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ABSTRACT
The role of lifestyle on mental health in the ambulance worker population is unclear. The aim of this paper is to explore the role and impact of lifestyle on the mental health of ambulance workers within the United Kingdom (UK). Participants ($N = 160$) were recruited from 4 NHS ambulance trusts in England. Data were collected on lifestyle factors (sleep, physical activity and alcohol use) and mental health outcomes (trauma, anxiety, depression and stress); these were assessed by use of various questionnaires including validated measures. Sleep was shown to be the single biggest unique and significant predictor to all mental health outcomes. Suggestions for future research and intervention are considered.

Introduction

Ambulance services provide first response emergency care to those in need; within the United Kingdom (UK) pressure and demands of ambulance workers in National Health Service (NHS) has grown exponentially and exacerbated due to the unprecedented global outbreak of the novel Coronavirus (COVID-19) (Morse, 2017; Wang, Horby, Hayden, & Gao, 2020; Wankhade, McCann, & Murphy, 2019). It is widely cited that the role of an ambulance worker is inherently stressful and can come with significant emotional and physical costs (Petrie et al., 2018; Wild et al., 2016). Epidemiological evidence has estimated prevalence rates of 27% for general psychological distress in this occupational group (Petrie et al., 2018), compared to 15.7% of common mental disorders in the general population (McManus et al. 2016). It has been cited that frequent exposure to potentially traumatic and distressing situations (Wild et al., 2016) and experience of increasing organizational demands with limited resources (Wankhade

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et al., 2019) are implicated in emotional wellbeing, however, the specific mechanisms associated with increased prevalence of psychological distress is unclear. The relationship between work, physical health and emotional wellbeing in ambulance workers is complex.

The term lifestyle is not well defined in research (Jensen, 2007). In this paper, we refer to it and it is defined in terms of behaviors that can impact health. It is generally accepted that health behaviors such as engagement in physical activity, maintaining a good diet, the absence of addiction, minimal psychosocial stressors and good quality sleep have a positive impact on health outcomes (Biddle & Asare, 2011; Dale, Brassington, & King, 2014; Reiner, Niermann, Jekauc, & Woll, 2013; Thorp, Owen, Neuhaus, & Dunstan, 2011; Velten et al., 2014; Walsh, 2011; Wang & Geng, 2019). In a sample of 364 Central European ambulance workers, these findings are somewhat echoed as Betlehem et al. (2014) reported that the lifestyle factors, smoking and alcohol consumption are known risk factors contributing to poor health. High quality data pertaining to the lifestyle of an ambulance worker in the UK is limited (Hutchinson, Forshaw, & Poole, 2020). There is suggestion that lifestyle may moderate or ameliorate the onset and exacerbation of mental health issues in the general population (Biddle & Asare, 2011; Dale et al., 2014; Reiner et al., 2013; Thorp et al., 2011; Walsh, 2011). There are increased rates of mental health issues in this specific occupational group (McManus et al. 2016) therefore, we believe it is a valid line of enquiry to collate epidemiological evidence on ambulance workers' lifestyles to explore the impact of this on mental health outcomes.

This paper takes a salutogenic approach to understand the impact that lifestyle may have on the mental health of ambulance workers within the UK. The aim of the study was to collect and explore data on the relationship between mental health and three key lifestyle markers, namely the following health behaviors; sleep, physical activity and alcohol use. It was hypothesized that those who engage in positive health behaviors maintaining "good" sleep, abstinence/reduced alcohol intake and engagement in physical activity, will have better mental health outcomes. Therefore, we have collected data directly exploring paramedics' lifestyle in the UK. To our knowledge this is the first study of its kind.

Methods

A total of four NHS Ambulance Trusts provided permission to recruit participants over a five-month period from spring to summer 2019. Appropriate NHS and Ethical approval were granted ahead of data collection (Reference:18/NSP/058). Convenience sampling was utilized to recruit ambulance workers, participants were approached through an email sent

via their trust communications team. A poster was attached to the email which was also displayed in stations and this contained information on the research and how to volunteer. It provided signposting and a Quick Response code (QR code) to a link/web address for an online participation information sheet and survey. Eligible individuals were in current employment at an NHS ambulance trust and had carried out front-line duties such as those of a paramedic, emergency medical technician (EMT), or emergency care assistant (ECA). Participants were excluded if this criterion was not met. A short-screening questionnaire following the participant information sheet allowed for application of this criterion. In line with ethical practice, participants gave consent and were provided with a debrief sheet which included signposting to appropriate resources.

This study employed quantitative methods, more specifically a cross-sectional design. The survey utilized was devised by the first author incorporating a mix of validated measures and demographic information (age, sex) and job details (years in service, predominant working environment i.e., rural or urban). For this study, there were three predictor variables related to lifestyle measures; sleep, alcohol use and physical activity. The outcome variables comprised several mental health related measures for anxiety, depression, perceived stress and post-traumatic stress disorder symptoms (PTSD). These were selected on the basis of their widespread accessibility, use and acceptable psychometric properties (Bocéréan & Dupret, 2014; Brunet, St-Hilaire, Jehel, & King, 2003; Lee, 2012). Each variable and means of measurement is outlined in Table 1.

Statistical analyses followed a standard procedure; the data were collected and inputted into SPSS (26th version; Chicago, IL). Once data were checked and totaled, the assumptions were tested. The variables had no normality or homogeneity violations as all scores for skewness and kurtosis were <1.96 (Tabachnick, Fidell, & Ullman, 2007). Frequencies and descriptive statistics were calculated for the entire sample and all relevant variables for this paper. Bivariate analysis was undertaken to test the existing hypotheses, and from this the relationships that emerged were robust. Multivariate statistics were explored iteratively to establish the most parsimonious regression model as presented in this paper and to minimize the redundancy of items. This was to allow the most robust predictor variables to emerge; finally, a path analysis approach was employed using AMOS (26th version; Chicago, IL) to test the theoretical model (Figure 1) relating lifestyle with mental health.

Table 1. Outline of measures.

| Variable	Measure	Number of questions	Scale	Scale interpretation	Internal consistency from participant sample (Cronbach's alpha)
Sleep	Adapted version of the Insomnia Severity Index (Morin, Belleville, Bélanger, & Ivers, 2011)	4	5-point Likert scale. 1 (None) to 5 (Very severe)	Overall scores on this scale ranged from 5 to 20 and a higher score indicates poorer sleep outcomes.	$\alpha = 0.75$
Alcohol	Single-item measure taken from the Alcohol AUDIT (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001)	1	5-point Likert scale ranging from 1 (Never) to 5 (4 or more times a week)	N/A	
Physical activity	Single-item measure of physical activity frequency	1	5-point Likert scale ranging from 1 (Never) to 5 (4 or more times a week)	N/A	
Post-traumatic stress symptoms (PTSD)	Impact of Events Scale Revised (IESr) (Weiss, 2007)	22	5-point Likert scale to assess the impact of stress/trauma; in this study the scale ranged from 1 (Not at all) to 5 (Extremely)	The higher the mean score the more indicative of stress/trauma impact.	$\alpha = 0.96$
Anxiety and depression	Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983)	14	Scoring criteria (scoring of 1 to 4), reverse scoring applied where necessary	Higher mean score would indicate presence of anxiety or depression symptoms.	Overall $\alpha = 0.91$ Anxiety subscale $\alpha = 0.88$ Depression subscale $\alpha = 0.84$
Stress	The Perceived Stress Scale (PSS) (Cohen, Kamarck, & Mermelstein, 1983)	10	5-point Likert scale, in this study ranging from 1 (Never) to 5 (Very often)		$\alpha = 0.88$
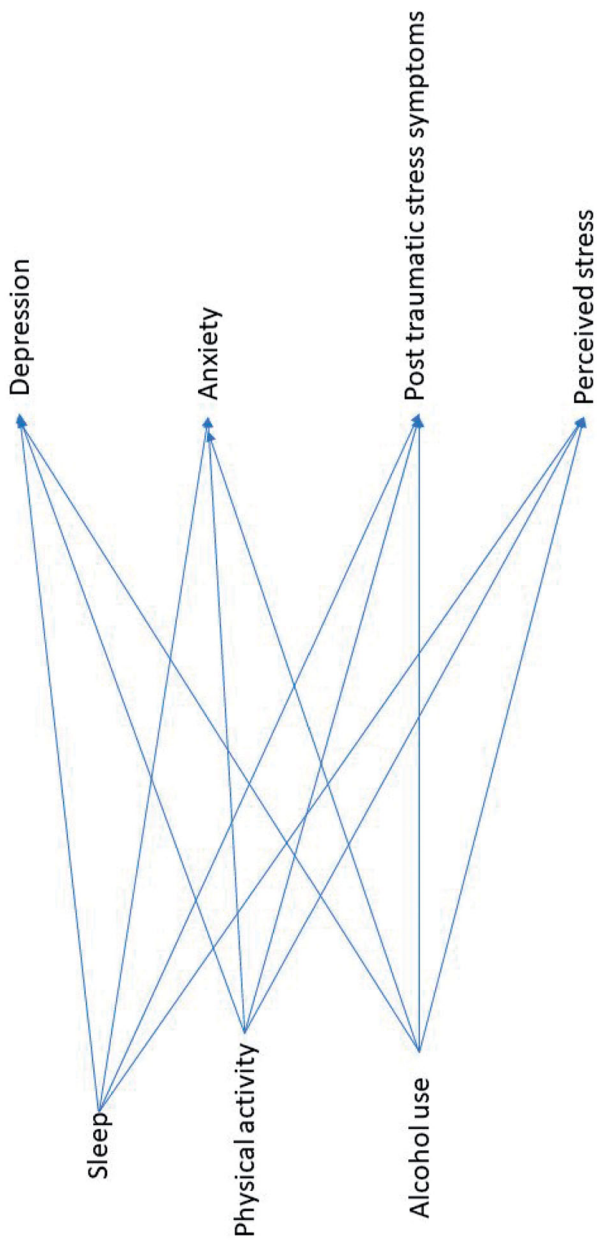
Figure 1. Conceptual model.

Table 2. Characteristic of participants.

Demographics	Entire sample ($N = 160$) Frequencies %	Entire sample ($N = 160$) M (SD)
Age*		40.65 (10.62)
Years in service		11.57 (8.61)
Sex Male	52.2	
Female	46.5	
Prefer not to say	1.3	
Predominant working area		
Equal mix of both urban and rural	59.7	
Urban (towns and cities)	24.5	
Rural (villages and countryside)	15.7	

*$N = 159$.

Table 3. Matrix of variables (means, Cronbach's alpha, standard deviations, ranges and zero order correlations).

	1	2	3	4	5	6	7
M	2.35	3.29	3.01	1.74	2.10	2.17	2.86
α	.75	n/a	n/a	.84	.88	.96	.88
SD	.90	1.25	1.16	.57	.69	.94	.71
Range	4	4	4	2.29	2.86	3.77	3.79
1. Sleep	1						
2. Physical activity	−.05	1					
3. Alcohol use	.16	.03	1				
4. Depression	.51**	−.26**	.08	1			
5. Anxiety	.55**	−.07	.13	.71**	1		
6. Trauma	.56**	−.24**	.15	.59**	.70**	1	
7. Perceived stress	.44**	−.24**	.17*	.72**	.70**	.67**	1

**Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).

Results

In total, 272 individuals took part in the study. However, in the data processing stage, it was identified that 112 cases had missing data or incomplete questionnaires; these were therefore omitted (Table 2).

There were $N = 160$ participants included in the final analysis; one participant did not include their age, however this did not impact on inferential statistics and they were therefore retained in the sample. Participant ages ranged from age 20 to 64 ($N = 159$, M = 40.65, SD = 10.62). Within the total participant sample 52.2% were Male, 46.5% were Female and 1.3% chose not to disclose their sex. All participants were working, or had worked, as an emergency responder in some capacity; participants had worked in the ambulance service from less than one year up to 45 years (M = 11.57, SD = 8.61). The majority of participants, 59.7%, worked mostly in an equal mix of both urban and rural areas, followed by 24.5% working mostly in an urban area and 15.7% worked mostly in a rural area. The demographic data is provided to generate a profile of the sample; these variables were not included in inferential analysis.
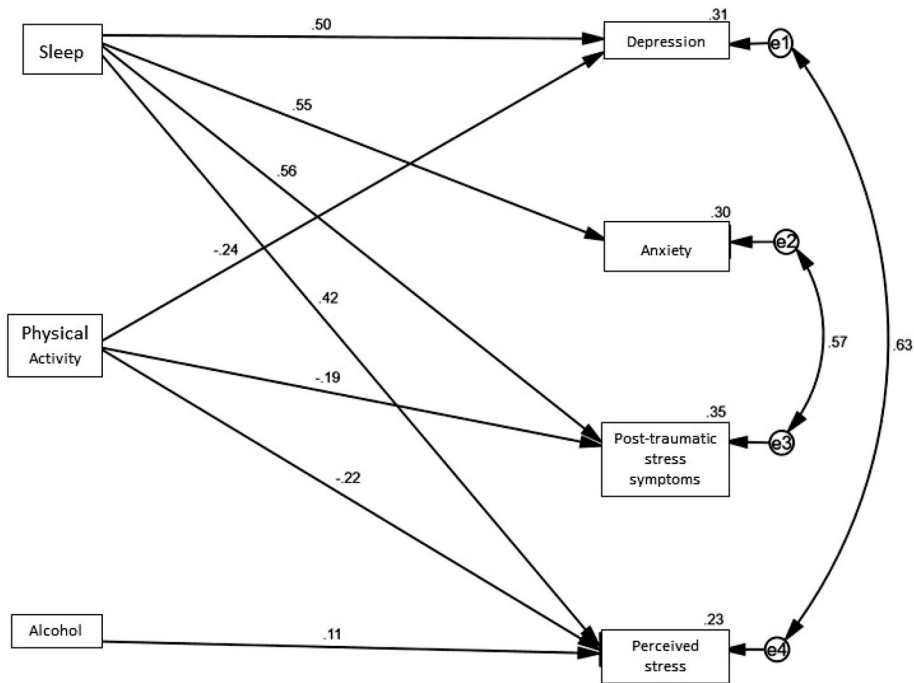
Figure 2. Path diagram: mental health indicators regressed on lifestyle indicators.

Pearson product-moment correlations were examined for the predictor lifestyle variables and mental health outcome variables; means, standard deviations, ranges and correlations among the research variables in path analysis are presented in Table 3. With reference to the mean scores, it appears that responses endorsed lie within the positive/adaptive parameter of each scale though standard deviations would demonstrate individual differences on each measure; this would indicate that a substantial minority of participants within the sample have anchored their responses in the maladaptive side of each scale, although this is less so for depression, with the lowest $SD = .58$. Observation of the intercorrelations between measures demonstrates a systemic pattern in expected directions. To illustrate, sleep, where a higher mean score (maximum 5) indicates poorer quality sleep, relates as expected to depression, anxiety, trauma and stress ($rs = .44$ to $.56, < .01$). Physical activity relates negatively but weakly to stress, depression and trauma ($rs = -.24$ to $-.26, p < .01$). Of the four mental health indicators (anxiety, depression, stress and trauma), alcohol use was weakly related to one outcome measure, perceived stress ($r = .17, p < .05$). As expected, anxiety and depression correlated positively and strongly with each other ($r = .71, p < .01$) and stress relates highly to anxiety, depression and trauma ($rs = .67$ to $.72, p < .01$). The pattern of associations provided the basis to build the model presented in Figure 1, although a few non-

significant pathways were excluded to facilitate parsimony as presented in Figure 2.

Figure 2 illustrates that all path coefficients, with the exception of alcohol to perceived stress ($p < .05$), were statistically significant at $p < .01$ levels. The predictor variables (sleep and physical activity) combined to account for 31%, 30%, 35% and 23% of the variance on the four outcome variables (depression, anxiety, trauma and perceived stress respectively). It can be observed that sleep has emerged as the single greatest predictor of mental health outcomes. Physical activity was not related to anxiety and was therefore not included in the model, however it explains unique variance in three of the four outcomes. Alcohol use was marginalized in the model, subsumed by the other two predictive covariates; alcohol use is only marginally implicated in one of the four mental health outcomes, namely stress. In general, the path coefficients between predictors and outcomes did not attenuate much from the zero order correlations presented in Table 3, which is indicative of the robustness of the relationships controlling for the other covariates, and demonstrates both unique and shared variance on the outcomes. The two correlated residuals between outcome variables in the diagram (.57 and .63), were inserted because they were suggested by the modification indices, these were moderate to strong and make sense conceptually.

Discussion

It is evident that sleep is the single greatest predictor of mental health outcomes within the ambulance worker population and it has a unique impact on each outcome ($p < .01$); this may suggest it is a vital regulator for reducing the negative and debilitative aspects of mental health. There is limited research on lifestyle factors and the role they play in the mental health of this occupational group (Hutchinson et al., 2020). There is partial support toward our hypothesis, that those who had "better sleep" had "better mental health outcomes"; a similar pattern was observed with the inverse associations reported with physical activity where those who engaged in more physical activity had lower scores within three of the four mental health indicators (depression, trauma and stress). There was tentative evidence for the role of alcohol in this population, however this predictor was superseded by the remaining predictors.

It was beyond the scope of this paper to identify the specific mechanisms by which these relationships are present, however, there are several lines of enquiry and existing research that would suggest possible mechanisms. There is a strong and robust amount of evidence to illustrate the restorative features of sleep (Irwin, Olmstead, & Carroll, 2016). The current study

emphasizes this within this occupational group given that sleep was identified to have a unique impact on each mental health outcome, most strongly related to trauma. Within this population there are significant detriments to sleep due to shift work, "irregular lifestyle" and competing personal/family commitments (Betlehem et al., 2014; Sofianopoulos, Williams, & Archer, 2012; Toyokuni et al., 2020). Further, exposure to trauma can lead to sleep disturbance, which is a characteristic symptom of post-traumatic stress (Wild et al., 2016), therefore this makes conceptual sense as to why these are strongly related. Together sleep and physical activity explained a significant level of variance in trauma response (35%), which, taking into account the reported correlations, would indicate protective effects of such behaviors. This is consistent with a plethora of existing evidence that demonstrates the benefits of engagement in positive health behaviors (Reiner et al., 2013; Thorp et al., 2011; Walsh, 2011).

It is surprising that alcohol use was marginalized by the other predictors in this study as there is a consensus within research that alcohol can have a negative impact on mental health (e.g., Jane-Llopis & Matytsina, 2006) and within this occupational group there is evidence of its use (Betlehem et al., 2014). Although the current study provides little evidence of this, as it is related only to perceived stress, it does raise an interesting discussion associated with coping mechanisms, whereby alcohol use can often be adopted (Mildenhall, 2012). Future research is warranted to explore whether the role of driving at work mitigates either actual use or disclosure of use; there is substantial evidence within the general population that indicates significant under-reporting drinking frequency (Stockwell et al., 2016). As suggested, the findings of this paper pose interesting lines of enquiry to explore the impact of the variables explored on work performance. A recent paper has sought to address this with exploration of "near-miss" driving incidents, however lifestyle was defined in a broader context than health behaviors alone (Toyokuni et al., 2020).

It is noteworthy that stress in itself is not a diagnosed condition; the other variables in this paper, anxiety, depression and post-traumatic stress symptoms are recognized mental health issues in the DSM-5 (American Psychological Association [APA], 2013). Therefore, consideration was given to its comparability/classification as a mental health outcome; stress is more often regarded as a mechanism/trigger to diagnosable conditions rather than a condition *per se,* and this is somewhat explained in the relationship that is observed in the path model between stress and depression ($r = .63$).

The findings of this paper highlight that a large proportion of the variance in mental health outcomes can be attributed to lifestyle, however as expected there is a significant level of variance that is left unexplained.

Some research suggests early life and adverse life experiences can contribute to mental health in adulthood (Schilling, Aseltine, & Gore, 2007). Exploration of such data in a future study is warranted in order to fully understand the mechanisms behind mental health in this occupational group. Doing so would allow for the development of various means of support and intervention. Further, the role of individual factors such as resilience and personality which have been shown to play a relevant role in the mental health of this population (Fjeldheim et al., 2014; Mirhaghi, Mirhaghi, Oshio, & Sarabian, 2016) may be a further line of enquiry toward understanding mental health in this research domain. Nevertheless, given that this paper presents evidence related to lifestyle, there is scope and suggestion to address the health behavior "sleep" on an organizational and personal level. Firstly, there is a wealth of research which suggests reviews to the ambulance services' stance on shift patterns to establish what is most productive and operationally feasible (Sofianopoulos et al., 2012). Secondly, individuals are responsible for their own health behaviors to an extent, therefore appropriate education and intervention could be developed for this occupational group to understand the impacts of shift work and trauma/stress on sleep; this could be delivered within training or at employment level across trusts to help develop a more aware task force. There are a multitude of applications from these findings, however, further research is warranted ahead of specific intervention development. We suggest that such research should include qualitative methods to establish the lived experiences of ambulance workers' lifestyles and the impact they believe it might have on mental health.

Limitations

Though some significant and interesting relationships have been established and although the quantitative methods employed were effective in gathering a data pool, there is a lack of clear insight into the nuances of an ambulance worker's lifestyle. To illustrate, physical activity and alcohol use were measured by a single item which as noted inhibits the ability to understand the nuances. The measure of sleep incorporated a wider range of questions which may explain the increased predictive utility of this variable. Further, despite the involvement of four NHS ambulance trusts, general uptake/involvement with the research was relatively low, which limits the generalizability of the findings. There is the potential for bias within the volunteer participant sample, where it is foreseeable that either those concerned about their level of stress were more likely to volunteer or conversely, those who were stressed did not feel able to take part. It is a limitation that potential confounding variables, such as personality, age and

gender were not explored, however the reason being that a wealth of literature exists in this domain (Mirhaghi et al., 2016; Mutambudzi, Flowers, & Demou, 2019) and exploration of lifestyle has been limited (Hutchinson et al., 2020).

Given that the data are cross-sectional, it is possible that the relationships established may be bi-directional. In the context of this paper, the predictor-outcome aspect has been proposed and discussed. However, considering the behaviors in question, sleep, physical activity and alcohol use, it is possible that these can be behavioral expressions of mental health.

Conclusion

This paper illustrates that lifestyle has an impact on mental health in this occupational group; this is consistent with existing research related to the role of lifestyle on mental health in the general population (Biddle & Asare, 2011; Dale et al., 2014; Farhud, 2015; Reiner et al., 2013; Thorp et al., 2011; Walsh, 2011). There is strong evidence to suggest the predictive utility of sleep on the ambulance worker population's mental health and initial psychoeducational interventions for ambulance workers about the impact of lifestyle on mental health might be a useful first line ahead of long-term support. However, further research is warranted to understand the remaining variance and influencing factors. Future studies of a longitudinal nature would enable causal relationships to be established and these could be augmented with qualitative studies to explore the lived experience of ambulance workers lifestyles and corresponding impact on their mental health.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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