

Research

Building personal resilience in primary care paramedic students, and subsequent skill decay

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Abstract

Introduction

Paramedics are routinely exposed to traumatic incidents that include physical injuries; these events may manifest into psychosocial injury. Proactive and preventive measures have the potential to mitigate the negative impact of exposure to traumatic events. Enhancing an individual's capacity to effectively manage stressful/adverse life events through an online resilience resource (ORR) offers a promising option for paramedics. The aim of this study is to investigate the initial impact of an ORR on resilience and to explore the potential skill decay following this self-guided online resource among pre-employment paramedic trainees.

Methods

Through a repeated measures design, 227 primary care paramedics from British Columbia, Canada completed a baseline resilience assessment and ORR. A subset of participants completed follow-up resilience assessments at 3 to 6 month or 9-month intervals.

Results

Between the baseline and 3-month follow-up tests, results indicate that self-report resilience scores showed a slight improvement. However, as time increased to 6 or 9 months, a statistically significant decrease in resilience scores in comparison to the baseline was observed.

Conclusion

This study presents evidence to suggest that an educational tool such as an online self-paced training program for building resilience may be an effective strategy for improving short-term personal resilience among primary care paramedic students. Given the gradual skill decay associated with an ORR, we can highlight the temporal limits of resilience training. Developing additional resilience training programs to be delivered throughout students' pre-employment education may help reduce skill decay.

Keywords:

resilience; web-based training; paramedic; EMS; PCP

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Introduction

Due to the nature of their work, public safety personnel (PSP) such as police officers, firefighters, correctional workers, emergency medical technicians (EMTs) and paramedics are highly likely to be exposed to potentially traumatic and stress-inducing events (1). As a result, they are at increased risk of developing post-traumatic stress injuries (PTSI), which may include mental health issues such as symptoms consistent with anxiety, depression, as well as the adoption of maladaptive coping styles (2-6). In general, PTSI could have deleterious effects on PSP, potentially leading to a reduced quality in occupational performance, increased absenteeism, attrition, sleep difficulties, interpersonal issues, burnout, substance use, and suicidal thoughts and behaviour (2-4,6,7).

Among EMTs/paramedics in particular, mental health issues and suicidal thoughts and behaviour are prominent (2,5-8) which may be – at least partially – attributable to the fact that they are often exposed to varying forms of human suffering to which they feel some level of responsibility (2,6,9). Carleton and colleagues (2) reported that 49.1% of paramedics screened positive for symptoms consistent with one or more mental disorders, with symptoms of depression and PTSI being the most commonly occurring mental health problems among this group of PSP. Carleton and colleagues (7) have also shown that paramedics reported statistically significantly higher prevalence of past-year and lifetime suicidality compared to other PSP. Given the nature of their work, and the prevalence of mental health and suicide-related issues, EMTs/paramedics would benefit from formal training that aims to build resilience and provide the necessary tools to maintain healthy psychological functioning.

Research has shown that resilience – an individual's capacity to effectively manage stressful/adverse life events (10-15) – is associated with wellbeing and that this association may be enhanced through appropriate interventions (16). However, the effectiveness of preventive/proactive programs that aim to educate EMTs/paramedics such as those that focus on building resilience to mitigate the effects of working in potentially traumatic and stressful environments are limited. Accordingly, researchers at the Justice Institute of British Columbia (JIBC) designed one of the first self-paced online resilience-building courses in Canada (hereafter referred to as the online resilience resource; ORR) to help PSP build resilience to increase mental wellness and psychological readiness for working in trauma-exposed fields (17).

The aim of this study is to investigate the initial impact of the ORR on resilience and to explore the potential skill decay following this self-guided online resource among pre-employment paramedic trainees. Training and educational requirements are complex policies in PSP contexts and are often fixed to resource and staffing levels. Identifying the

point at which certain skills, such as those adopted through resilience training, may begin to decay, provides stakeholders with knowledge of when it may be appropriate to refresh the skills of PSP.

Methods

Study design

Through a repeated-measures research design, this study investigated the effectiveness of the ORR (17) as an educational tool for building personal resilience among a sample of paramedic students enrolled in a primary care paramedic (PCP) program.

Setting

PCP students were recruited from JIBC, a post-secondary institution that provides training to professionals in the justice, public safety and social service fields. The study was based entirely online. Specifically, participants were contacted via email to ask for participation, and were prompted to complete a baseline assessment survey if they provided consent to participate. Once baseline data were established, participants were directed to complete the self-paced online resilience course. Following completion of these components, participants were later contacted via email to complete a follow-up assessment survey at one of the randomly assigned time-points (3, 6 or 9 months following the ORR).

Participants

A total of 227 students enrolled in the Province of British Columbia's PCP certificate program delivered by the JIBC participated in this study. Of these 227 respondents, 34 paramedic students completed all three phases of the study: baseline assessment; self-paced online resilience course; and follow-up assessment. Accordingly, 193 respondents completed only the baseline assessment and did not respond to the follow-up assessment. All participation in this study was voluntary and thus had no impact on participants' performance in the PCP program.

Instrumentation

The baseline assessment incorporated measures on age, gender and education. The Resilience Scale for Adults (RSA) (18) is a 33-item self-report scale that measures inter- and intra-personal protective factors believed to play an important role in one's adaptation to adversity. This instrument consists of 17 positively worded items and 16 negatively worded items, measuring five dimensions of resilience: personal strength (10 items) – perception of oneself and one's future; structured style (four items) – perception of one's level of structure and organisation in life; social competence (six items) – perception of one's sociability; family cohesion (six items) – perception of one's level of connection to their family; social resources (seven items) – perception of one's access to support from friends/family members. All items on the RSA are scored

according to a 5-point Likert scale (ranging from 1 to 5). The full RSA scale, along with its subscales, are created by reverse-coding negatively worded items and summing across pertinent items. Possible range for the full RSA scale is from 33 to 165, with higher scores indicative of greater perceived resilience. With respect to psychometric properties, Windle et al (19) ranked the 33-item RSA (18) highly on reliability and validity.

Procedures

The researcher team randomly assigned classes to three separate study cohorts based on when they would receive the follow-up assessment: 3 months after completing the ORR, 6 months after completing the ORR, or 9 months after completing the ORR. All communication for baseline and follow-up survey data collection was conducted through Qualtrics (a secure platform for distributing online surveys and storing data). The baseline assessment survey included questions on sociodemographic characteristics (eg. age, gender, education), as well as the instrument used to measure resilience (the RSA). At the end of the baseline assessment survey, participants were provided a link to the online resilience course and were directed to complete the course at their own pace (the course is estimated to take approximately 6–8 hours to complete). A certificate of completion was awarded to participants who completed all learning modules in the ORR.

Depending on their randomly assigned cohort, participants who completed the baseline assessment survey and the ORR were contacted via Qualtrics at either 3, 6 or 9-month intervals to participate in the follow-up assessment survey. The follow-up survey included only the measure of resilience (the RSA).

Outcome

This study investigated whether, after having completed a self-paced online resilience course (17), paramedic students' scores on a measure of personal resilience would increase or decrease between the baseline and the 3, 6 or 9-month follow-up assessments.

Data analysis

The Statistical Package for the Social Sciences (Version 25) was used to clean the data and conduct all statistical analyses. A missing values analysis was conducted on the RSA, showing that data were missing completely at random at the baseline (Little's MCAR, $X^2(2680) = 2644.27$, $p=0.685$) and follow up (Little's MCAR, $X^2(277) = 257.31$, $p=0.796$) assessments. Given our small analytic sample ($n=34$) and Little's MCAR test was not statistically significant, we opted to use data imputation methods to handle missing data on RSA items as opposed to deleting cases with missing values. Specifically, expectation-maximisation data imputation was used to handle missing cases. The RSA scale and subscales were created after data imputation.

With respect to descriptive statistics, analyses were conducted

on sociodemographic characteristics, stratified according to whether or not respondents completed all three phases of the study (responders; $n=34$) and those who completed only the first phase of the study (non-responders; $n=193$); chi-square test for independence and independent samples t-test were used to compare these two groups on sociodemographic characteristics (Table 1). Descriptive and reliability statistics are also provided for the RSA (Table 2). Paired samples t-tests were conducted to examine change, if any, in RSA score from baseline to follow-up assessment for the total subset of respondents who completed all three phases of the study ($n=34$), as well as according to individual study cohort (Table 3).

Ethics

This study received ethical approval (JIBCER-2016-11-BREP) from the Research Ethics Board at JIBC.

Results

Sociodemographic characteristics were stratified according to the subset of respondents who completed all three phases of the study. As shown in Table 1, responders were, on average, older than non-responders; nearly two-thirds of responders were female, whereas a greater proportion of non-responders were male; and responders had a higher level of education than non-responders.

Descriptive and reliability statistics for the RSA at baseline and follow-up assessments are reported in Table 2. Among those who completed the baseline assessment ($n=227$), baseline scores on the RSA ranged from 79 to 162 with a mean of 127.54 ($SD=15.95$; 95% CI: 125–130) and internal consistency reliability was excellent (Cronbach's $\alpha=0.900$). Among the subset who completed all three phases of the study ($n=34$), baseline scores on the RSA ranged from 94 to 156 with a mean of 126.38 ($SD=14.40$; 95% CI: 122–131) and internal consistency reliability was good (Cronbach's $\alpha=0.878$). An independent samples t-test revealed that responders ($n=34$; $M=126.38$, $SD=14.40$; 95% CI: 122–131) and non-responders ($n=193$; $M=127.75$, $SD=16.24$; 95% CI: 125–130) did not significantly differ on baseline RSA score, $t(225) = 0.460$, $p=0.646$. Furthermore, among the subset who completed all three phases of the study ($n=34$), follow-up scores on the RSA ranged from 89 to 156 with a mean of 121.73 ($SD=16.36$; 95% CI: 116–127) and internal consistency reliability was excellent (Cronbach's $\alpha=0.912$).

Table 3 reports findings for paired samples t-tests, comparing RSA scores at baseline to follow-up assessment for the total subset of respondents who completed all three phases of the study ($n=34$), along with the individual 3-month ($n=8$), 6-month ($n=20$), and 9-month ($n=6$) study cohorts. For the total subset of paramedic students who completed all three phases of the

Table 1. Sample characteristics

	Responders ^a (n=34)	Non-responders ^b (n=193)	Test-statistic ^c
	M (SD) or %	M (SD) or %	
Age	29.52 (9.60)	27.02 (7.28)	1.760 (p<.10)
Gender			6.400 (p<.05)
Male	32.4	52.3	
Female	64.7	47.2	
Education			9.160 (p<.05)
High school	5.9	20.2	
Some college/institute/university	29.4	40.4	
College certificate/diploma	38.2	20.7	
Bachelor's degree	20.6	14.5	
Other	5.9	4.1	

^aParticipants who provided data both before and after using the ORR; ^bparticipants who provided data only before using the ORR;

^cchi-square test for independence and independent samples t-test, comparing responders to non-responders on sociodemographic characteristics

Table 2. Means, standard deviations and reliability for total RSA and RSA subscales by baseline and follow-up data collection period

	Possible range	Actual range	n	Mean (SD)	Cronbach's α	No. of items
Time 1^{a,b}			227			
RSA	33-165	79-162		127.54 (15.95)	.900	33
Personal strength	10-50	24-50		39.58 (5.52)	.801	10
Structured style	4-20	5-20		14.16 (2.87)	.647	4
Social competence	6-30	9-30		21.91 (4.37)	.788	6
Family cohesion	6-30	8-30		21.95 (5.18)	.872	6
Social resources	7-35	15-35		29.92 (4.33)	.812	7
Time 2^{a,b}			34			
RSA		89-156		121.73 (16.36)	.912	
Personal strength		25-49		37.00 (6.33)	.870	
Structured style		9-19		13.88 (2.64)	.527	
Social competence		9-28		20.85 (4.38)	.802	
Family cohesion		9-30		21.64 (5.48)	.917	
Social resources		21-35		28.35 (3.69)	.787	

RSA = Resilience Scale for Adults; ^aTime 1 is RSA score before using the ORR, Time 2 is RSA score after using the ORR; ^bTime 1 consists of responders and non-responders, Time 2 consists only of responders

study (n=34), results suggest that mean RSA score decreased by 4.64 (95% CI: -8.06 to -1.23) from baseline (M=126.38, SD=14.40; 95% CI: 122–131) to follow-up assessment (M=121.73, SD=16.36; 95% CI: 116–127). A paired samples t-test revealed that the change in mean RSA score from baseline to follow-up assessment for this subset of respondents was statistically significant, $t(33) = -2.769$, $p=.009$. The eta squared statistic (0.188) indicated a large effect size. Although these results suggest that, for the total subset of respondents who completed all three phases of the study (n=34), there is a downward trend in mean RSA score from baseline to follow-up assessment, further stratifying this group according to individual study cohort reveals a somewhat different pattern.

For the subset of paramedic students assigned to receive the follow-up assessment 3 months after completing the ORR (n=8), findings suggest that mean RSA score increased by 3.75 (95% CI: -2.43 to 9.93) from baseline (M=128.25, SD=17.67; 95% CI: 116–140) to follow-up assessment (M=132.00, SD=19.92; 95% CI: 118–146). However, a paired samples t-test revealed that the change in mean RSA score from baseline to follow-up assessment for this subset of respondents was not statistically significant, $t(7) = 1.433$, $p=.195$. For the subset of paramedic students assigned to receive the follow-up assessment 6 months after completing the ORR (n=20), findings suggest that mean RSA score decreased by 6.65 (95% CI: -11.22 to -2.07) from baseline (M=127.95, SD=13.63; 95% CI: 122–134) to follow-up assessment (M=121.30, SD=13.23; 95% CI: 116–127). A paired samples t-test revealed that the change in mean RSA score from baseline to follow-up assessment for this subset of respondents was statistically significant, $t(19) = -3.040$, $p=.007$. The eta squared statistic (0.327) indicated a large effect size. Finally, for the subset of paramedic students assigned to receive the follow-up assessment 9 months after completing the ORR (n=6), findings suggest that mean RSA score decreased by 9.16 (95% CI:

-15.65 to -2.68) from baseline (M=118.66, SD=11.75; 95% CI: 109–128) to follow-up assessment (M=109.50, SD=13.99; 95% CI: 98–121). A paired samples t-test revealed that the change in mean RSA score from baseline to follow-up assessment for this subset of respondents was statistically significant, $t(5) = -3.635$, $p=.015$. The eta squared statistic (0.725) indicated a large effect size.

Figure 1a and 1b further illustrate the patterns reported in Table 3. Figure 1a shows that the 3-month and 6-month study cohort reported a similar mean RSA score at baseline, whereas the 9-month study cohort reported a slightly lower mean RSA score at baseline compared to these two cohorts. When comparing Figure 1a and 1b, the mean RSA score increases between baseline to follow-up assessment for the 3-month study cohort, whereas mean RSA score decreases between baseline and follow-up assessment for the 6-month and 9-month cohorts. Figure 1b further shows that, in general, the 3-month study cohort reported the highest mean RSA score at follow-up, followed by the 6-month cohort and 9-month cohort.

Discussion

The results from this study suggest that the ORR may be an effective strategy for building personal resilience among paramedic students in the short-term. However, much like previous research that highlights a significant skill decay after 90 days for training in healthcare contexts (20,21), the diminished impact of the ORR over time was also illustrated in this study. In addition, it is noteworthy to highlight that the decrease in mean scores on the RSA was larger for the 9-month compared to the 6-month study cohort. Although these findings are only preliminary, stakeholders should acknowledge that it may be important to establish guidelines for refreshing resilience-based skills among PSP. Perhaps it would be most beneficial to ensure PSP are consistently exposed to resilience-

Table 3. Paired samples t-tests comparing RSA scores before and after completing the ORR, by full analytic subgroup and individual study cohort

		Paired samples test				95% CI	
	Cohort	Mean (SD)	Mean difference	t-value	p-value	Lower bound	Upper bound
Time 1	Full	126.38 (14.40)	-4.64	-2.769	.009	-8.06	-1.23
Time 2	Subgroup ^a	121.73 (16.36)					
Time 1	3-month ^b	128.25 (17.67)	3.75	1.433	.195	-2.43	9.93
Time 2		132.00 (19.92)					
Time 1	6-month ^c	127.95 (13.63)	-6.65	-3.040	.007	-11.22	-2.07
Time 2		121.30 (13.23)					
Time 1	9-month ^d	118.66 (11.75)	-9.16	-3.635	.015	-15.65	-2.68
Time 2		109.50 (13.99)					

RSA = Resilience Scale for Adults; Time 1 is RSA score before using the ORR; Time 2 is RSA score after using the ORR; ^aN=34; ^bn=8; ^cn=20; ^dn=6

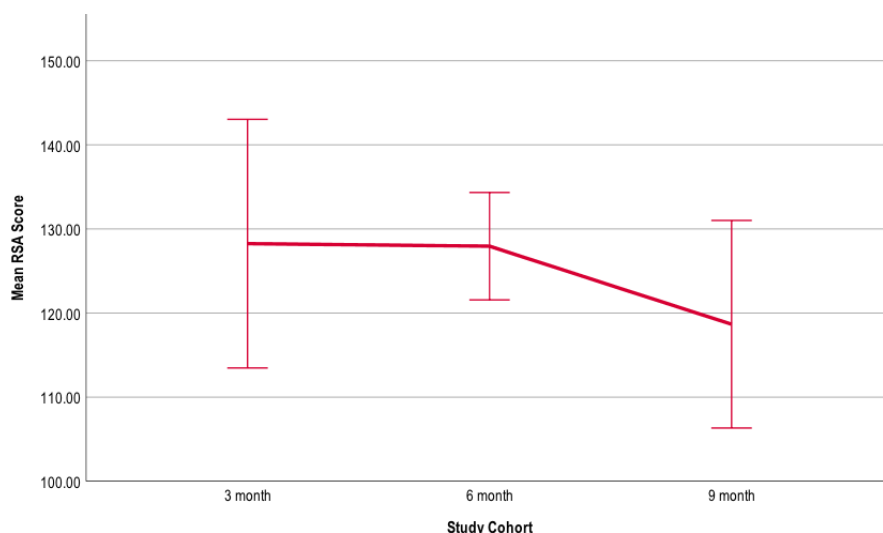


Figure 1a. RSA score before completing ORR (with 95% CI)

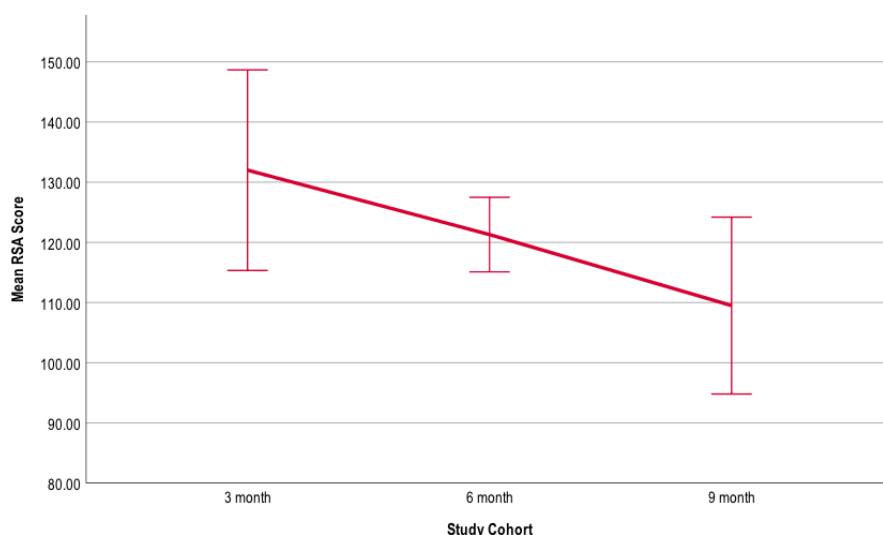


Figure 1b. RSA score after completing ORR (with 95% CI)

building strategies (eg. over 3 or 6-month intervals) following initial involvement in a resilience training program. Such practices would allow for these professionals to draw on resilience-building techniques if they desire.

In addition, more general recommendations for research and current practice may be extracted from the current study. First, EMT/paramedic programs should consider implementing mandatory resilience training services/programs to better help professionals manage exposure to potentially traumatic and stressful work-related events. In this case, a 6 to 8-hour self-paced online resilience course may be enough for improving personal resilience in the short-term. Further research will need to identify an appropriate time interval for refreshing resilience-based skills following initial involvement in a resilience training service/program.

Researchers should also continue to investigate the effectiveness of online educational tools, such as the ORR (17),

among varying PSP working in the field as well as students in educational/training programs for varying types of public health and safety professions. Continued focus on online educational tools designed for building personal resilience, enhancing mental wellness and psychological readiness among those working in trauma-exposed fields is imperative, especially given that this method of delivery increases accessibility to PSP who may experience challenges in accessing such resources (eg. those located in remote or rural communities and/or completing their education online). Finally, given that several studies have reported that a considerable proportion of EMTs/paramedics experience mental health issues and struggle with suicidal thoughts and behaviour (2,5-7), it is recommended that educational tools for building personal resilience among this group of PSP provide psychoeducation, especially with respect to trauma or stressor-related disorders (eg. PTSD), mood disorders (eg. anxiety and depression) and suicidal thoughts and behaviour.

Limitations

There are several limitations that must be considered when interpreting the findings from this study. First, attrition is a common issue with longitudinal study designs. Relatedly, it is plausible that findings are somewhat biased as participants who responded to the follow-up assessments may differ in some respects from those who did not. In this case, it is clear that responders and non-responders significantly differed on some sociodemographic characteristics; however, analyses also showed that responders and non-responders did not significantly differ on baseline assessment of resilience. Second, the analytic sample size ($n=34$) was quite small, especially when further disaggregated by individual study cohort; for instance, the 3-month and 9-month study cohorts comprised of eight and six participants, respectively. Such a small analytic sample size limits the power of inferential tests, as well as limits generalisability and validity of the findings. Collecting data on PCP participants at 3, 6 or 9 months after ORR completion was particularly challenging as the participants had graduated from the program at that point in time and were no longer students. There are a range of methods to improve retention for longitudinal studies, particularly for web-delivered training for student paramedics who are likely to be bombarded with new information in their studies. Financial compensation may have been effective at increasing response rates as perhaps the addition of a paper-based version of the questionnaire.

Third, there are some limitations related to the instrument used to capture participants' level of personal resilience (ie. the RSA). Although it is understood that a higher score on the RSA is indicative of a greater level of resilience, the scale does not have 'cut-off' points which could aid in interpretation of the score (eg. 'cut-off' points for low, medium or high resilience). Fourth, the current study did not control for potential confounding effects that may also explain why scores changed between baseline and follow-up assessment. Specifically, it is unclear whether improvement or deterioration in personal resilience is due to a true change in skill over time or if this change is related to exposure to other factors between baseline and follow-up assessment.

Conclusion

This study presents evidence to suggest that an educational tool, such as a self-paced ORR, may be an effective strategy for improving short-term personal resilience among PCP students. This study also presents evidence to suggest that any improvement in personal resilience following initial involvement in a resilience training service/program may decay over time. Although the present findings support the use of proactive training programs to build resilience among paramedic students, as well as the need to consider refresher practices to prevent skill decay, further research is required to identify

whether the skills acquired through resilience training are effective when put into practice (eg. identifying whether PSP with resilience training are less likely to develop PTSD related to exposure to potentially traumatic and stressful work-related events).

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Competing interests

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

References

1. Carleton RN, Afifi TO, Taillieu T, et al. Exposures to potentially traumatic events among public safety personnel in Canada. *Can J Behav Sci* 2019;51:37.
2. Carleton RN, Afifi TO, Turner S, et al. Mental disorder symptoms among public safety personnel in Canada. *Can J Psychiatry* 2018;63:54-64.
3. O'Hara AF, Violanti JM, Levenson Jr RL, Clark Sr RG. National police suicide estimates: web surveillance study III. *Int J Emerg Ment Health* 2013;15:31-8.
4. Sheen K, Slade P, Spiby H. An integrative review of the impact of indirect trauma exposure in health professionals and potential issues of salience for midwives. *J Adv Nurs* 2014;70:729-43.
5. Stanley IH, Hom MA, Joiner TE. A systematic review of suicidal thoughts and behaviors among police officers, firefighters, EMTs, and paramedics. *Clin Psychol Rev* 2016;44:25-44.
6. Berger W, Coutinho ESF, Figueira I, et al. Rescuers at risk: a systematic review and meta-regression analysis of the worldwide current prevalence and correlates of PTSD in rescue workers. *Soc Psychiatry Psychiatr Epidemiol* 2012;47:1001-11.
7. Carleton RN, Afifi TO, Turner S, et al. Suicidal ideation, plans, and attempts among public safety personnel in Canada. *Can Psychol* 2018;59:220-31.
8. Streb M, Haller P, Michael T. PTSD in paramedics: resilience and sense of coherence. *Behav Cogn Psychother* 2014;42:452-63.
9. Jonsson A, Segesten K. Guilt, shame and need for a container: a study of post-traumatic stress among ambulance personnel. *Accid Emerg Nurs* 2004;12:15-223.

References (continued)

10. Kelley TM. Natural resilience and innate mental health. *Am Psychol* 2005;60:265.
11. Luthar SS, Cicchetti D, Becker B. The construct of resilience: a critical evaluation and guidelines for future work. *Child Dev* 2000;71:543-62.
12. Masten AS, Best KM, Garmezy N. Resilience and development: contributions from the study of children who overcome adversity. *Dev Psychopathol* 1990;2:425-44.
13. Sedgeman A. Effects of a mind-consciousness-thought (MCT) intervention on stress and well-being in freshman nursing students. West Virginia University; 2008.
14. Tusaie K, Dyer J. Resilience: a historical review of the construct. *Holist Nurs Pract* 2004;18:3-10.
15. Bilsker D, Gilbert M, Alden L, Sochting I, Khalis A. Basic dimensions of resilient coping in paramedics and dispatchers. *Australasian Journal of Paramedicine* 2019;16.
16. Sood A, Prasad K, Schroeder D, Varkey P. Stress management and resilience training among department of medicine faculty: a pilot randomized clinical trial. *J Gen Intern Med* 2011;26:858-61.
17. Anderson GS, Vaughan AD, Mills S. Building personal resilience in paramedic students. *Journal of Community Safety and Well-Being* 2017;2:51-4.
18. Friborg O, Barlaug D, Martinussen M, Rosenvinge JH, Hjemdal O. Resilience in relation to personality and intelligence. *Int J Methods Psychiatr Res* 2005;14:29-42.
19. Windle G, Bennett KM, Noyes J. A methodological review of resilience measurement scales. *Health Qual Life Outcomes* 2011;9:6-20.
20. Anderson GS, Gaetz M, Statz C. CPR skill retention of first aid attendants within the workplace. *Prehosp Disaster Med* 2012;27:312-8.
21. Anderson GS, Gaetz M, Masse J. First aid skill retention of first responders within the workplace. *Scand J Trauma Resusc Emerg Med* 2011;19:11.