Research

Exploring resilience in undergraduate and early career paramedics

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Abstract

Introduction

Australian paramedics are frequently exposed to traumatic incidents as part of their role, and subsequently are at increased risk of mental health issues and negative impacts on psychological wellbeing. Evidence suggests student and early career paramedics are also at risk of trauma exposure during clinical placements. Increased levels of resilience are known to be protective against the risks of trauma exposure, and both age and experience may impact resilience. Self-efficacy is also known to influence resilience, however there is limited knowledge regarding the personal factors related to increased resilience in undergraduate and early career paramedic science students. This study aims to examine if resilience differs between age or experience groups, and if controlling for self-efficacy influences these differences.

Methods

An anonymous online survey was administered to current student paramedics and graduates from a regional Australian university. In addition to demographic characteristics, respondents completed the Brief Resilience Scale and the General Self-Efficacy Scale. Analysis of variance examined differences in resilience score based on age and clinical placement experience groups. Follow up analysis of covariance was conducted to control for self-efficacy scores.

Results

Analysis showed resilience scores differed between age groups ($F(4,54)=3.26$ $p=0.02$). Those 26 to 30 years of age reported significantly higher resilience compared to those 18 to 25 years of age. When controlling for self-efficacy, significant differences were found between clinical placement experience groups ($F(4,51)=2.72$, $p=0.04$). Those completing 200 to 360 hours had significantly lower scores compared to those with less than 200 hours, 360 to 600 hours, or more than 600 hours.

Conclusion

We show that self-efficacy moderates resilience in undergraduate paramedic students. Examining the impact of self-efficacy training on resilience may be an important next step in curriculum development.

Keywords:

paramedic; student; resilience; self-efficacy; mental health

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Introduction

Australian paramedics respond to critical incidents involving human pain and suffering as part of their role. They are also subject to other job-related stressors such as workplace violence, abuse, shift work and work conflict (1,2). Frequent exposure to trauma leaves paramedics at risk of developing subsequent mental health issues such as post-traumatic stress disorder (PTSD) which can have negative impacts on their psychological wellbeing (3). Paramedics have higher rates of mental health issues such as psychological distress, PTSD and lower mental wellbeing than the Australian general population (3). The higher likelihood of poor psychological wellbeing in on-road paramedics may begin during undergraduate studies. Evidence suggests student paramedics are exposed to traumatic events during clinical placements (4) and almost half of students feel that personal mental health challenges while working in the profession are not sufficiently addressed during undergraduate studies (5).

Previous research suggests exposure and subsequent risk for mental health issues may be mitigated by resilience. Smith, Dalen (6) defines resilience as “the ability to bounce back or recover from stress”. Evidence suggests higher levels of resilience are significantly associated with increased wellbeing and general health in Australian paramedics (1). This finding is consistent in other health professions including medical (7) and nursing students (8). Resilience of Australian paramedics has been found to increase with experience. Older paramedics (1), and those with prior medical experience (9) tend to have better coping mechanisms and report feeling more prepared for the demands of paramedic work.

Another potential factor influencing resilience is self-efficacy. According to social cognitive theory, an individual's reaction to stress and adversity is dependent on their levels of self-efficacy (10). Bandura (11) theorised that efficacy determines the amount of effort that a person will expend, and how long they will sustain this effort for in stressful situations (11,12). The theory is supported in literature on emergency and rescue workers in Italy, where research demonstrates self-efficacy is strongly correlated with compassion satisfaction and the use of active coping (13). Furthermore, self-efficacy has been shown to effectively moderate the relationship between stress and quality of life (14). Self-efficacy has been shown to have a significant positive effect on resilience in nurses (15) and positively predicted increased wellbeing in emergency medical dispatchers in Australia (16).

Literature on self-efficacy in relation to stress and resilience is limited in the paramedic field. The influence of self-efficacy on resilience in Australian paramedics is unknown, however in accordance with social cognitive theory and literature on other emergency services and health workers, its examination in the context of paramedics appears warranted.

Given the potential increase in resilience with increased age and experience, and the potential role of self-efficacy in resilience, this study explores these factors within an undergraduate student and early career paramedic cohort in Australia. More specifically, this study aims to contribute to the existing knowledge about resilience and self-efficacy in student paramedics by examining if resilience differs between age or experience groups, and if controlling for self-efficacy influences these differences. The research questions to be examined are 1) Does the resilience of current and former paramedic students vary with age or years of experience? 2) Does the resilience of current and former paramedic students vary with age or years of experience while controlling for self-efficacy? This further knowledge is an important step to aid in future design of resilience training for undergraduate paramedic science students.

Methods

Study design

This cross-sectional study collected quantitative data through a self-administered anonymous online survey. The survey was hosted on Survey Monkey online survey platform and distributed to potential participants via university distribution lists, alumni emails and social media. Data collection occurred between 4 August 2020 and 4 September 2020.

Participants

Participants were undergraduate students currently enrolled in the Bachelor of Paramedic Science course at a regional Australian university, and course alumni who graduated in 2019. A total of 605 eligible participants were identified comprising 502 enrolled students and 103 alumni.

The undergraduate course is offered as a 3-year full-time or 6-year part-time equivalent degree, requiring 600 hours of clinical placement. Year 2 required 200 hours of clinical placement during term 2, while year 3 required 160 hours during term 1 and 240 hours during term 2.

Participation in this survey was voluntary and anonymous and participation or otherwise had no impact on academic standing or association with the university. Consent was obtained through agreement to electronic consent on the information page before commencing the survey questions. Approval for access to the potential participants was provided by the university head of course for paramedic science, and university alumni relations.

Instrumentation

Demographics

The survey first collected demographic information including participant age, gender, enrolment status, current year of study, level of clinical practicum experience and number of years of external experience, including either paid or volunteer employment in relevant occupations. In addition to demographic

questions, participants completed the Brief Resilience Scale (BRS) and General Self-Efficacy Scale (GSES).

The Brief Resilience Scale

The BRS measures a person's ability "to bounce back or recover from stress" (6). This 6-item unidimensional scale asks participants to indicate their level of agreement with a series of positively and negatively worded statements using a 5-point Likert scale where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. Items 2, 4 and 6 are reverse coded and the final score is reported as the mean score for the six items. Higher scores are interpreted as higher levels of resilience (6). Resilience is scored as low (1.00–2.99), normal (3.00–4.30), and high (4.31–5.00) (17). Internal consistency (Cronbach's alpha) of the BRS is reported as good to excellent ($\alpha=.80-.91$) (6).

Generalised Self-Efficacy Scale

The GSES assesses "the strength of an individual's belief in his or her own ability to respond to novel or difficult situations, and to deal with any associated obstacles or setback" (18). This 10-item scale consists of statements relating to the general belief in oneself to solve problems and reach goals. Each item is rated

using a 4-point Likert scale where 1 = not at all true, 2 = hardly true, 3 = moderately true, and 4 = exactly true. The summed score reflects the strength of the individuals generalised self-efficacy belief, total score ranges between 10 and 40 with higher scores indicating greater self-efficacy. Reliability of the GSES is reported as moderate to good ($\alpha=.76-.90$) (18).

Data analysis

Demographic characteristics are reported using descriptive statistics (mean $\pm$ SD; n, %). Normality of distribution for BRS and GSES was assessed using the absolute z-score of kurtosis and skewness where a z-score less than 3.29 at $p<0.05$ was interpreted as normal distribution (19). For the BRS, the z-score for kurtosis was 1.11, and for skewness the z-score was -1.77. For the GSES, the z-score for kurtosis was -0.31, and for skewness the z-score was -0.88. Normality was confirmed by visual inspection of normal Q-Q plots and taken together, data was found to be normally distributed.

A one-way ANOVA was conducted to determine if resilience scores differed between age groups, university clinical placement experience groups based on number of hours, and external experience groups based on years of service. Where

Table 1. Demographic characteristics of participants

	n	Percentage (%)
Gender		
Female	34	57.63
Male	25	42.37
Age (years)		
18-25	14	23.73
26-30	11	18.64
31-35	13	22.03
36-40	12	20.34
40+	9	15.25
University year level		
First year	10	16.95
Second year	11	18.64
Third year	15	25.42
Graduate (2019)	23	38.98
University clinical placement (hours)		
Nil	16	27.12
<200	6	10.17
200-360	9	15.25
350-600	5	8.47
600+	23	38.98
Other experience (years)		
None	18	30.51
<2	7	11.86
3-5	11	18.64
6+	23	38.98

a statistically significant difference was found, Tukey's post-hoc test was used to identify between-group differences.

As self-efficacy has been shown to impact resilience (15), between group differences in resilience was further examined using ANOVA to control for self-efficacy. Where a statistically significant difference was found, Bonferroni post-hoc tests was used to identify between group differences.

Statistical analysis was undertaken using Statistical Package for the Social Sciences (SPSS v26, IBM Corp. Armonk, NY). Statistical significance was accepted where $p < 0.05$.

Ethical approval

This study was approved by an Institutional (name removed to facilitate blind review) Human Research Ethics Committee (clearance number: 2020-067).

Results

Demographics

Sixty responses were received representing a response rate of 9.9%. From the 60 responses one respondent did not complete the BRS or GSES, and three respondents did not complete the GSES. Thus, final analyses related to BRS included $n=59$ and

final analyses related to GSES included $n=57$.

Demographic characteristics of respondents are shown in Table 1. More than half of respondents were female ($n=34$, 58%). Most participants were less than 40 years of age ($n=50$, 85%). Almost two-thirds of respondents were undergraduate students ($n=36$, 61%), and the majority had attended clinical placement ($n=43$, 72%). Most participants also had external experience in other emergency/health services ($n=41$, 69%) with most having more than 6 years of service ($n=23$, 39%).

Resilience

Table 2 shows resilience scores based on demographic characteristics. Resilience results showed that almost two-thirds ($n=37$, 63%) of participants had resilience scores in the normal range (3.00–4.30) with almost one-third ($n=17$, 29%) reporting high resilience scores (4.31–5.00). One-way ANOVA revealed a significant difference between age groups for resilience ($F(4, 54)=3.26$, $p=0.02$). Tukey's post-hoc test revealed resilience was higher in those 26 to 30 years of age (4.36 ± 0.43) compared to those 18 to 25 years of age (3.64 ± 0.68) ($p=0.03$). No other significant between group differences were observed for resilience scores. One-way ANOVA revealed no significant between-group differences in resilience based on hours of clinical placement ($F(4, 54)=1.88$, $p=0.13$) or years of other experience ($F(3, 55)=1.04$, $p=0.38$).

Table 2. Resilience, and resilience when controlling for self-efficacy based on age, and experience groups

	Resilience ($n=59$)			Resilience, controlling for self-efficacy ($n=57$)		
	n	Mean	SD	n	Mean	SD
Age (years)						
18-25	14	3.64	0.68	12	3.54	0.67
26-30	11	4.36	0.43	11	4.36	0.43
31-35	13	3.86	0.45	13	3.86	0.45
36-40	12	4.29	0.74	12	4.29	0.74
40+	9	3.89	0.61	9	3.89	0.61
Clinical placement experience (hours)						
0	16	4.08	0.65	15	4.06	0.67
<200	6	4.19	0.41	6	4.19	0.41
200-360	9	3.48	0.71	9	3.48	0.71
360-600	5	4.00	0.42	5	4.00	0.42
600+	23	4.08	0.63	22	4.08	0.65
Other experience (years)						
None	18	3.86	0.61	16	3.81	0.62
<2	7	4.33	0.88	7	4.33	0.88
3-5	11	4.09	0.75	11	4.09	0.75
6 --	23	3.95	0.52	23	3.95	0.52
Total sample	59	3.99	0.64	57	3.99	0.65

General self-efficacy

Table 2 shows resilience scores between the demographic groups, controlling for self-efficacy, all data is presented as mean $\pm$ SD. One-way ANOVA revealed a significant difference between clinical placement experience groups for resilience when controlling for general self-efficacy ($F(4,51)=2.72$, $p=0.04$). When controlling for general self-efficacy, Bonferroni's post-hoc test revealed that resilience was significantly lower in the 200 to 360 hours (3.48 ± 0.71) group compared to the less than 200 hours group (4.19 ± 0.41) ($p=0.02$), 360 to 600 hours group (4.00 ± 0.42) ($p=0.02$), and the more than 600 hours group (4.08 ± 0.45) ($p=0.00$). There was no statistically significant difference found in resilience scores between age groups when controlling for general self-efficacy ($F(4, 51)=1.82$, $p=0.14$), or between groups based on years of service ($F(3, 52)=0.13$, $p=0.94$).

Discussion

This study sought to examine whether resilience differs between age or experience groups, and if self-efficacy influences these differences. Findings show most participants had a normal level of resilience. Resilience differed significantly between age groups but not based on experiences. When controlling for self-efficacy, resilience differed significantly between clinical placement experience groups, but not between age or external experience.

The mean resilience for the sample was 3.99 ± 0.64 . This score is similar to that observed in a larger representative sample of 259 US college students (mean BRS score 3.56 ± 0.67) (17), suggesting resilience levels of participants in the present study are comparable to those of general university cohorts. Most respondents in the present study had resilience scores in the normal (63%), or high (29%) range. Beyond Blue (3) found that more than half of ambulance employees had high levels of resilience and more than one-third had normal levels of resilience. In comparison, less than 9% of employees reported low levels of resilience. Despite these positive findings, just 6% of ambulance employees reported a high level of mental wellbeing, 29% reported high or very high psychological distress, and more than 8% reported probably PTSD. Moreover, 39% of ambulance employees reported being diagnosed with a mental health condition, and 22% reported currently experiencing a mental health condition, however, whether these conditions were related to work stress or trauma are unclear. Of greater significance is the finding that former employees reported lower levels of resilience, poorer wellbeing, and lower social support, suggesting identifying those with low resilience may be important in reducing workforce attrition.

Findings of the present study show that resilience scores differ between age groups. Participants 26 to 30 years of age had significantly higher resilience compared to those 18 to 25 years of age. While not statistically significant, other differences were observed between older age groups however no consistent trend was observed. Furthermore, self-efficacy did not influence

resilience scores across age groups. Previous research involving Australian paramedics reported a moderate but significant association between age and resilience, whereby older paramedics reported higher resilience scores (1). These findings are unexpected and are underpinned by strong association between age and experience with older paramedics having greater levels of experience. This present study did not examine the association between age and resilience as age was reported as a categorical variable, however, there is no apparent trend observed.

Previous research (1) on paramedics and student paramedics in Australia has observed that resilience scores increased as a function of experience, whereby paramedics with 3 to 5 years' experience reported higher resilience score compared to those with 1 to 3 years' experience, and paramedic students. In contrast, resilience levels were lower in paramedics with more than 5 years' experience (1). However, this present study did not show any significant difference in resilience scores between students based on hours of clinical placement experience. The conflicting findings of the Gayton and Lovell study might be a result of a different measure of resilience, the inclusion of both qualified paramedics and students providing wider experience ranges, or categorisation of clinical experience.

Interestingly, the present study showed that when controlling for self-efficacy significant differences in resilience were found between clinical experience groups. Students with 200 to 360 hours experience (second placement) had significantly lower resilience than those with less than 200 hours (first placement), 360 to 600 hours (third placement) and more than 600 hours (graduates) showing a U-shaped curve (Figure 1). That is, resilience scores decreased following the first placement, but showed a sustained increase following the second placement. This finding might be a result of increased expectations on students in their second placement, as the students are no longer considered a novice and are expected to show an intermediate level of clinical knowledge and skills. Viewed differently, when controlling for self-efficacy, resilience scores of those with higher placements hours do not change significantly from those with no placement hours. This might suggest students coming into the degree are already highly resilient, and the second placement where greater skills are required places increased stress and burden on students, leading to a significant decline in resilience, which recovers to baseline following subsequent placements. It is not fully clear why this occurs as longitudinal examinations of resilience in undergraduate paramedic students are absent from the literature. Previous research (1) shows resilience continues to increase until 5 years of service after which a plateau is observed, and that this plateau may be related to a change in duties from on-road to more administrative roles. The observed ceiling effects on resilience may be a consequence of repeated exposure to stress and the development of protective or coping mechanisms (20). More research on resilience trajectories in undergraduate paramedic students including the transition to on-road roles is required to fully elaborate on current findings.

Years of experience in either volunteer or paid employment in emergency services also had no significant effect on resilience scores. Those with external experience did have slightly higher resilience to those without, however this difference was not significant. Other research (although based on a different population and experience type) has shown a similar slight increase in resilience scores based on external experience. For example, postgraduate nursing students in Hong Kong demonstrated higher levels of resilience than undergraduate nursing students (8), however this could be due to self-selection bias in that only students with a higher degree of resilience progress on to postgraduate studies. In this present study, controlling for self-efficacy did not affect differences in resilience scores categorised according to years of other experience. Further longitudinal investigations with a larger sample of student and early career paramedics should be considered.

Previous research has shown self-efficacy to have a significant positive effect on resilience in nurses (15). Results of the present study showed controlling for self-efficacy identified significant differences in resilience score categorised according to clinical placement hours. Although both nursing and paramedics can be considered 'caring professions', there are notable differences in cohorts. The nursing profession comprises almost 90% women, compared to less than 50% for paramedics. Women are more resilient compared to men and this may in part account to different findings between professions. The difference in findings compared to previous research may also be due to the scale used to assess self-efficacy. Wang and Tao (15) used a nurse resilience scale for their study confirming the significant positive effect. Self-efficacy is not a generalised trait, and levels can vary across different functions (21). As there is currently no self-efficacy scale for paramedics, the present study used the GSES, however future studies should consider the development and use of a discipline specific resilience measure.

Results of this study suggest a need for further research on

the factors associated with resilience in student and early career paramedics. It would be beneficial to repeat this study on a larger population involving more universities and qualified paramedics. Given the findings that resilience scores differ between levels of clinical experience when controlling for self-efficacy, further research would help determine the generalisability across diverse student paramedic and early career cohorts. If further research confirms that self-efficacy is an influential factor in resilience, this would further support the addition of self-efficacy-based training programs in university curricula to increase resilience in student paramedics. Further research could also consider development of a paramedic specific self-efficacy scale to provide a more suitable tool to assess self-efficacy within the paramedic discipline.

Limitations

This research has some limitations. First, a cross-sectional design has been used to examine difference between groups and cannot infer causation. This study was conducted during the COVID-19 pandemic, leading to possible negative impacts on results due to suspension of clinical placements, shifts in delivery methods and research fatigue. We were not able to track student attrition across cohorts, and therefore the findings might be indicative of those with higher levels of resilience remaining enrolled in university studies. Finally, the sample size of this study was small, representing ~10% response rate.

Conclusion

This study examined factors associated with resilience in student and early career paramedics. We show that self-efficacy moderates resilience in undergraduate and early career paramedics. Echoing previous calls for resilience education and training for health disciplines, examining the impact of self-efficacy training on resilience may be an important next step in curriculum development.

Figure 1. Resilience scores of clinical placement experience groups when controlling for self-efficacy

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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.

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