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Exploring the Link between Mindset and Psychological Well-Being among Veterinary Students

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1 **Exploring the link between mindset and psychological well-being in veterinary students.**

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19 **Abstract**

20 This study set out to improve our understanding of potential pedagogical factors which may
21 influence the mental health of veterinary students. Previous research has demonstrated
22 that the type of feedback given to children by parents and teachers can strongly influence
23 young people's beliefs in their ability to modify their intelligence - their 'mindset'. There is
24 also evidence that we can change the mindset of students relating to their intelligence by
25 changing the methods by which we teach and assess. We used a paper based questionnaire
26 to assess mindset and psychological wellbeing in veterinary students (n=148). We found an
27 association between students' mindset relating to their intelligence and their psychological
28 wellbeing. Students believing that their level of intelligence was fixed had significantly lower
29 scores on five out of six areas of psychological well-being compared to students who
30 believed that their intelligence was malleable. Giving process rather than person feedback
31 and reducing assessment methods that encourage comparison with other students could
32 increase the proportion of our students with a growth mindset and, if the association we
33 identified is causal, improve their psychological wellbeing.

34 **Introduction**

35 The causes of the current potential epidemic in mental health problems in the world are not
36 well understood. Decreasing mental health has been demonstrated in many countries and

37 cultures across the world¹. Data show a higher incidence of mental health problems within
38 certain professions e.g. veterinary surgeons compared to the general population.²

39 The number of UK university students seeking counselling has risen by more than 30% in the
40 last four years and at five universities numbers have more than doubled.³ We have
41 observed similar changes within our veterinary student body. A published cross sectional
42 study of veterinary students assessed mental health of 500 students in the largest UK
43 veterinary school⁴. In the preceding 12 months, 31% had suffered from low self-esteem,
44 26% from depression, 21% from anxiety disorder or panic attacks, 10% had intentionally
45 harmed themselves and 10% had eating disorders. These figures were significantly worse
46 than results from the general population, but similar to results from other members of the
47 UK veterinary profession^{5,6,7}. About half of the respondents said that they had experienced
48 some of these mental health issues before they started their training and there was no sign
49 of worsening of well-being over the five years of the course, suggesting that many of the
50 issues could relate to the characteristics of people starting their training as Veterinary
51 Surgeons⁴. Results from these studies indicate that influences on mental health before
52 students start a university course may be important and need investigation. They also raise
53 the controversial question of whether we should screen for mental health problems in our
54 admissions process.^{8,9} Evidence from a medical school in Australia has demonstrated a link
55 between dysfunctional tendencies on admission and failure to complete the course.^{10,11}

56 Stressors identified for students across all disciplines are financial concerns, balancing
57 conflicting priorities e.g. parental, family and carer responsibilities, future uncertainty
58 relating to financial provision, academic concerns and personal concerns e.g. bereavement,
59 abuse¹². None of these stressors are new to students and have not changed significantly
60 enough in recent years to explain the increase in mental health concerns in the student
61 body. We propose that changes during children's upbringing may have altered the ability to
62 manage these stressors, so, as well as looking at the increased support needed in
63 universities, educators should also gain a greater understanding of the causes of poor
64 resilience, particularly in students who have been successful at school and gone onto
65 university.

66 It has been shown that people's views relating to their intelligence vary widely; some people
67 believing that they have a fixed amount of intelligence ("fixed mindset") and others
68 believing that their intelligence is malleable ("growth mindset")¹³. People with a fixed
69 mindset have been shown to select activities that demonstrate their intelligence; they will
70 choose to do things that they know they are good at to reaffirm their self-esteem and avoid
71 challenges that may raise any doubt about their intelligence. In the face of a setback this
72 group will often have a "helpless" response, interpreting a poor outcome as a reflection on
73 their identity as a whole. After a failed assessment, poor feedback or poor outcome after a
74 clinical procedure, a student or veterinary surgeon with a fixed mindset might want to give

75 up trying in that area, e.g. “I can’t do bitch spays” or leave the profession completely
76 interpreting the one failure as a reflection of their entire ability to be a vet.

77 People with a growth mindset behave differently. They select activities that will help them
78 to improve and they enjoy taking on challenges. If they face a setback they have a “mastery”
79 approach, focussing on what went wrong and why, and taking actions to improve their
80 performance for next time. For example, after a post-operative haemorrhage following a
81 bitch spay, a student might say “I must make sure that I tie my ligatures tightly and check
82 well for any haemorrhage before finishing the procedure in the future. I’ll ask my colleagues
83 if they have any advice for avoiding this next time”¹⁴⁻¹⁷.

84 Previous research has demonstrated a link between an individual’s beliefs about intelligence
85 and their response to setbacks¹⁴. Children who have grown up being told that they are
86 intelligent, gifted and special, (often those who have been identified as high achievers at
87 school) tend to believe that they have a fixed amount of intelligence and are, in fact, the
88 most vulnerable to setbacks. High achieving girls are particularly at risk^{14, 18}.

89 Teaching and assessment styles can influence motivation and mindset. A review of 128
90 papers researching how the way we teach and assess influences students’ response to
91 setbacks and approach to challenges was published in 2010¹⁹. It showed that a high
92 emphasis on performance compared to others led to “helpless” responses to setbacks and
93 emphasis on goal driven learning led to “mastery” responses in school- aged children¹⁹.
94 Performance focused assessment encourages a more fixed mindset, goal focused
95 assessment encourages a growth mindset relating to intelligence.

96 We hypothesise that having a fixed mindset relating to intelligence is associated with a
97 negative impact on mental health of our students. Our study evaluates the mindset and
98 mental well-being in a cohort of veterinary students.

99 **Method**

100 Our study population was the 2012 entry cohort of veterinary students at the R(D)SVS,
101 University of Edinburgh. Paper questionnaires were made available to 186 first year
102 students at the end of a tutorial. Although participation was voluntary, timetabling ensured
103 that the students had sufficient time to complete the questionnaires and take a break
104 before their next scheduled session. Students could choose to withdraw their consent at any
105 time. All data were treated confidentially and assigned anonymous student identifier codes.
106 The study received ethical approval from the University of Edinburgh, College of Medicine
107 and Veterinary Medicine’s committee for the use of student volunteers in educational
108 research.

109 The questionnaire consisted of 111 questions; 84 assessing psychometric dimension, eight
110 to assess mindset and 19 to assess approach to study (not used in this study). All questions
111 were on a 6 point Likert scale with no neutral option.

112 The questions to measure psychological well-being are widely used and validated with
113 regard to reliability and validity ²⁰. The questions are constructed to measure the
114 psychometric dimensions of autonomy, environmental mastery, personal growth, positive
115 relations with others, purpose in life and self-acceptance. We deliberately chose these
116 scales to avoid questions involving negative aspects of poor psychological well-being,
117 e.g. suicide or self-harm, to minimise potential distress from completing the questionnaire.
118 Information from the psychological well-being questionnaire does not give us specific scores
119 or have cut points for defining high or low well-being. We summarised each student's score
120 for each dimension using a mean of their numerical 1 – 6 likert scale responses after
121 reversing the scores for any negative questions ²⁰.

122 Mindset relating to intelligence was evaluated using the standard methodology developed
123 by Carol Dweck ¹⁵. Each questionnaire included eight questions. Four positive questions
124 were interspersed with four negative questions to prevent students from giving the same
125 answer to every question and to allow us to internally validate the responses. The responses
126 to the 4 positive questions were used to calculate a mean mindset score. This method
127 replicated previous practice using these questions. The numerical mindset score was then
128 converted to an ordinal outcome of 'fixed', 'intermediate' or 'growth' using cut-points of 3.0
129 and 4.0 as described by Dweck ¹⁵. Students that didn't respond to all four specific mindset
130 questions were excluded from further analysis.

131 The relationship between psychometric dimension and mindset was explored graphically
132 and differences in the distribution of scores between students identified as having 'fixed'
133 and 'growth' mindsets were tested statistically. We used the Mann-Whitney U Test under
134 the conservative assumption that the mean psychometric dimension scores are an ordinal
135 scale. A critical p-value of 0.05 was used for all comparisons. The R Statistical system ²¹ was
136 used for data management, plotting and hypothesis testing.

137 **Results**

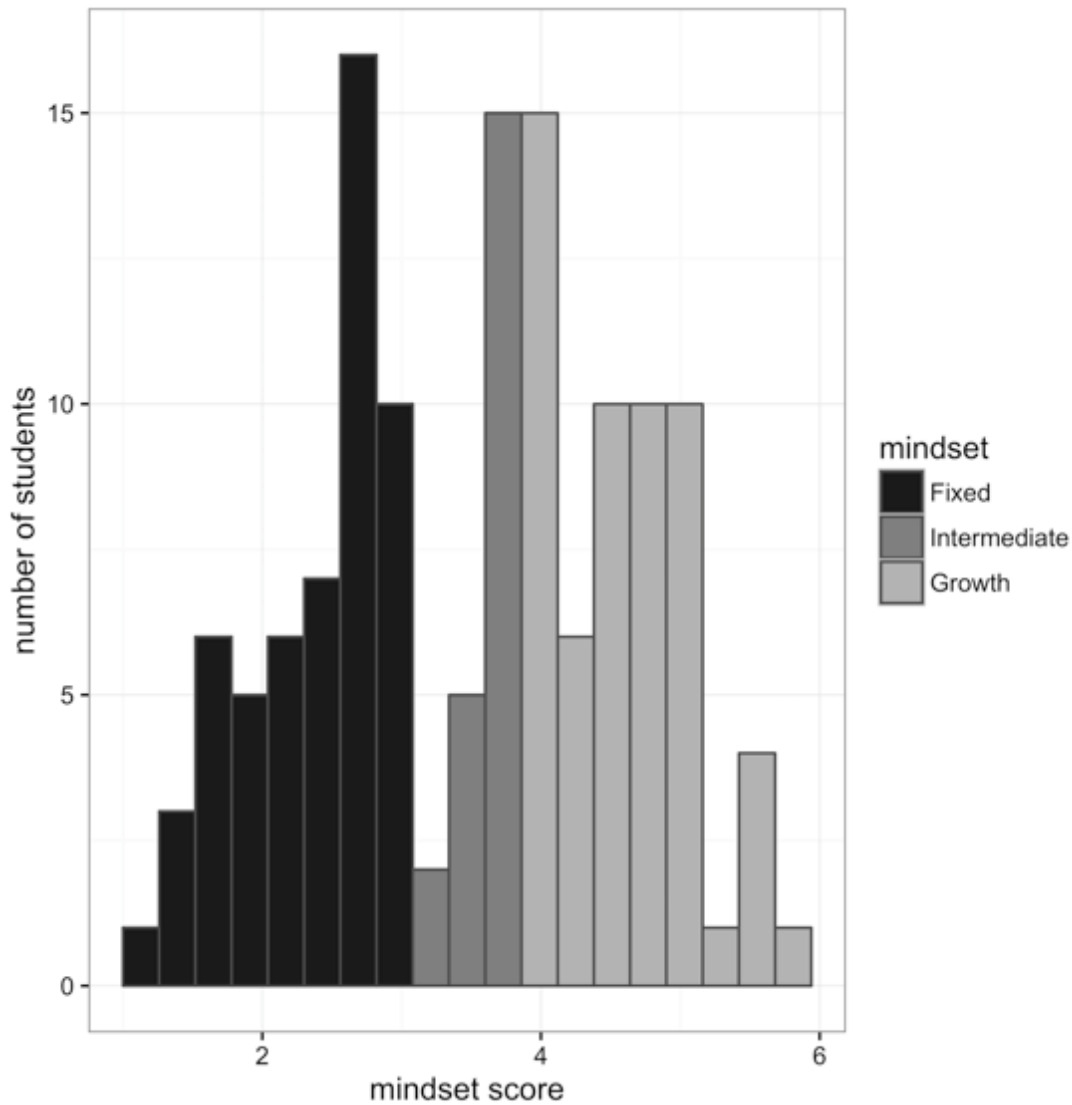
138 *Data*

139 Of 186 students in the cohort, 148 returned a questionnaire (80% response rate). There
140 were 147 with a valid identifier. Eleven students failed to complete the four specific mindset
141 questions leaving 136 questionnaires for subsequent analysis (partial mindset responders).
142 There were no substantive changes to any results when a mean mark for the mindset
143 questions they completed was used to permit their inclusion in the analysis compared to
144 analysis of only full responders. Additionally the psychometric dimension results of partial
145 mindset responders were not significantly different to those of full responders. Hence the
146 incomplete mindset questionnaires were excluded leaving 136 questionnaires for final
147 analysis.

148 *Mindset*

149 Mindset scores ranged from 1.25 to 6 with a median score of 3.75. The distribution of
150 mindset results with the derived ordinal category is shown in Figure 1.

151 **Figure 1**



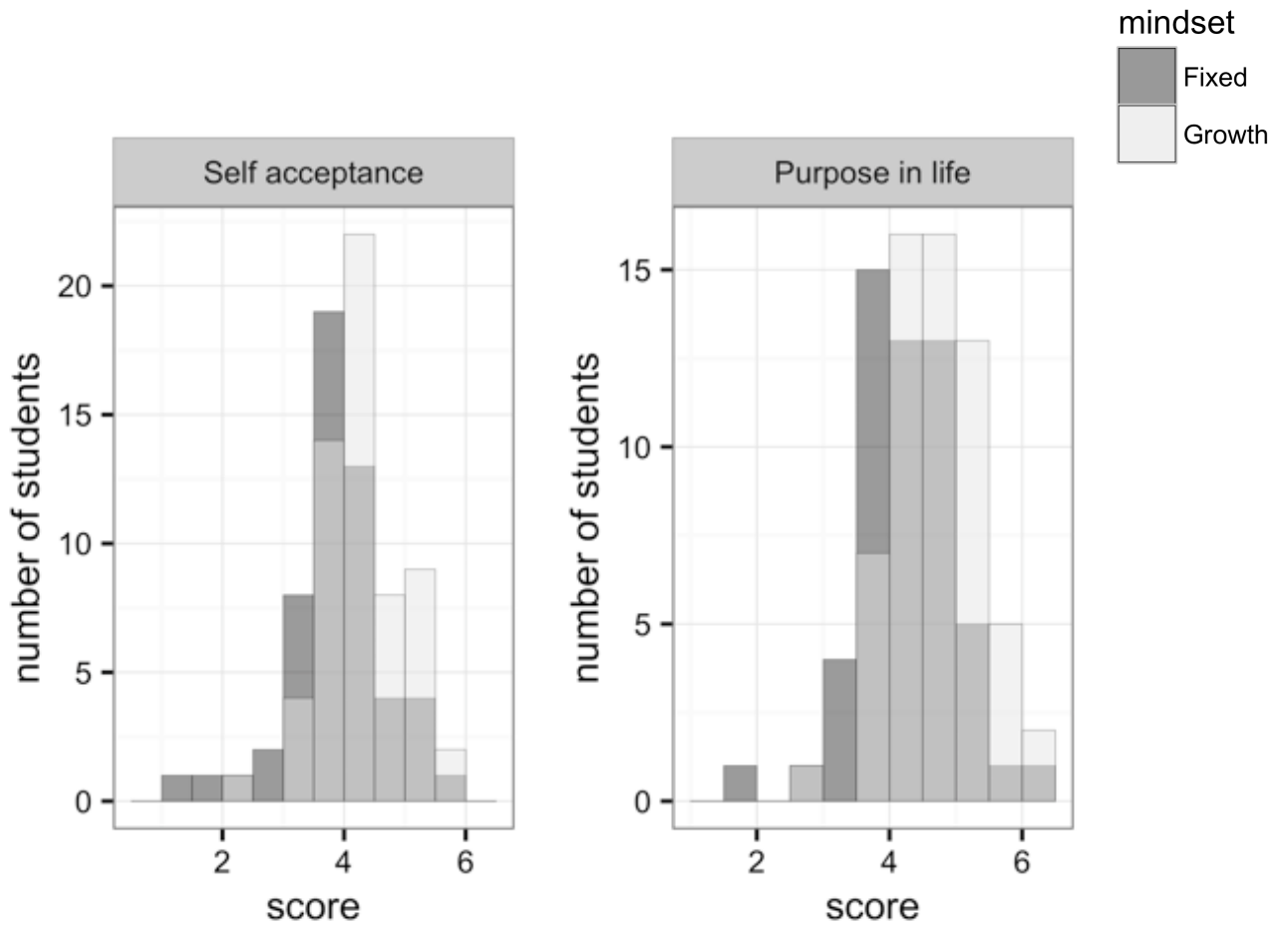
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153 *Mindset and psychometric dimensions*

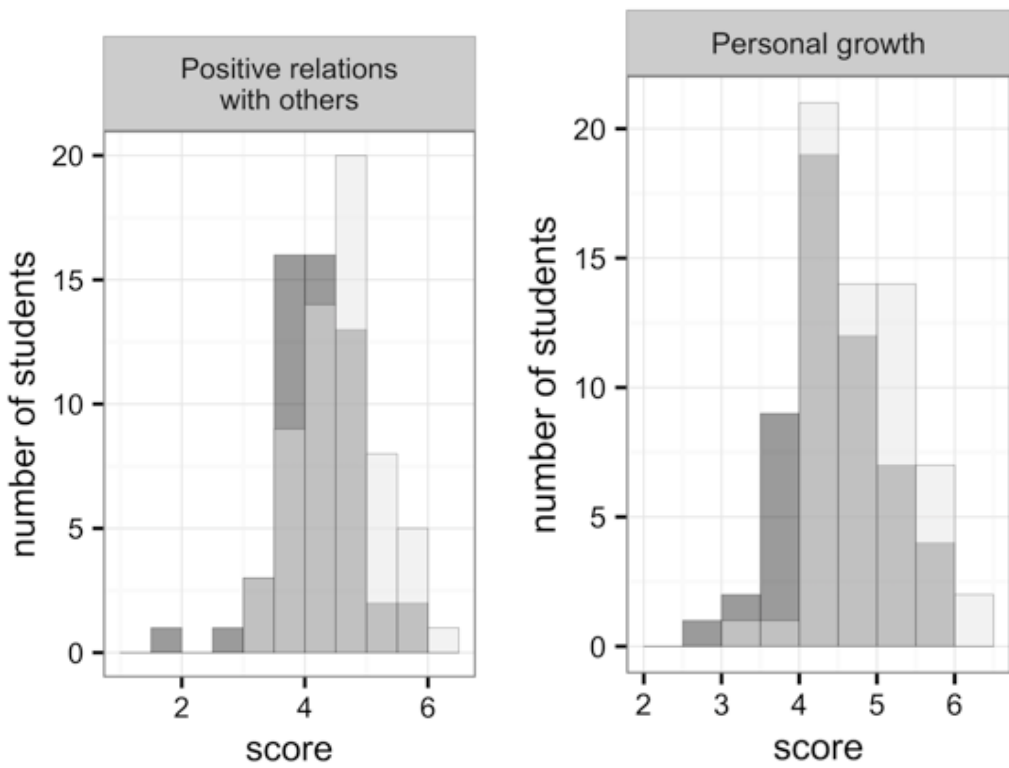
154 The relationship between mindset category and psychometric dimension is shown in Figure
155 2. The 'Intermediate' category results are not shown for clarity and in line with previous
156 applications of this scale¹⁵. The group mean and median psychometric dimension scores for
157 each dimension and mindset group are shown in Table 1. For each dimension the mean and
158 median score is higher in the 'Growth' mindset group than in the 'Fixed' mindset group. A
159 higher score on a psychometric dimension is considered to represent greater psychological
160 well-being²⁰. These differences are statistically significant for all dimensions apart from
161 'Environmental mastery'

162 **Figure 2**

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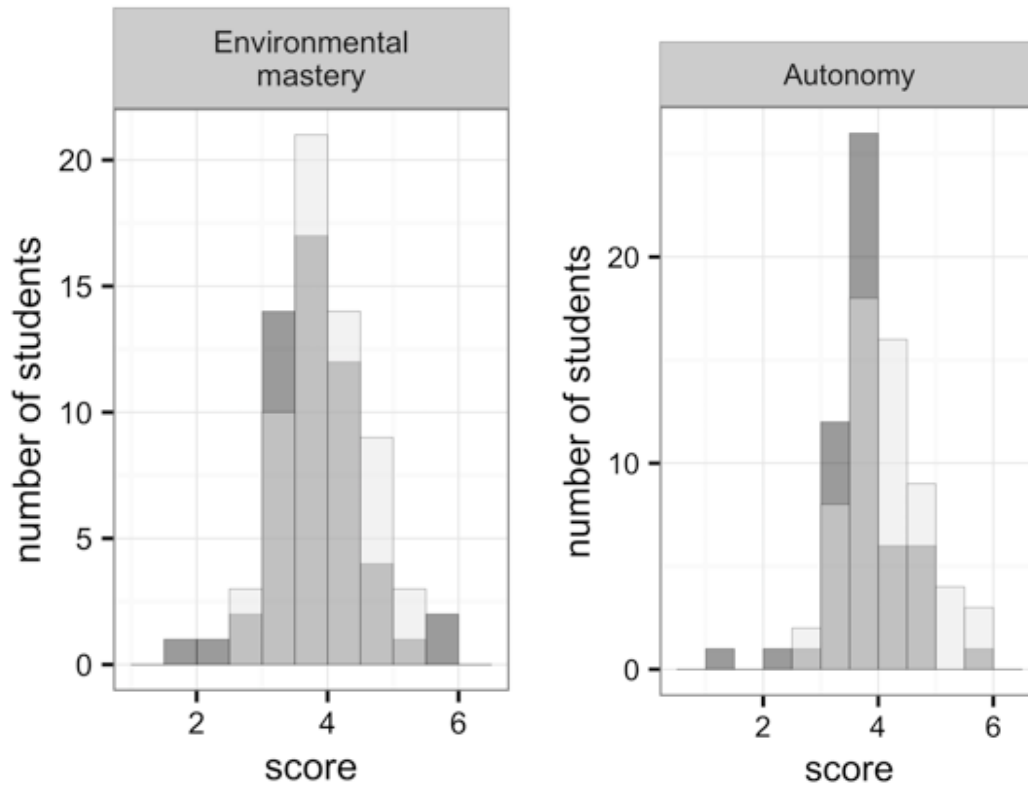


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173 **Table 1** Summary statistics for each psychometric dimension sub-grouped by mindset. P-
174 values are for Mann-Whitney U test comparison of distributions of subgroup scores.

Psychometric dimension	Mindset	Mean	Median	p-value
Autonomy	Fixed	3.70	3.66	0.002
	Growth	4.11	4.00	
Environmental mastery	Fixed	3.77	3.71	0.197
	Growth	3.93	3.86	
Personal growth	Fixed	4.41	4.36	0.004
	Growth	4.77	4.71	
Positive relations with others	Fixed	4.14	4.09	0.002
	Growth	4.56	4.57	
Purpose in life	Fixed	4.23	4.17	0.001
	Growth	4.67	4.71	
Self-acceptance	Fixed	3.83	3.86	0.001
	Growth	4.29	4.25	

175 **Discussion**

176 Our research has shown that veterinary undergraduates with a fixed mindset relating to
177 their intelligence have significantly poorer psychological well-being than those with a
178 growth mindset in five out of six dimensions measured in Ryff's ²⁰assessment tool. Previous

179 research has shown that mindset relating to intelligence is influenced by the type of praise
180 given by parents and teachers and the ways in which we assess young people. Drawing this
181 together indicates that if the association between mindset and psychological well-being is
182 causal we may be able to influence psychological well-being in a positive and negative way
183 by the specific ways that we teach and assess.

184 These findings may have implications for how we assess and give feedback to students in
185 Universities. More careful consideration of this aspect may lead to improvements in the
186 mental health of our students. Mindset and psychological well-being are both variable and
187 malleable so we may have an opportunity to influence the mental well-being of our
188 students in a way that has not been explored before. It has been shown ¹⁵that person praise
189 and performance assessment can induce a fixed mindset in students, so by using methods
190 that have been shown to induce a growth mindset, e.g. praising effort and goal focussed
191 assessment we may be able to improve their psychological well-being.

192 Furthermore, because a student's mindset relating to intelligence is already established by
193 their previous experience, there is a need to feed back the impact of current, common place
194 teaching and assessment methods to school educators and to parents.

195 This work raises concerns about the repeated pressure on schools to increase testing and
196 bring in formal teaching and comparative assessment in Maths and English at a younger age.
197 All pupils, but particularly the high achieving girls at school, are in greater danger of
198 developing a fixed mindset relating to their intelligence ¹⁵ which now we have linked to
199 significantly poorer mental health. It is crucial that this issue is considered when curriculum
200 and teaching / assessment strategies are developed at the highest (government) level.

201 A new curriculum for excellence was introduced to Scottish Schools in 2011 ^{22, 23}; intended to
202 significantly reduce the number of performance based assessments in school with the
203 feedback given being specific to the given task and process rather than 'person focussed'.
204 There is a far greater emphasis on process and reflection on how to improve. We would
205 expect this change to increase the number of young people with a growth mindset relating
206 to their intelligence ²² and hence would expect to see a significant improvement in the
207 mental health of pupils following the new curriculum in Scotland. These pupils will enter
208 higher education in September 2016, offering an opportunity for a natural experiment; we
209 will be closely observing this year group as they start on our course.

210 *Limitations*

211 The target group that we would like to understand would be all young people, but our
212 current research is limited to one year group on the Veterinary Medicine course. Repeating
213 the research with students on different courses and other universities and in school aged
214 pupils would increase the validity of the results.

215 The questionnaires we have applied have been used in previous research and are
216 considered to be robust tools but the information that we have gathered is not easy to
217 measure. An individual's response to a particular question will vary according to their
218 understanding of the question and their interpretation of the descriptors on the
219 measurement scale. The results are a snapshot in time and students may have responded
220 differently if asked the same questions on a different day, but the questions were asked in
221 the same questionnaire, on the same day, so we can confidently link these responses.

222 We have assumed that the questions have been answered honestly, but our understanding
223 of typical behaviours of people with a fixed mindset is that their focus is on how they appear
224 and that they sometimes lie or cheat to appear good to others. If this was the case it may be
225 that for questions such as "I often feel lonely because I have few close friends with whom to
226 share my concerns." or "Many days I wake up feeling discouraged about how I have lived my
227 life" they may have given a more positive response than they actually felt. If this effect
228 occurred it would reduce the observed difference between individuals with fixed and
229 growth mindsets; our findings are a conservative estimate in this respect.

230 *Future Direction*

231 Further work is needed to gain a better understanding of these results using qualitative
232 research. Our students have been shown the initial aggregated results of our research and
233 volunteers have taken part in individual interviews to give us a richer qualitative
234 understanding of the findings.

235 The results of both the qualitative and quantitative research will inform future development
236 of our veterinary curriculum. For example, introducing sessions discussing mindset and
237 recent evidence relating to an individual's ability to continue to develop their intellect over
238 their whole life. We will also consider the feedback and assessment methods used. We
239 intend to improve feedback to be always related to a specific behaviour rather than the
240 person as a whole e.g. "Your catheter placement technique worked well, you made sure
241 that you had everything you needed ready before you started and held the catheter
242 correctly" rather than "You are excellent at placing catheters". We hope to increase the
243 number of pass/ fail assessments with formative specific feedback to drive improvement,
244 with multiple attempts to pass. Hand in hand with this we would reduce the number of
245 assessments where students get a grade or mark that gives a rank within their year group.
246 These ranking assessments encourage a focus on how they did compared to others rather
247 than whether they can perform at a good enough standard.

248 Changes to feedback and particularly assessment are not easy to make. Many of our
249 students want to know their ranking within a year group and want the opportunity to show
250 they are better than others. Throughout their life doing well compared to others is what
251 they have been encouraged to aim for and they believe that this will improve their self-
252 esteem. This comparative data is also required for some job applications in the UK and most

253 in the USA. Everyone on Veterinary Medicine courses was given a place because they have
254 performed well academically compared to others and it is essential that we can select
255 students with sufficient intellect to perform well enough on the course. We need
256 assessment that will allow us to differentiate applicants academically, so we cannot remove
257 comparative assessment completely. But, our results suggest that if we were able to reduce
258 the comparative nature of our assessments and increase feedback focussing on the process
259 rather than the person we would see an increase in the number of students with a growth
260 mindset relating to their intelligence. If the evidenced link is causal this could in turn
261 improve the psychological well-being of our profession.

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