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1 **Psychological Predictors of Health Anxiety and Pain in Ambulatory Presentations in a**
2 **Hospital Emergency Department**

3


4 **Abstract**

5 **Background:** Health anxiety in attendees of outpatient medical clinics is well established,
6 however there has been a lack of research into health anxiety within emergency settings.

7 **Aims:** This study explored the prevalence of health anxiety in ambulatory presentations in a
8 tertiary emergency department (ED) as well as the factors associated with pain and health
9 anxiety in this setting.

10 **Methods:** A cross-sectional questionnaire design was used to gather data from adult ED
11 ambulatory attendees across a four-day sampling period to assess psychological and physical
12 health variables. Number of attendances to ED over the previous 12 months was accessed
13 through healthcare records.

14 **Results:** Of the final sample ($n$ = 106), 77% were white British, 54% were male, and 14%
15 presented with severe health anxiety as measured by the Short Health Anxiety Inventory ($\geq$
16 18). Participants with pre-existing health conditions had significantly higher levels of health
17 anxiety ($M$ = 12.36, $SE$ = 1.59) compared to those without ($M$ = 7.79, $SE$ = 0.66). Stepwise
18 multiple regression analyses identified anxiety sensitivity and pain catastrophizing as
19 significant independent predictors of health anxiety, explaining 51% of the variance in health
20 anxiety. Pain catastrophizing was also a significant independent predictor of pain level,
21 accounting for 20% of the variance.

22 **Conclusion:** This study provides insight into the prevalence of health anxiety in ED
23 ambulatory presentations and key psychological predictors of health anxiety and pain. This has
24 implications for treatment in an ED setting whereby patients may benefit from referral to
25 medical psychology or mental health services.


26

27

28

29

30 **Introduction**

31 Health anxiety has been purported to be relevant to repeat and unnecessary attendance in
32 the emergency department (ED; Daniels et al., 2018). This is a common mental health difficulty
33 seen across medical settings (Daniels et al., 2020; Tyrer et al., 2011) yet the rate of health
34 anxiety within emergency settings such as the ED has not yet been established. With high rates
35 of presentation of pain in the ED (Todd et al., 2007) and elevated health anxiety seen in chronic
36 pain and other chronic conditions, ([51.1%]; Rode et al., 2006; Tyrer et al., 2011), it is likely
37 that health anxiety is prevalent in an ED setting (Daniels et al., 2018), particularly as those with
38 chronic health problems are often high impact users.

39 ED clinicians may notice behaviours consistent with the cognitive behavioural model of
40 health anxiety (Salkovskis & Warwick, 1986) whereby strategies such as reassurance seeking
41 provide only temporary relief from distress. This is particularly relevant given previous
42 research suggesting that repeat attendance at the ED may represent a counter-productive
43 'safety-seeking behaviour' in health anxiety (Daniels et al., 2018; Daniels & Sheils, 2017).
44 Constructs such as pain catastrophization and anxiety sensitivity (fear of behaviour or
45 physiological sensations associated with anxiety) are established key factors in the maintenance
46 of distress in both health anxiety and pain, and may be relevant in the ED, in respect to
47 recognition and understanding of communication of distress.

48 Health anxiety in medical settings may provide a barrier to assessment and intervention and
49 a reason for repeat attendance, despite being a condition which is highly responsive to treatment
50 (Cooper et al., 2017). Identification of psychological factors such as health anxiety and
51 associated constructs in this population will increase our understanding of repeat attendance
52 and potentially open avenues for targeted intervention. Indeed, a recent systematic review of
53 psychological interventions in the ED were feasible and acceptable, with some evidence to
54 indicate clinical effectiveness; amongst those included were studies treating health anxiety and
55 non-cardiac chest pain (McGuire et al., in submission).

56 This study therefore aims to identify whether health anxiety is prevalent in the ED where
57 80% of attendances are pain related (Todd et al., 2007), and furthermore, seeks to establish
58 whether the key psychological factors, anxiety sensitivity and pain catastrophising, predict
59 health anxiety and pain level in this setting. Given the known high prevalence of distress and
60 psychological trauma in pain populations (Lumley et al.et al., 2022, these factors will also be
61 examined and accounted for.

62
63
64 **Method**
65
66 **Design and setting**

67 The study implemented a cross-sectional questionnaire design with a convenience sample
68 of walk-in patients accessing Southmead Hospital ED over a four-day sampling period.
69 Southmead Hospital is a Major Trauma Centre in Bristol, UK. The ED has an annual attendance
70 of approximately 100,000 of which approximately 40% self-present via the waiting room. It is
71 predominantly an adult ED with paediatric presentations managed in a nearby Children's
72 Hospital.
73
74 **Participants**

75 Participants were all those attending the ED over the pre-specified sampling period who also
76 met the following inclusion criteria: (a) aged 18 or over (b) able to complete (or complete with
77 assistance) a set of self-report questionnaires (c) able to give informed consent (d) attended via
78 the ED waiting room (only). Participants were excluded from taking part in the study if they
79 were identified as requiring majors/resuscitation care by the triage nurse or there was
80 insufficient information data relating to their reason for ED attendance. Those attending via
81 ambulance were excluded from the study as it was deemed inappropriate to administer a battery
82 of questionnaires and consent forms to these patients when they were likely to be in acute
83 distress or medically very unwell.
84
85 **Procedure**

86 Recruitment took place on the 15$^{th}$, 17$^{th}$, 18$^{th}$, and 21$^{st}$ July 2019 across four eight-hour
87 daytime or early evening shifts. Participants were recruited at the ED reception desk after
88 registration and brief clinical assessment by an ED nurse. Questionnaires were given to all
89 patients who met eligibility criteria. Participants were asked to complete their questionnaires
90 while waiting to be seen by a clinician and were invited to deposit their anonymised
91 questionnaires to the return box provided on the desk.
92
93 **Measures**

94 Participants completed a battery of measures and a standard demographic questionnaire.

95 The Short Health Anxiety Inventory (SHAI; Salkovskis et al., 2002) is a 14-item measure
96 of health-related anxiety. Each item is scored from 0 to 3 with higher scores indicating higher
97 levels of health anxiety and a score of ≥ 18 indicating severe health anxiety, consistent with
98 previous studies (Daniels et al., 2020). The SHAI has good internal consistency ($\alpha$ = .89;
99 Salkovskis et al., 2002).

100 The Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001) is a 9-item measure of
101 depressive symptoms scored from 0 to 3, higher scores indicate higher severity. The PHQ-9
102 has good internal consistency ($\alpha$ = .89; Kroenke et al., 2001). PHQ-9 score of ≥ 10 represents
103 case level depression (Kroenke et al., 2001).

104 The Generalised Anxiety Disorder-7 (GAD-7; Spitzer et al., 2006) is a 7-item measure of
105 anxiety symptoms scored identically to the PHQ-9, with good internal consistency ($\alpha$ = .92;
106 Spitzer et al., 2006). GAD-7 score of ≥ 8 represents case level anxiety (The National
107 Collaborating Centre for Mental Health, 2019).

108 The Adverse Childhood Experiences (ACE) Questionnaire (Felitti et al., 1998) asks
109 participants to indicate frequency of adverse childhood experiences, such as growing up in a
110 household which featured domestic abuse, alcohol abuse or mental health problems, and was
111 used in the present study as a measure of psychological trauma This study used the ACE
112 Questionnaire which features a minor amendment in wording and scoring for UK participants
113 (Bellis et al., 2015; Ford et al., 2016). Both UK and US scoring were used; these were nearly
114 perfectly correlated ($r_s$ = .99) and therefore the UK scoring only is reported. The ACE
115 Questionnaire has demonstrated reliability ($\alpha$ = .78; Ford et al., 2014).

116 The Pain Catastrophizing Scale (Sullivan et al., 1995) asks participants to rate their
117 agreement with 13 catastrophic statements about painful experiences. A score of 30 or higher
118 indicates a clinical threshold for catastrophizing (Sullivan et al., 1995). The scale has excellent
119 internal consistency ($\alpha$ = .95; Osman et al., 2000).

120 The Anxiety Sensitivity Index (Reiss et al., 1986) is a 16-item measure of negative
121 consequences of anxiety which has acceptable test-retest reliability ($r$ = .75; Reiss et al., 1986).
122 A score of 25 or higher represents "possible problems" warranting further investigation
123 (Peterson & Plehn, 1999).

124 A visual analogue scale (VAS) was used for both current pain and anxiety level, with
125 participants asked to record a number between 0 and 10. The VAS is a reliable measure used
126 across populations and commonly used for pain in medical settings (Hjermstad et al., 2011).

127 Healthcare records were also accessed for each consenting participant to determine number
128 of ED attendances over the preceding 12 months. The GAD-7 and PHQ-9 were used as generic
129 measures of psychological distress, commonly used across health settings.
130

131 **Patient and Public Involvement (PPI) Statement**

132 Feedback on the questionnaire battery and burden of participation was sought from a PPI
133 representative. Minor amendments arising from the feedback were made, for example,
134 questionnaire titles were removed. The length of the questionnaires was deemed to be
135 acceptable.
136

137 **Ethical approval**

138 Ethical approval was granted by the Department of Psychology Research Ethics Committee
139 at the University of Bath (PREC reference number: 19-188). Local approval was obtained
140 through North Bristol NHS Trust information governance processes. The authors have abided
141 by the Ethical Principles of Psychologists and Code of Conduct as set out by the BABCP and
142 BPS.
143

144 **Statistical analysis plan**

145 Statistical analyses were carried out using IBM Statistical Package for the Social Sciences
146 (SPSS Statistics) 26.
147 To assess prevalence of health anxiety, a score of $\geq 18$ was used as a cut off for definite
148 cases of health anxiety, replicating previous work in similar fields (Daniels et al., 2020).
149 Independent samples t-test were planned to determine whether there was a statistically
150 significant difference between health anxiety level for participants with pre-existing health
151 conditions compared to those without. Correlational analyses (Spearman's Rho due to non-
152 normality within the data set) would test for associations between age and clinical variables,
153 including anxiety VAS and GAD-7 for convergent validity, and associations with frequent
154 attender status. A significance level of $p < .001$ was used for correlational analyses due to
155 multiple comparisons.
156 A stepwise multiple regression analysis was planned to test whether pre-existing health
157 conditions, anxiety sensitivity, history of adverse experiences, pain level, and pain
158 catastrophizing are significant independent predictors of health anxiety. A second stepwise
159 multiple regression with pain level as the outcome variable was also planned. In addition to

160 the psychological variables of interest, the relevant demographic factors, age and reason for
161 attendance, were entered into both regression analyses as control variables.

162 If 20% or fewer items were missing from questionnaires then the case mean substitution
163 method was planned (Roth et al., 1999). If more than 20% of the items were missing, then the
164 measure for that participant was considered incomplete and excluded from analysis. Regarding
165 the ACE Questionnaire, participants with any missing items were removed from the analysis
166 (*n* = 1), as recommended. Outliers were screened for data entry error and retained in the dataset.

167

168

169 **Results**

170

171 **Descriptive statistics**

172 Of the 178 questionnaires distributed, 118 were returned (66.3%). Twelve participants were
173 subsequently excluded due to insufficient consent (*n* = 10) and two further for insufficient data
174 relating to reason for attendance reason (*n* = 2), resulting in a final sample size of 106 (59.6%
175 of possible sample). The mean substitution method was used to impute scores for 22 cases.

176 Participants were primarily white British (77%, *n* = 82), 54% were male (*n* = 56), 54% were
177 employed (*n* = 57), and 38% reported having a pre-existing medical condition (*n* = 36). The
178 majority presented with minor injuries (65%, *n* = 69), with the rest presenting with a minor
179 illness (35%, *n* = 37).

180

181 **[Insert table 1 here]**

182

183 Means and standard deviations of clinical variables are displayed in Table 2. Approximately
184 equal percentages of participants reached case level depression (22%, *n* = 23) and anxiety
185 (22%, *n* = 23) as measured by the PHQ-9 (score of ≥ 10) and GAD-7 (score of ≥ 8) respectively.
186 In relation to pre-existing medical conditions, 27% (*n* = 26) reported already having a physical
187 health condition. These proportions reflect standard norms and are unremarkable. Despite this,
188 only 3.2% of participants (*n* = 3) reported having a mental health condition; 7% of participants
189 (*n* = 7) reported having both physical and mental health conditions.

190 Number of ACEs ranged from 0 to 8, with 19% (*n* = 20) of participants having experienced
191 4 or more ACEs. Using the anxiety VAS, nearly a third (32%, *n* = 30) reported anxiety reaching
192 5 out of 10 or higher, with 30% (*n* = 28) reporting no anxiety. In relation to pain VAS, 94% (*n*

193 = 90) of participants reported some level of pain (rated as 1 out of 10 or higher), with 60% (*n*
194 = 58) reporting pain reaching 5 out of 10 or higher. Pain as measured by the VAS was normally
195 distributed, with skewness of -0.06 (*SE* = 0.25) and kurtosis of -0.74 (*SE* = 0.49).
196 Of those who completed the SHAI (*n* = 100), 14% (*n* = 14) reached threshold for severe
197 health anxiety as indicated by a score of 18 or above. SHAI scores ranged from 0 - 32 (*Md* =
198 8, *IQR* = 4,13). Reliability was calculated, resulting in Cronbach's $\alpha$ = .903. Inspection of the
199 histogram and skewness statistic (1.17, *SE* = 0.24) indicated that the SHAI data was highly
200 positively skewed, with kurtosis of 1.10 (*SE* = 0.48).
201
202
203 **Inferential statistics**
204 Two separate t-tests (with 5,000 bootstrapped samples and Welch's corrected degrees of
205 freedom) showed significantly higher health anxiety for participants with pre-existing health
206 conditions (*M* = 12.36, *SE* = 1.59) compared to those without (*M* = 7.79, *SE* = 0.66), 95%
207 bootstrap CI [-7.98, -1.22], Welch's $t(43.22) = -2.67$, $p = 0.01$, $d_z = -0.68$ but no significant
208 difference in pain levels in patients with pre-existing health conditions (*M* = 5.50, *SE* = 0.43)
209 compared to those without (*M* = 4.60, *SE* = 0.37): 95% bootstrap CI [-2.02, 0.20], Welch's
210 $t(74.42) = -1.56$, $p > .05$ $d_z = -0.35$.
211 Spearman's Rho was performed due to non-normality of SHAI data. Significant
212 relationships were identified between key variables (see Table 2). The moderate relationship
213 between the anxiety VAS and GAD-7 indicated the measures assess similar but distinct
214 constructs. This is attributed to the discrepancy between measurement of current anxiety (VAS)
215 and anxiety over the preceding two weeks (GAD-7) which is likely to have been more variable;
216 anxiety is also likely to be higher in a pre-diagnostic setting. Age was positively associated
217 with trauma, but not any other variables. Strong associations were found in expected directions,
218 including anxiety and depression which co-occur, and anxiety sensitivity and pain
219 catastrophizing which are conceptually linked.
220
221 **[Insert table 2 here]**
222
223 Two separate stepwise multiple regressions were conducted to identify which key factors
224 predicted health anxiety and pain in this setting, results of these regression analyses can be
225 viewed in table 3. There was no evidence of multicollinearity in either regression analysis.

226 First considering the outcome variable health anxiety, results show that anxiety sensitivity
227 and pain catastrophizing were significant independent predictors of health anxiety accounting
228 for 51% of the variance explained; variables excluded from the model included age, pre-
229 existing conditions, pain level, attendance reason, ACE, PHQ-9, and GAD-7.

230 Second regarding the outcome variable pain level, results show that pain catastrophising
231 was the sole significant independent predictor of pain level accounting for 20% of the variance
232 explained. Variables excluded from the model include anxiety sensitivity, age, pre-existing
233 conditions, attendance reason, ACE, PHQ-9, GAD-7.

234

235 **[Insert table 3 here]**

236

237 Despite lower levels of recruitment that anticipated, performance of a post-hoc G*Power
238 analysis indicated that both regression analyses were sufficiently powered to detect significant
239 associations between variables ($n = 80$, $R^2 = 0.51$, effect size $f^2 = 1.04$, power = 0.99; $n = 83$,
240 $R^2 = 0.20$, effect size $f^2 = 0.25$, power = 0.89 respectively), this suggests we can exercise
241 confidence in these findings.

## Discussion

This study aimed to determine the prevalence of health anxiety in an ED setting and identify key psychological factors that predicted health anxiety and pain in ED walk-in attendees. Findings indicate that 14% of ED walk-ins reported severe levels of health anxiety; this is similar to the levels seen in medical clinics (Tyrer et al., 2011) but contrasts significantly with the rates of health anxiety observed in chronic pain settings which is around 50% (Rode et al., 2006). In line with previous research, the present study also found that over 80% of patients presenting to the ED attend with pain (Todd et al., 2007). This may be attributable to repeated use of strategic behaviours to resolve distress or symptoms (Salkovskis & Warwick, 1986) when experiencing chronic and unexplained pain; extended undiagnosed pain without amelioration or adequate explanation may increase the likelihood of symptom hypervigilance, fear avoidance, catastrophic thinking, and may inadvertently increase or maintain health focussed anxiety. Indeed, those who are presenting with acute pain in this sample may be commencing their journey to chronicity. There is scope here to identify a highly distressing condition presenting in the ED and provide support to re-direct to medical psychology or mental health services, which may bear some impact on repeat attendance (Daniels & Sheils, 2017). This can be done using a brief screening measure such as the SHAI, which has now shown good reliability in this setting.

Consistent with the literature (Daniels et al., 2020; Rode et al., 2006; Tyrer et al., 2011), participants with pre-existing health conditions reported significantly higher levels of health anxiety compared to those without any pre-existing health conditions. This suggests that those with pre-existing medical conditions may be more distressed in relation to their presenting health needs in the ED. Redirecting or targeting amelioration of health anxiety symptoms in this patient group could therefore be clinically beneficial, presenting as an opportunity to integrate physical and mental health interventions in existing community health services. However, as identified in this study, only a small minority of participants had other services involved in their care - perhaps indicating a need to first facilitate access to these specialist community services, a strategy which could in-turn help to reduce repeat ED attendances.

Stepwise multiple regression analyses identified that anxiety sensitivity and pain catastrophizing were significant independent predictors of health anxiety, accounting for over half of the variance in health anxiety. This is unsurprising given physiological changes detected within the body serve as both the primary sensory input and reinforcing behaviour which triggers off common catastrophic misinterpretations of health stimuli in the health anxiety

model. Pain catastrophizing was the sole significant independent predictor of pain, however the proportion of variance accounted for was much less, at 20%. The relationship between pain catastrophizing and pain has been well documented (Osman et al., 2000), and is consistent with the health anxiety model, evidently other factors are at play here.

These findings provide empirical support for the utility of the cognitive behavioural model of health anxiety (Salkovskis & Warwick, 1986) in the ED setting. Those with health anxiety are likely to detect changes in physical sensations, generate catastrophic interpretations related to the pain, experience distress and concern, and consequently employ safety-seeking behaviours (such as attend the ED) as an attempt to reduce distress/anxiety and resolve health concerns (Daniels & Sheils, 2017; Rode et al., 2006). However, attending the ED is likely to elevate rather than ameliorate health anxiety in the long-term (Daniels & Sheils, 2017; Rode et al., 2006). Yet, this short-term, immediate reduction of anxiety offered by medical reassurance is sufficiently powerful to perpetually reinforce ED attendance as a behavioural strategy to alleviate physical and emotional distress. Once identified, health-anxious patients attending the ED may benefit from appropriately addressing this issue in order to better meet need and reduce repeat attendance. Evidence supports the use of CBT for health anxiety in medical populations (Tyrer et al., 2011), and the role of psychology in the ED (McGuire et al., in submission).

Despite previous research and theoretical support for other constructs examined in this study, pre-existing health conditions and history of adverse experiences were not included in the health anxiety and pain final regression models. This was unexpected; it is noted that trauma was also not associated with either pain or health anxiety in correlational analysis. Trauma was associated with age, perhaps reflecting that with age you experience more trauma. This is a logical conclusion to draw, however the direction of these relationships is hampered by the limitations of a correlational analysis.

## Limitations

Due to the low rates of repeat attendance in the sample, the relationship between psychological variables and attendance could not be examined

It is hypothesised that repeat attenders were not captured in this study as they may be less likely to participate due to common complex psychosocial circumstances, higher likelihood of vulnerability and perceived a higher need for urgent care (Daniels et al. 2018). Data reflects that frequent attenders have a higher propensity to attend during night shifts (Dr Foster, 2018),

which was not included in our sampling time frame. Future work should focus on capturing this using 24 hour sampling periods. It is noted that measuring health anxiety prior to a medical appointment may be perceived to risk artificially inflating rates of health anxiety, however the SHAI is based on the previous two weeks, offering context outside of the ED attendance and mirrors methodology in similar studies medical settings (Seivewright et al. 2004; Rode et al,2006; Tyrer et al, 2011; Daniels et al, 2020), allowing comparison across groups.

This study is also limited due to collecting self-reported reason for attendance meaning it was not possible to correlate health anxiety with clinical diagnosis. Further research is therefore needed to better understand the relationship between clinical diagnosis and health anxiety in the ED.

## Conclusion

The present study found that health anxiety was common in a convenience sample of ED walk-in patients, however further research must replicate these findings. Key psychological variables were associated with health anxiety and pain in this population, with findings offering valuable insight into the potential role of health anxiety in ED attendances and further empirical support for the utility of the cognitive behavioural model of health anxiety in medical settings. Screening for health anxiety in the ED may help to identify an unmet clinical need in patients who would benefit from a specialist referral to medical psychology or mental health services.

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