allow for a recuperative period to facilitate a process of healing and growth.

Model summary

Although the aforementioned bifurcation of coping strategies has notable empirical support, its applicability to first-responder populations, particularly across the wide diversity of first-responder groups, is unclear. The present research sought to assess this applicability via an extensive survey of first responders. Our hypotheses are as follows:

H1: We posit that coping strategies will largely fall along two primary axes: approach coping and avoidance coping.

H2: While both forms are expected to result in some measure of post-traumatic growth, we anticipate that approach coping will prove to be strongly associated with greater well-being, while avoidant coping will ultimately result in a decrease in well-being, in part owing to an associated increase in substance use.

H3: Social support will mediate the relationships between exposure to stress and both post-traumatic growth and well-being.

H4: Physical health will mediate the relationships between exposure to stress and both post-traumatic growth and well-being. These relationships are shown in Figure 1.

Methods

Participants

Participants were drawn from Swedish first responders in the following occupations: coast guard, customs control, military, emergency medical services, fire department and police services. The survey was distributed to a nationally representative sample of 6240 first responders, of whom 3656 (59%) responded. Among these groups, military (43%) and police (24%) were the most common respondents. There were significant differences in gender distribution across the first-responder groups (a total of 751 women responded). The highest proportion of female respondents were in customs control (40% women), while the fire department had the smallest (10% women). Approximately 67% of the sample was between the ages of 30 and 55.

Participants were identified through a collaboration with senior management and union representatives from all six first-responder agencies. Additionally, the research project worked in conjunction with the Royal Foundation of Sweden 'Kungafonden'. This foundation is, to our knowledge, the world's only foundation solely dedicated to the health and well-being of first responders.

Survey distribution

First responders expressing interest in participation completed the survey in an online format, with the exception of the Department of Defense, which used a paper version distributed to a random sample of enlisted officers (we were not permitted access to their information technology system owing to concerns over safety risks). For the other first-responder agencies, we used a special task force that established the highest degree of data security, in collaboration with an independent computer information technology and survey company, to ensure that all information was handled in strictest confidence.

Survey construction

Items in the survey were derived from focus group interviews with first responders in Sweden as part of the development of the survey. These focus group meetings consisted of departmental leadership as well as more junior employees. During these meetings, professional representatives identified difficulties they personally experienced, as well as difficulties they felt were applicable to their profession as a whole. A comprehensive list of these concerns was generated after each focus group interview. These lists were then

condensed into a single list of potential items for the survey. Inclusion in the final survey was guided by three principles: (1) broad applicability (i.e. items that did not apply across first-responder groups were removed); (2) impact (topics that were identified by many first responders or were described as particularly important were retained); and (3) current theory related to first-responder health and stress (i.e. items that connected to topics identified in the literature as being relevant were retained). The resulting survey focused upon exposure to stress, well-being, social support, coping styles, substance use, physical health and post-traumatic growth.

To facilitate cooperation with the various departments and to limit the burden carried by participation, the survey emphasized brevity and included responses on interval scales ranging from 1 to 10 ('strongly disagree' to 'strongly agree'). All scales presented achieved Cronbach's α values of 0.75 or higher. The items for each scale are presented in Table I.

Analyses

All analyses were conducted in a structural equation modelling framework using MPLUS software (v7, Muthen & Muthen, Los Angeles, CA). Prior to path analyses, survey items were submitted to confirmatory factor analysis with weighted least squares estimation of interval scale data, following which the items were summed and entered into a path analysis to test specific hypotheses of indirect effects estimated with full information maximum likelihood. By standard practice, model fit was evaluated via multiple indices (Raykov & Marcoulides, 2006): chi-squared significance testing (non-significant value supports good fit), comparative fit index (CFI = 0.90), root mean square error of approximation (RMSEA = 0.05), and standardized root mean residual (< 0.05). The cut-offs are recommended values to determine 'excellent fit', but the indices fall on a continuum, and a model that does not meet all of these standards may still be considered acceptable for the purpose of comparing relative fit among alternate models. All reported effects are standardized. The hypotheses were tested in a single model (hypothesized indirect paths model) that was constructed to include the effects of exposure to trauma on well-being mediated by approach, avoidant coping, social support and physical health, and the complex mediation of each of these via post-traumatic growth and substance use. Three alternate models were tested to compare model fit with that of the hypothesized indirect paths model: (1) a model including only correlations; (2) a model of all variable direct effects predicting well-being, without correlations among variables; and (3) a reverse effects model that tested the reverse causality of the variables (to better confirm the direction of effects laid out in the hypothesized indirect paths model).

Results

Path constructs

Each construct was identified by several self-report ratings on a scale of 1 (low agreement) to 10 (high agreement). Prior to path modelling, a confirmatory factor analysis demonstrated that the various items identified the specified factor: exposure to stress (factor loading = 0.32–0.63, all $p < 0.001$), well-being (0.57–0.81, all $p < 0.001$), social support (0.60–0.69, all $p < 0.001$), approach coping (0.55–0.65, all $p < 0.001$), avoidant coping (0.60–0.90, all p

< 0.001), physical health (0.21–0.62, all $p < 0.001$), substance use (0.57–0.92, all $p < 0.001$) and post-traumatic growth (0.67–0.87, all $p < 0.001$). The confirmatory factor analysis had low but acceptable fit to evaluate the factor loadings: $\chi^2(436) = 8982.27$, $p < 0.01$; CFI = 0.86; RMSEA = 0.07. Because of the limited variability imposed by the interval scales, the items were summed to create path constructs that approximate continuous measures, which were log transformed to alleviate moderate skew.

Alternative model testing

Because theoretically there are several variables that may have positive and negative effects to account for the relationship between exposure to stress and well-being, we tested several path models. Although the chi-squared test did not meet the standard of non-significance, the other indices supported the hypothesized indirect paths model as the best reproduction of the data as compared with correlation and direct effects models (Table II). Finally, we can further test the direction of mediation effects by reversing the paths. The reverse causality model fitted worse than the hypothesized model (Table II), further supporting the direction of effects reported.

Summary of hypothesized indirect paths model

In the final model, exposure to stress related to well-being through several indirect paths (total standardized indirect effect = -0.12 , $p < 0.05$) that in sum accounted for the original direct relationship between these constructs (standardized direct effect = -0.12 , $p < 0.05$). These several indirect paths were classified theoretically as either approach or avoidance coping behaviours or subsequent health outcomes. In general, approach coping behaviours in interaction with increased exposure to stress were related to better well-being; and avoidance coping was related to a decrease in the outcome (Figure 1).

Exposure to stress was directly associated with a slight decrease in approach coping (standardized direct effect = -0.05 , $p < 0.05$) and social support (standardized direct effect = -0.18 , $p < 0.05$) and an increase in physical health behaviours (standardized direct effect = 0.09 , $p < 0.05$). Thus, the first responders increased health behaviours like exercise and regular sleep schedules in response to stress, although approach behaviours and socialization slightly lessened. Through the indirect relationships, approach coping (standardized indirect effect = 0.01 , $p < 0.05$) and social support (standardized indirect effect = -0.01 , $p < 0.05$) equally mitigated the negative relationship between exposure to stress and well-being, as did physical health to a slightly greater degree (standardized indirect effect = -0.02 , $p < 0.05$). Increased social support was also related to a moderate increase in post-traumatic growth (standardized direct effect = 0.16 , $p < 0.05$), which in turn accounted for better well-being in the presence of stress above social support alone (standardized indirect effect = 0.002 , $p < 0.05$). Approach coping also was associated with increase in post-traumatic growth (standardized direct effect = 0.19 , $p < 0.05$), and this mediated the positive effect of approach coping on better well-being (standardized indirect effect = 0.001 , $p < 0.05$). Thus, through specific indirect paths, coping strategies that were associated with greater post-traumatic growth encouraged better well-being.

As was expected, avoidant coping was directly related to a decrease in well-being (standardized direct effect = -0.20 , $p < 0.05$) and partially accounted for the negative relationship between exposure to stress and the outcome (standardized indirect effect = -0.07 , $p < 0.05$). Both an increase in exposure to stress (standardized direct effect = 0.08 , $p < 0.05$) and avoidant coping (standardized indirect effect = 0.38 , $p < 0.05$) were associated with a greater incidence of substance use, which in turn accounted for a moderate decrease in well-being (standardized direct effect = -0.19 , $p < 0.05$) and for indirect negative effects of stress on it (total standardized indirect effect = -0.04 , $p < 0.05$). An increase in avoidant coping was also associated with a moderate increase in post-traumatic growth (standardized direct effect = 0.05 , $p < 0.05$), which not only mitigated but also overcame the negative effects of exposure to stress and avoidant coping to ultimately increase well-being (standardized indirect effect = -0.001 , $p < 0.05$). Finally, approach coping was correlated with greater social support (standardized effect = 0.42 , $p < 0.05$) and physical health (standardized effect = 0.23 , $p < 0.05$), but avoidant coping was only correlated with physical health (standardized effect = 0.18 , $p < 0.05$). Importantly, testing the same model with a single coping latent factor identified by both approach and avoidant scores fitted the data worse than the hypothesized indirect effects model [$\chi^2(9) = 827.25$, $p < 0.001$; CFI = 0.70 ; RMSEA = 0.16 ; standardized root mean residual = 0.09], supporting identification of separate approach and avoidant coping paths that each have unique effects on well-being following exposure to trauma.

Finally, we examined possible sex differences in the indices by regressing all variables in the model on sex. Women reported a similar level of exposure to stress as men (0.03 , $p = 0.11$) but better physical health (standardized coefficient = 0.03 , $p = 0.045$), lesser well-being (-0.06 , $p < 0.001$) and social support (-0.18 , $p < 0.001$) and fewer approach coping behaviours (-0.10 , $p < 0.001$). Women and men were equivalent in post-traumatic growth (0.02 , $p = 0.38$), avoidant coping (-0.01 , $p = 0.59$) and substance use (0.02 , $p = 0.35$). Accounting for sex differences in the model did not change any of the reported effects. Because of the small number of women in the sample, the variable was removed from the model, and thus, all reported effects were not controlled for sex.

Discussion

The present study provides a number of important findings. Perhaps the most apparent was that the effect of exposure to stress was consistently significant, resulting in decreases to approach coping strategies, social support and, ultimately, well-being. This finding is consistent with the contemporary literature, as cumulative stress and trauma are increasingly recognized as risk factors for adverse health effects. This is a particularly relevant finding for first responders, as frequent exposure to job-derived stressors is a necessary element of their respective professions, thus speaking to the importance of effective and sustainable coping strategies.

The model's fit statistics support the overall proposition of a theoretical bifurcation of coping strategies into approach and avoidance domains. This separation does not imply a conflict between the two, nor does it suggest that both strategies cannot be employed by the same individual. Nonetheless, it does suggest that there is a significant qualitative difference

between the two, in terms of both their manifestations and ultimate psychobiological consequences.

In the case of approach coping strategies, the individual seeks to confront and gain mastery of a particular stressor. This is reflected in items such as ‘When I experience professional stress, I try to think about how I can deal with its impact’. In this approach mentality, individuals are enacting a strategy to face the troubling aspect of their work and produce a more palatable state of affairs. Additionally, explicitly discussing issues, as opposed to becoming ‘emotionally reserved’, offers a pathway for an emotion-focused form of approach coping (i.e. explicitly identifying and confronting emotional experiences). As expected, such strategies tended to be predictive of post-traumatic growth, as well as increases in well-being. Theoretically, not only can individuals who engage in approach strategies subdue the potential negative effects of workplace stressors by successfully managing them, but further, this approach may ultimately create a more positive work environment (thereby resulting in less stressors). For example, a police officer may feel unsupported by management, leading to feelings of frustration and hostility. Addressing and expressing such feelings may not only reduce them, but if the officer’s approach involves a willingness to take a new perspective, the officer may improve the very relationships with management that were previously the source of stress (e.g. Anshel, 1996).

The avoidance coping strategies require a more complex interpretation. Stress exposure resulted in an increase in avoidance coping, which in turn was associated with an increase in substance use and ultimately a decrease in well-being. This is a reasonable series of relationships, as substance use is quite frequently employed as a means of avoidance coping (Dietrich & Smith, 1984). For example, if a first responder is feeling highly anxious, the use of alcohol can numb such feelings, thereby avoiding them. Of course, the potential for abuse of such strategies remains obvious.

Furthermore, avoidant coping strategies may carry potential dangers beyond the use of substances. The importance of affective expression is becoming increasingly clear in the literature. Individuals who do not recognize or express their emotions may unwittingly create a negative reinforcement pattern wherein such emotions become increasingly feared. Indeed, this is precisely the pattern observed in many sufferers of post-traumatic stress disorder (Badour, Blonigen, Boden & Bonn-Miller, 2012). Until exposure to the event and the states that it produces is experienced, the individual is frequently unable to alleviate their symptoms. In this sense, the pathway between avoidance coping and decreases in well-being is clear.

Nonetheless, a strong relationship between avoidant coping and post-traumatic growth was also observed, and the overall effect of this pathway to well-being was positive. This speaks to the notion that avoidant coping does indeed have a place as an effective coping strategy. Items such as ‘I try not to think about my work stress’ reflect a strategy that, if employed in the short term, seems to offer something of a benefit. An unyielding focus on negative elements of stress or trauma does not offer time from recovery and recuperation. Furthermore, avoidance of negative affect may also allow for the growth of positive experiences that may provide something of a counterbalance. In some respects, avoidance

may at times prove helpful, analogous to the essential role of rest within the context of an exercise regimen. In short, a precise understanding of the nature of ‘avoidance’ is critical to predicting its effects.

This notion of ‘taking a break’ stands in direct contrast to a persistent effort at defending against negative affect. For example, if an individual feels stressed at work and elects to engage in an enjoyable activity during off-hours, this may be characterized as an avoidance coping strategy. This same individual may later choose to enact an approach coping strategy and may even feel more energized and capable of doing so after taking a momentary break. The strong relationship between avoidance coping and post-traumatic growth suggests that periods of avoidance may in fact create the psychic space necessary for recovery. Perhaps most directly, items that may reflect avoidance may also limit exposure (e.g. taking a sick day), a fact that the literature is increasingly recognizing as highly beneficial (Flannery, 2015).

Finally, both social support and physical fitness were also found to be associated with increased well-being, as was expected. These categories were deliberately excluded from the coping strategy bifurcation, as such behaviours can comfortably fit within both domains. For example, an evening out with friends may reflect an opportunity to discuss ongoing problems and receive empathy, a very approach-oriented strategy. Conversely, it may reflect a simple opportunity to do something enjoyable and avoid thinking of a stressful event (i.e. an avoidance-based strategy). Physical exercise is similarly comfortable in both realms. Going for a run may afford the opportunity for reflection on events, thereby becoming an approach-oriented strategy. Conversely, exercising for the sake of distraction would represent an avoidance-based strategy. This complicated relationship is reflected in the positive coefficient between exposure to stress and physical health, suggesting that as exposure to stress increased, first responders reported an increase in health-related behaviours. This unique relationship between exposure to stress and physical health (as compared with the other variables explored) may reflect the centrality of physical health as a coping strategy preferred by first responders and may also suggest that physical health could serve as a core for future first-responder interventions (particularly if it is utilized as a vehicle for both approach and avoidant coping styles).

Limitations

There are several limitations to the present investigation. Firstly, because the data are cross-sectional, there is a necessary caution in that the provided model cannot assert causal relationships. Rather, the model suggests avenues for future longitudinal studies to investigate and confirm.

Secondly, the use of brief focus group-generated items ensured item relevancy and survey brevity. However, the scales created for this study, although internally consistent and seemingly enjoying face validity, may not capture elements of the constructs that more thorough and well-validated existing measures might be capable of. Indeed, the items identified common constructs with significant loadings in the confirmatory factor analysis, but the model failed to meet criteria that indicate excellent fit. Improved measurement of the constructs could result in a significant change in the model’s pathways.

Thirdly, the coefficients of some of the indirect effects were small, albeit statistically significant. By nature of multiplying fractions, the size of an indirect effect will become smaller with each additional intermediary variable. Here, we find standardized indirect effects as small as 0.001 reaching significance, which underscores the need for large, population-based studies required to detect the effects. Moreover, the model was designed to test specific hypotheses regarding the effects of coping strategies on well-being in response to stress, but the totality of well-being is not fully represented in this model. Thus, it is unclear the extent to which these effects translate to meaningful and salient differences in an individual's life. Further study with a broader description of well-being is warranted.

Fourthly, although the present study had an excellent response rate compared with many other studies (Van Horn, Green & Martinussen, 2009), as well as the fact that we included five major first-responder groups, rather than focusing on only one group as is the case for most prior first-responder studies (Flannery, 2015), the overall response rate was approximately 60%, which raises the concern of differential loss to follow-up and under-representativeness of the study.

Fifthly, the use of a convenience sample presents two primary challenges for comparisons across first-responder agencies and sex of the respondents. Firstly, our data collection was not aimed at such a comparison (nor were our methods of survey construction), meaning that we have widely different sample sizes for each first-responder agency and an unbalanced representation of the sexes across agencies. There are likely differential experiences across first-responder agencies that may not be fully captured by the overall model. Additionally, the representation of women is very low in this sample and differentially low across agencies. Thus, the effects of sex on outcomes are confounded by possible differences in agency culture and experience. Future research may benefit from oversampling female first responders and smaller first-responder agencies in order to allow for more meaningful comparisons.

Finally, there are necessary limitations that accompany a purely self-report investigation. Defensiveness, inaccuracy in self-evaluation and mono-method variance are all factors that may exert undue influence in a self-report model. In addition to longitudinal experimental designs and more thorough assessment batteries, biological and performance-based measures could provide an important supplement to the existing research.

Conclusions

The present study highlights multiple pathways for first responders to increase their well-being in the face of work stress. Such a model offers two critical contributions to the extant literature. Firstly, it indicates the numerous areas for intervention, while also noting that an integrative philosophy, involving both approach and avoidance coping strategies, physical health behaviours and methods of seeking social support could prove most beneficial. Secondly, these data offer a uniquely broad assessment of the first-responder community and connect this special population with existing psycho-socio-biological research. Although additional and more nuanced research is required, the present study offers a platform for understanding the broader context of first-responder health and well-being.

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Figure 1.

A path model of the indirect effects of stress on well-being via approach and avoidant coping and post-traumatic growth. All effects are standardized, $*p < 0.05$. All indirect effects are significant, $p < 0.05$; total standardized indirect effect = -0.12 , $p < 0.05$

Table 1.

Path constructs and scale response items

Path construct	Scale response item
Exposure to stress	<p>I often feel at danger while working.</p> <p>The public's lack of respect for my profession is problematic.</p> <p>Working among the public has become more dangerous.</p> <p>I have been subject to discrimination from members of the public while at work</p> <p>Organizational change causes an increase in occupational stress.</p>
Well-being	<p>How is your health at the moment?</p> <p>How well do you sleep, in general?</p> <p>How is your self-esteem, in general?</p> <p>How is your confidence while at work?</p> <p>How are your energy levels, in general?</p>
Social support	<p>Vacations with friends/family help me to recover from professional stress.</p> <p>Spending time with people helps counteract my professional stress.</p> <p>There are various colleagues from work that I spend time with.</p>
Approach coping	<p>At times when I experience professional stress, I try to deal proactively with the causes of it.</p> <p>When I experience professional stress, I try to think about how I can deal with its impact</p> <p>Talking to support personnel helps me manage professional stress</p>
Avoidant coping	<p>I counteract professional stress by not thinking about it.</p> <p>I manage my professional stress by becoming emotionally reserved and not outwardly expressing my emotions.</p> <p>I take a sick day to allow myself a break when I am feeling stressed.</p>
Substance use	<p>I drink alcohol to deal with professional stress.</p> <p>I handle my professional stress by smoking more frequently.</p> <p>I use medications to deal with stress.</p>
Physical health	<p>Physical activity helps me to deal better with professional stress.</p> <p>I try to counteract professional stress by sleeping an adequate number of hours.</p> <p>How often do you exercise?</p>
Post-traumatic growth	<p>I enjoy each day more.</p> <p>I feel that I am better able to deal with various problems and difficulties</p> <p>I have a better understanding for the importance of spiritual matters and existential issues.</p> <p>I feel more compassionate towards others.</p>

Table II.

Comparison of path model fit indices

Index	Correlation only	Uncorrelated direct effects	Hypothesized indirect paths	Reverse effects
Nested models				
χ^2 (<i>p</i> -value)	578.28 (<0.01)	1555.42 (<0.01)	96.49 (<0.01)	238.88 (<0.01)
df	8	13	6	6
CFI	0.79	0.00	0.97	0.91
RMSEA	0.14	0.18	0.06	0.10
SRMR	0.08	0.15	0.03	0.05

Note: See Methods section for a description of each model.

df: degrees of freedom; CFI: comparative fit index; RMSEA: root mean square error approximation; SRMR: standardized root mean residual.