Research

Basic dimensions of resilient coping in paramedics and dispatchers

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Abstract

Introduction

Paramedics and dispatchers are exposed to high levels of stress and consequent psychological injury. Resilience training enhances the capacity to cope with stress and be resilient. It is widely recommended that resilience training be customised to specific occupational groups, but there is no established method for achieving such customisation. Exploratory factor analysis was used to identify dimensions underlying resilient coping in paramedics and dispatchers. The objective was to provide a basis for customised resilience training in this population.

Methods

The Resilient Coping Survey (RCS) was developed on the basis of interviews with paramedics and dispatchers as well as scoping review to identify coping items relevant to this occupational group. The RCS included scales of coping (Resilience at Work and the Self-Compassion Scale – Short Form), a scale of self-perceived resilience (the Brief Resilience Scale) and a set of items reflecting coping skills specific to paramedic service work. The survey was administered to paramedics and dispatchers in British Columbia, Canada.

Results

703 paramedics and dispatchers responded to the survey. Analysis of the survey data identified five resilient coping factors: balance, self-acceptance, trusted social support, meaningful work and physical self-care. Each of these factors predicted resilience. No difference was found overall in resilience across gender; but only for male workers did resilience fall steadily with years of service.

Conclusion

Resilience training for paramedics and dispatchers would appropriately target the five resilient coping factors and be delivered throughout the paramedic service career.

Keywords:

resilience; EMS; paramedic services; paramedic; dispatcher

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Introduction

Paramedics are exposed to more traumatically stressful events in the course of their work than the general population (1-4) and also experience higher rates of post-traumatic stress disorder (5-7). The same pattern is found in emergency dispatchers. Troxell (8) found that 16% of emergency dispatchers experienced traumatic stress reactions arising from hearing about traumatic experiences of others. This is referred to as secondary or vicarious traumatisation and is a critical issue for dispatchers (9). Whether exposure to intense stress is direct or secondary in nature, psychological impact can be substantial: exposure to highly stressful experiences in the paramedic or dispatcher context is associated with psychological injuries, mental health diagnoses and occupational disabilities (10).

One approach to addressing the suffering and disability resulting from stress exposure has been to develop psychological resilience training programs. These interventions are intended to teach workers stress coping skills to better manage stress exposure and increase their capacity to bounce back psychologically following stressful events (11,12). Psychological resilience training has been shown to enhance stress coping skills and thus to reduce the psychological impact of stress exposure, particularly when targeted at identified high-risk groups (13). It may provide primary prevention of psychological injuries (14,15). The skills taught by resilience training may be termed 'resilient coping skills'.

Preliminary efforts to develop a form of resilience training appropriate to paramedics and dispatchers (16,17) have yielded promising results, suggesting that resilient coping skills can be improved in paramedics and dispatchers through training. However, we are in the early stages of developing a form of resilience training specific to paramedics and dispatchers, training that addresses the resilient coping skills most effective and appropriate to this occupational setting. It has frequently been recommended that resilience training be customised to particular occupational groups (18-20), but we do not have a well-founded strategy for customising resilience training to the needs of paramedics and dispatchers.

Several studies have examined resilient coping in paramedics and dispatchers. Shakespeare-Finch et al (21) identified 'workplace belongingness' as contributing to psychological resilience in paramedics. Rasmussen (22) found that 'resilience in emergency dispatchers was higher in the presence of lower levels of behavioural disengagement and higher levels of positive reinterpretation and growth and acceptance'. Holland (23) identified a set of negative coping strategies in paramedics and firefighters (eg. escape/avoidance, distancing and confrontational coping) that predicted higher levels of stress impact. These studies point to coping issues in this population but do not provide a strategy for identifying their resilience training needs. Having a strategy for identifying the resilience

training needs of paramedics and dispatchers would fill a gap in the research literature and foster effective and targeted resilience training for this occupational group.

In this study, qualitative and quantitative data were integrated, validated scales of resilient coping were incorporated and a factor-analytic approach was applied to elucidate dimensions of resilient coping. The objective of this study was to identify resilient coping skills for paramedics and dispatchers in order to support the design of customised resilience training.

Methods

Study design

The study involved the administration of the Resilient Coping Survey (RCS), followed by exploratory factor analysis of RCS findings in order to identify key coping factors conducive to resilience.

Setting

Survey data collection and analysis were conducted by Vancouver Psych Safety Consulting Inc., in partnership with British Columbia Emergency Health Services (BCEHS, responsible for paramedic service to the province of British Columbia, Canada) and researchers at the University of British Columbia.

Participants

All paramedics and dispatchers employed by BCEHS were invited to complete an online survey. The survey was distributed via an online link provided by the employer and employees were permitted to complete the survey on work time. In order to maximise participation in this survey, endorsement by the relevant union was obtained. Advance notice of the survey was provided through the BCEHS intranet and email 1 week before its dissemination. Informed consent was obtained on the survey platform before initiation of the survey.

Participation was voluntary, and all data was stored in a de-identified form on a secure Canadian server. Only group level aggregate data was analysed.

Procedures

First, qualitative data was gathered through interviews with paramedics and dispatchers and discussions with an advisory group of highly experienced paramedics. These conversations helped to define coping strategies relevant to paramedic and dispatcher resilience.

Second, a literature review was conducted to identify validated measures of resilient coping relevant to paramedics and dispatchers.

Third, we developed a measure of resilient coping, the RCS, comprised of the validated measures of resilient coping plus

test items devised on the basis of our interviews with paramedics and dispatchers and discussions with the expert advisory group.

Fourth, the RCS was administered online to all paramedics and dispatchers within the BCEHS, made available for a 4-week period in the spring of 2018.

Instrumentation

The RCS included items from several scales of psychological resilience and new items developed for this study. Included were:

- the Resilience At Work scale, a 20-item measure of coping skills conducive to resilience in the workplace (24). Adequate reliability (Cronbach's alpha of .84 for the scale total) and concurrent validity have been demonstrated (25)
- the Self-Compassion Scale – Short Form, a 12-item measure of 'the ability to hold one's feelings of suffering with a sense of warmth, connection and concern' (26). The developers of this scale observe 'research has shown that self-compassion is associated with psychological wellbeing and suggests that self-compassion might be an important protective factor, fostering emotional resilience'. Adequate reliability (Cronbach's alpha=.86) and validity have been demonstrated for the total scale (26, 27)
- the Brief Resilience Scale (BRS) (28), designed to measure an individual's level of psychological resilience. Respondents are asked to rate the degree to which they consider themselves able to bounce back from difficult or stressful situations. The sum of the six BRS items yields a measure of (self-perceived) resilience
- Nine items reflecting coping skills specifically relevant to the emergency context developed from interviews and discussions. These items were incorporated into the RCS. The items showed adequate internal consistency (Cronbach's alpha=0.77). A sample item is: 'I discuss stressful work situations with trusted colleagues'
- The RCS included 52 items, which were rated on a 7-point scale from 'strongly disagree' to 'strongly agree'. Respondents were asked to provide demographic information: location of work, gender and duration of employment.

Data analysis

Statistical analysis was conducted using the IBM SPSS Statistics Program, Version 25. An exploratory factor analysis (EFA) was conducted to identify the factors underlying the dataset of survey responses. The EFA was conducted according to the framework of Williams et al (29). A linear regression analysis was conducted to examine whether the EFA factors predicted BRS resilience.

The effects of gender and years of service on BRS resilience

were examined with a two-way between subjects ANOVA. Independent sample t-tests were conducted to test the effect on BRS resilience of position (paramedic vs. dispatcher) and paramedic location (rural vs. urban).

Ethics

The Behavioural Research Ethics Board of the University of British Columbia approved this study.

Results

Of the 4073 paramedic service personnel to whom this survey was made available, 703 responded; a response rate of 17.3%.

Gender of the sample was well balanced: 396 (56%) of the sample were male and 303 (43%) female; 86% were paramedics and 14% were dispatchers. Paramedic location was defined by two categories: rural versus urban, a designation assigned by the employer based on a combination of call volume, healthcare supports, distances, geography and types of calls: the respondent breakdown was 43% rural and 57% urban. With regard to years of service, the breakdown was: 5% first year; 11% 1–3 years; 25% 3–10 years; 27% 10–20 years; and 32% over 20 years.

Suitability of the data for exploratory factor analysis was determined by:

- adequacy of the sample size – the sample size of 703 is more than adequate by common standards for EFA >300 (30)
- ratio of sample size to variables – 46 survey items were entered as variables in the EFA – the sample size/number of variables ratio (15.3) is above 10, the generally accepted threshold (31)
- Bartlett's test of sphericity: Bartlett's test of sphericity, assessing the overall significance of all correlations within the correlation matrix was significant (chi-square (1035) = 14398.5, $p=0.000$), indicating that it was appropriate to use the factor analytic model on this set of data
- Kaiser-Meyer-Olkin measure of sampling adequacy = 0.918, indicating a high degree of suitability for FA.

The method of factor extraction was principal components analysis, recommended in cases where there is no prior model (32).

The rotational method selected was oblimin with kaiser rotation, reflecting the expectation that underlying dimensions of resilient coping would be correlated rather than fully orthogonal (33).

The extracted/rotated factors are shown in Table 1. The factors extracted from the data with oblimin rotation are ordered according to the proportion of variance explained.

The criteria used to assist with factor retention were: Eigenvalue (>1). 29 factors emerge from the EFA with eigenvalue >1 , too many to allow cogent interpretation or utility for our purposes.

Scree plot of the extracted factors, also called 'components' (Figure 1). This was used to winnow the extracted set of factors to a meaningful number. Finding the inflection point on the curve where little further explanatory power is gained leads to identification of five factors with most power to explain the variance.

Cumulative percentage of variance explained. These five factors together explain 46.4% of the total variance. Note that the remaining 53.5% of the variance is accounted for by 41 other factors, each explaining a very small amount of the variance (Figure 1).

Interpretation and labelling of factors were based on the conceptual paradigm of resilience enhancement. These five factors were labelled 'resilient coping factors' (RCFs). The items composing a factor, especially those with the highest loadings, were used to name and define the meaning of that factor.

The RCFs are presented in Table 2. Each factor is listed along with two items that load on the factor. The items under each factor give a sense of its meaning.

The first RCF, 'balance', accounted for 25.5% of total variance. It included items that reflect taking appropriate breaks from work, finding ways to relax, maintaining balance between work and personal life and engaging with hobbies and family life.

The second RCF, 'self-acceptance', accounted for 7.3% of the variance. It included items reflecting the tendency to [not] be

Table 1. Total variance explained by extracted factors

Component	Extraction sums of squared loadings			Rotation sums of squared loadings
	Total	% of variance explained		Total
1	11.743	25.527	25.527	6.337
2	3.364	7.313	32.840	4.082
3	2.545	5.533	38.374	5.900
4	2.088	4.540	42.913	4.355
5	1.621	3.525	46.438	5.040
6	1.544	3.356	49.794	3.747
7	1.377	2.993	52.787	4.024
8	1.265	2.749	55.537	3.032
9	1.147	2.493	58.029	4.505
10	1.080	2.347	60.376	3.259

Figure 1. Scree plot of extracted factors

harshly self-critical of one's performance or personal qualities, but maintain a compassionate attitude towards oneself.

The third RCF, 'trusted social support', accounted for 5.5% of the variance. It incorporated items indicative of having colleagues, friends or family with whom one can discuss stressful job experiences. A critical feature emergent from RCS data was being able to trust the loyalty and discretion of one's social connections. It may also reflect the contribution to resilient coping of sharing with one's work-team the challenge of a highly stressful situation (34).

The fourth RCF, 'meaningful work', accounted for 4.5% of the variance. It incorporated items reflecting a sense of finding a sense of purpose and meaning in the work, matching one's personal strengths and values. This may be the factor most impacted by moral injury (35), in which the capacity to do one's job in a manner consistent with personal values is unduly limited.

The fifth RCF, 'physical self-care', accounting for 3.5% of the variance, incorporated items that reflect protecting one's physical health.

Validating the RCFs by regression analysis

Regression analysis revealed that the five RCFs entered together accounted for significant variance in the BRS resilience score (balance, Adj $R^2 = .317$; self-acceptance, Adj $R^2 = .324$; meaningful work, Adj $R^2 = .194$; trusted social support, Adj $R^2 = .065$; physical self-care, Adj $R^2 = .048$). Furthermore, each RCF taken alone significantly predicted the resilience score, based on a t-test analysis: balance ($t=18.075$, $p<.01$); self-acceptance ($t= 18.350$, $p<.01$); meaningful work ($t= 13.038$, $p<.01$); trusted social support ($t= 7.042$, $p<.01$); and physical self-care ($t= 6.044$, $p<.01$). This result suggested that all five RCFs contributed to the prediction of resilience.

Gender and years of service

Figure 2 shows the means for resilience by gender and years of service. The effects of gender and years of service on resilience were analysed with a two-way between-subjects ANOVA. The main effect of gender on resilience was not significant: $F(2,691) = 1.592$, $p>.05$. The main effect of years of service on resilience was significant: $F(4,691) = 2.492$, $p<.05$. However, these main effects were qualified by a significant interaction between gender and years of service, $F(5,691) = 2.532$, $p<.05$. Although there was no overall difference between male and female

Table 2. The resilient coping factors (with sample items)

Balance	Self-acceptance (reverse-scored)	Trusted social support	Meaningful work	Physical self-care
<ul style="list-style-type: none"> I make time for my personal and family life, even when the job is very demanding. I have developed some reliable ways to relax when I'm under pressure at work. 	<ul style="list-style-type: none"> I'm disapproving and judgemental about my own flaws and inadequacies. When I fail at something that's important to me, I tend to feel alone in my failure. 	<ul style="list-style-type: none"> I have friends at work I can rely on to support me when I need it. I discuss stressful work situations with trusted colleagues. 	<ul style="list-style-type: none"> The work that I do fits well with my personal values and beliefs. The work that I do helps to fulfil my sense of purpose in life. 	<ul style="list-style-type: none"> I am careful to maintain a good level of physical fitness. I am careful about eating well and healthily.

Figure 2. Mean resilience scores by gender and years of service

workers, there was a steady decline in resilience across years of service for male (but not female) workers.

Position and paramedic location

With regard to position, an independent-samples t-test showed no significant difference in BRS resilience between paramedics ($M=3.51$, $SD=.71$) and dispatchers ($M=3.55$, $SD=.79$); $t(701)=.482$, $p>.05$. With regard to paramedic location, an independent-samples t-test showed no significant difference in BRS resilience between rural ($M=3.57$, $SD=.68$) and urban ($M=3.46$, $SD=.73$) paramedics; $t(607)=1.89$, ($p>.05$).

Discussion

This study identified five factors that are fundamental to the resilient coping of paramedics and dispatchers. These five factors provide a unique framework for designing resilience training, helping to ensure that training will be relevant to critical aspects of resilient coping in these workers. The five resilient coping factors were: balance; self-acceptance; trusted social support; meaningful work; and physical self-care. These factors were shown to predict self-rated resilience.

It is worth noting that the RCFs are consistent with the targets of well-validated psychological interventions. Physical self-care and balance could be addressed through behavioural activation (36-38). Trusted social support could be addressed through peer support programs (39). Self-acceptance could be addressed through cognitive restructuring (40-42). Meaningful work ties into 'positive psychology', which emphasises the need to build on individuals' values to achieve psychological health (43-44).

Although study findings showed no direct effect of gender on resilience, there was a significant effect (for males only) of years of service. Duration of service was associated in men with a steady fall in self-rated resilience. This is consistent with an earlier study of traumatic exposure in paramedics, which found increased psychological impact with experience (45). It may be that the resilience decline reflects a cumulative impact of stress exposure, such that each exposure leaves one more vulnerable to the next exposure (46). The male-specific nature of this decline might be viewed in the context of the (well-established) specific vulnerability of men to such psychological risks as alcohol overuse and suicidality (47).

It may be useful to apply this methodology to other occupations that involve unique patterns of effective coping. The identified coping factors in those occupations would support customisation of resilience training.

Results of this study point to the need for further research in several areas. First, a five-factor resilience training intervention for paramedics and dispatchers should be tested to determine its effect on resilience. Second, there should be investigation of methods to adapt training to workers in their early, mid or late career, and perhaps consider gender-unique factors that may

be associated with the curious inverse relationship between years of service and resilience in male workers. Third, it would be beneficial to include those who have retired from paramedic service work and might benefit from resilient coping skills to manage the transition into retirement. Again, there may be specific gender factors requiring further customisation. Fourth, it would be important to determine whether the resilient coping factors should be addressed differently for workers dealing with direct versus secondary traumatic stress exposure.

The research has certain limitations. These include:

- a response rate of 17.3%. Although the resultant sample gave us sufficient statistical power, it would have been preferable to obtain a higher rate of response, and
- validation of the RCFs via self-rated resilience rather than demonstrated resilient response to high stress.

Conclusion

This study examined the coping factors conducive to psychological resilience in paramedics and dispatchers so as to inform customisation of resilience training. The five resilient coping factors identified by this study could contribute to customised resilience training for paramedics and dispatchers.

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Conflict of interest

The authors declare they have no competing interests. Each author of this paper has completed the ICMJE conflict of interest statement.

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