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

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Abstract

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

Introduction

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

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

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

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

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

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

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

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

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

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

Method

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

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

The questions to measure psychological well-being are widely used and validated with regard to reliability and validity²⁰. The questions are constructed to measure the psychometric dimensions of autonomy, environmental mastery, personal growth, positive relations with others, purpose in life and self-acceptance. We deliberately chose these scales to avoid questions involving negative aspects of poor psychological well-being, e.g. suicide or self-harm, to minimise potential distress from completing the questionnaire. Information from the psychological well-being questionnaire does not give us specific scores or have cut points for defining high or low well-being. We summarised each student's score for each dimension using a mean of their numerical 1 – 6 likert scale responses after reversing the scores for any negative questions²⁰.

Mindset relating to intelligence was evaluated using the standard methodology developed by Carol Dweck¹⁵. Each questionnaire included eight questions. Four positive questions were interspersed with four negative questions to prevent students from giving the same answer to every question and to allow us to internally validate the responses. The responses to the 4 positive questions were used to calculate a mean mindset score. This method replicated previous practice using these questions. The numerical mindset score was then converted to an ordinal outcome of 'fixed', 'intermediate' or 'growth' using cut-points of 3.0 and 4.0 as described by Dweck¹⁵. Students that didn't respond to all four specific mindset questions were excluded from further analysis.

The relationship between psychometric dimension and mindset was explored graphically and differences in the distribution of scores between students identified as having 'fixed' and 'growth' mindsets were tested statistically. We used the Mann-Whitney U Test under the conservative assumption that the mean psychometric dimension scores are an ordinal scale. A critical p-value of 0.05 was used for all comparisons. The R Statistical system²¹ was used for data management, plotting and hypothesis testing.

Results

Data

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

Mindset

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

Figure 1

Mindset and psychometric dimensions

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

Figure 2

Table 1 Summary statistics for each psychometric dimension sub-grouped by mindset. P-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	

Discussion

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

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

These findings may have implications for how we assess and give feedback to students in Universities. More careful consideration of this aspect may lead to improvements in the mental health of our students. Mindset and psychological well-being are both variable and malleable so we may have an opportunity to influence the mental well-being of our students in a way that has not been explored before. It has been shown¹⁵ that person praise and performance assessment can induce a fixed mindset in students, so by using methods that have been shown to induce a growth mindset, e.g. praising effort and goal focussed assessment we may be able to improve their psychological well-being.

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

This work raises concerns about the repeated pressure on schools to increase testing and bring in formal teaching and comparative assessment in Maths and English at a younger age. All pupils, but particularly the high achieving girls at school, are in greater danger of developing a fixed mindset relating to their intelligence¹⁵ which now we have linked to significantly poorer mental health. It is crucial that this issue is considered when curriculum and teaching / assessment strategies are developed at the highest (government) level.

A new curriculum for excellence was introduced to Scottish Schools in 2011^{22, 23}, intended to significantly reduce the number of performance based assessments in school with the feedback given being specific to the given task and process rather than 'person focussed'. There is a far greater emphasis on process and reflection on how to improve. We would expect this change to increase the number of young people with a growth mindset relating to their intelligence²² and hence would expect to see a significant improvement in the mental health of pupils following the new curriculum in Scotland. These pupils will enter higher education in September 2016, offering an opportunity for a natural experiment; we will be closely observing this year group as they start on our course.

Limitations

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

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

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

Future Direction

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

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

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

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

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