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# Challenging identity: Development of a measure of veterinary career motivations

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# 1 Challenging identity: development of a measure of veterinary 2 career motivations

## 3 4 **ABSTRACT**

### 5 6 **Background**

7 While little is known about the motivations underpinning veterinary work, previous  
8 literature has suggested that the main influences on veterinary career choice are  
9 early/formative exposure to animals or veterinary role models. The aim of this study  
10 was to develop and provisionally validate a veterinary career motivations  
11 questionnaire to assess the strength of various types of career motivations in  
12 graduating and experienced veterinarians.

### 13 **Methods**

14 A cross-sectional sample of experienced veterinarians ( $N=305$ ) and a smaller cohort  
15 of newly-graduated veterinarians ( $N=53$ ) were surveyed online using a long-form  
16 questionnaire. Exploratory factor analysis (EFA) was used to iteratively derive a final,  
17 short-form questionnaire for survey of a second cross-sectional sample of  
18 experienced veterinarians ( $N=751$ ).

### 19 **Results**

20 EFA derived a final questionnaire with 22 items loading onto six factors (*social*  
21 *purpose, animal orientation, vocational identity, challenge and learning, career*  
22 *affordances, and people orientation*). While motivations based in *animal orientation*  
23 were predictably strong, those based in *vocational identity* were not universal and  
24 were weaker in younger and graduate veterinarians; both of these motivations were  
25 rated lower by males. Motivations based in *challenge and learning* emerged as some  
26 of the strongest, most universal and most influential; *people orientation* and *social*  
27 *purpose* were also important, particularly for older veterinarians.

### 28 **Conclusion**

29 The major motivations for pursuing a veterinary career may best be represented as  
30 an intrinsic passion for animal care and for learning through solving varied  
31 challenges. These motivations are largely intrinsically oriented and autonomously  
32 regulated, thus likely to be supportive of work satisfaction and wellbeing.

33  
34

## 35 INTRODUCTION

36

37 What motivates people to become veterinarians, and what provides ongoing motivation for  
38 veterinarians in their work? While it might be assumed that the barrier of highly competitive  
39 selection implies strong career motivations in incoming veterinary students, little is known  
40 about the nature of these motivations and how they evolve across the transition to work, or  
41 across the career lifespan. Several propositions are clearly flagged in the literature: that  
42 people decide to become veterinarians at an early age,<sup>1-6</sup> and that this decision is typically  
43 influenced by formative exposure to animals<sup>1-4,7</sup> or veterinary role models.<sup>4,5,7,8</sup> However  
44 these factors describe more the *narrative* of initial career choice, than the ongoing or future  
45 motivations that veterinarians might seek in their work. By contrast, an exploratory  
46 qualitative study of the career motivations stated by graduating Australian veterinary  
47 students<sup>9</sup> found that statements of early vocational identity were not prominent. Rather,  
48 graduates stated a broad range of reasons for becoming a veterinarian in addition to animal-  
49 oriented identity, including themes such as love of learning, challenge and problem-solving,  
50 variety, social relatedness, helping people, social contribution, and career opportunity. An  
51 interview-based qualitative study in the UK found similar themes of intrinsic interest in  
52 scientific problem-solving, and navigating belongingness.<sup>6</sup>

53

54 Some data suggest gender differences in veterinary career motivations, which are of interest  
55 given the strong gender bias in those entering the profession.<sup>3,5,10</sup> In Heath's longitudinal  
56 studies, female students reported deciding to enter veterinary science earlier, and were  
57 more influenced by 'love of animals' and 'interest as a child in living things' relative to males,  
58 who were more influenced by income.<sup>10</sup> Ilgen *et al.*<sup>7</sup> found in the US that females were  
59 more likely to report being attracted to the career by the experience of owning a pet and  
60 the opportunity to care for animals, while men were more likely to be attracted by career  
61 status or "the rigour of the educational environment".<sup>(p. 1590)</sup> Similarly in UK veterinary  
62 students, females were more likely to confirm 'owning an animal', 'something I always  
63 wanted to do' and 'visited a vet with a sick animal' as reasons for choosing a veterinary  
64 career, while males were more likely to indicate 'hardest course to get into', 'to join a  
65 profession' and 'want to train as a scientist'.<sup>11</sup> In a French study, Sans *et al.*<sup>5</sup> found the  
66 themes of 'passion', 'vocation/dream job', 'varied job', 'animal welfare', and 'liking animals'  
67 were more frequently cited by female students, while males were more likely to state 'high  
68 income' or 'well-thought-of job'. Female veterinary students have been shown to have

69 greater concerns for animal welfare than males,<sup>2,10</sup> and similar bias towards animal welfare  
70 has been shown in the context of analgesia provision by female veterinarians.<sup>12,13</sup>

71

72 While most of these studies have approached veterinary career motivations in the context  
73 of college admissions and future workforce planning, motivation influences a wide range of  
74 important outcomes including work performance, engagement, learning, and job  
75 satisfaction. A small but consistent body of evidence shows that veterinarians find job  
76 satisfaction from intellectual challenge and learning, from client and colleague relationships,  
77 and from 'making a difference' through helping animals, people, and society.<sup>14-16</sup> Motivation  
78 is also a central factor in veterinarian resilience and wellbeing.<sup>9,17</sup> One major theoretical  
79 framework linking motivation and wellbeing is Self-Determination Theory (SDT),<sup>18</sup> which  
80 concerns the quality, rather than the quantity, of the motivations underpinning behavioural  
81 choices, particularly the degree to which these are self-regulated and autonomous. SDT  
82 broadly divides motivations into those that are *intrinsic* (inherently rewarding) versus those  
83 that are *extrinsic* (for attainment of an external goal or reward separable from the activity  
84 itself). These can be further subdivided into a continuum in which extrinsic motivations are  
85 categorised by the degree to which they are internalised, and thus supportive of  
86 fundamental psychological needs for competence, relatedness, and autonomy. Motivations  
87 closer to the intrinsic/autonomous end of the SDT continuum have been associated with  
88 positive psychological consequences.<sup>18</sup> In the context of medical education, the Academic  
89 Motivation Scale (AMS) builds on SDT by further subdividing intrinsic motivations according  
90 to their alignment with the needs to *know*, to *accomplish*, or to experience *stimulation*.<sup>19</sup>  
91 This scale has itself been adapted and validated for veterinary education by Vandeweerd *et*  
92 *al.*<sup>20</sup> as the 'Veterinary Motivation Test'. Cake *et al.*<sup>9</sup> similarly found that SDT and the AMS  
93 formed a useful explanatory framework for typifying the career motivations stated by  
94 graduating veterinary students.

95

96 Notwithstanding the consistency of the above evidence, this study was designed to address  
97 several knowledge gaps around veterinary career motivations. Most studies of motivation  
98 have sampled undergraduates, rather than working veterinarians, and have discussed the  
99 likelihood that regardless of a person's initial motivations for entering veterinary science,  
100 these may change across their career.<sup>1,3,5-7,9</sup> This leaves open questions around whether  
101 patterns of career motivations are similar between veterinary students and experienced  
102 veterinarians, and thus by inference how these change over time or with increasing work

103 experience. Comparison of motivation between populations or over time ideally requires a  
104 career motivation questionnaire that has been designed and validated for veterinary  
105 contexts. The structure and wording of the 'Veterinary Motivation Test' developed and  
106 validated by Vandeweerd *et al.*<sup>20</sup> render it principally suitable for student contexts.  
107 Accordingly, the aims of this study were to develop and pilot a veterinary career motivations  
108 questionnaire, and apply this to assess the strength of various types of career motivations in  
109 graduating and experienced veterinarians. In order to establish construct validity, the  
110 sensitivity of the instrument to predicted gender effects was tested, as well as the  
111 relationship between career motivations and basic demographics including age and type of  
112 practice.

113

114

## 115 **METHODS**

116

### 117 **Sampling**

118 Three survey samples were collected independently, two within a broader study of  
119 veterinarian resilience conducted as part of the VetSet2Go project ([www.vetset2go.edu.au](http://www.vetset2go.edu.au)).  
120 Briefly, a cross-sectional sample of experienced veterinarians in 2016 (survey 1) and a  
121 smaller cohort of newly-graduated veterinarians in 2016 (survey 2) were surveyed using a  
122 long-form questionnaire; exploratory factor analysis (EFA) and iterative item reduction was  
123 then used to derive a short-form questionnaire for survey of another large, cross-sectional  
124 sample of experienced veterinarians in 2017 (survey 3). All surveys were administered online  
125 using SurveyMonkey ([www.surveymonkey.com](http://www.surveymonkey.com)). Recruitment for the first sample was by an  
126 invitation appended to another survey related to employability, which was distributed  
127 through veterinary journals and organisations in Australia, New Zealand, the UK and parts of  
128 the USA. New graduate veterinarians (survey 2) were recruited at the point of graduation,  
129 from the 2016 cohort of graduating students at five Australian veterinary schools (University  
130 of Adelaide, University of Sydney, University of Melbourne, Murdoch University, and James  
131 Cook University) by emailed invitations distributed via internal university mailing lists  
132 immediately after the final examinations. The short-form questionnaire (survey 3) was  
133 included in a longer survey for a study of resilience in veterinarians. An email invitation to  
134 join the study was distributed via professional groups including Australian state veterinary  
135 registration boards, the Australian Veterinary Association, and the VetSet2go project. The  
136 survey was available during August-November 2017 for a period of 3 months. This study was



137 approved by the University of Adelaide Human Research Ethics Committee (H-2015-257, H-  
138 2016-206, H-2017-073) and all participants consented to use of their anonymised responses  
139 for this purpose.

140

#### 141 **Questionnaire**

142 Initial questionnaire development was based on the exploratory study of Cake *et al.*,<sup>9</sup> which  
143 captured the range of career motivations stated by graduating veterinarians using a free-  
144 response Ten Statements Test,<sup>21</sup> and coded these into themes mapped against major  
145 motivational theories including SDT and expectancy-value theory. This precursor study  
146 effectively established the conceptual framework, and face and content validity for the  
147 questionnaire developed in the present study. The Factors Influencing Teaching Choice (FIT-  
148 Choice) questionnaire developed for teacher education<sup>22</sup> provided an additional framework  
149 for item development.

150

151 Based primarily on participant's free-choice responses in Cake *et al.*,<sup>9</sup> the long-form iteration  
152 of the questionnaire included 71 items under the stem question '*I am motivated to be a*  
153 *veterinarian because...*', rated by a five-point Likert scale for their importance to the  
154 respondent's motivation to be a veterinarian (1: not at all like me, 2: rarely like me, 3:  
155 sometimes like me, 4: often like me, 5: very much like me). Items were selected to test a  
156 wide range of hypothesised motivation factors based on Cake *et al.*<sup>9</sup> and Watt &  
157 Richardson's<sup>22</sup> FIT-Choice framework, including prior experiences, self-beliefs (e.g., ability  
158 beliefs), intrinsic value, task demand, task return, and 'fallback career'. In order to test  
159 convergent validity in the absence of suitable validated comparison measures, four items  
160 were added to provide global measures for motivation ('*My work as a veterinarian is*  
161 *motivating*'; '*I am motivated to remain a veterinarian*') and career satisfaction ('*I am very*  
162 *satisfied with my choice of becoming a veterinarian*'; '*Working as a veterinarian gives me*  
163 *great satisfaction*').

164

#### 165 **Analysis**

166 Data were analysed using SPSS Statistics (v. 24.0, IBM). Normality of data was confirmed  
167 from histogram shape, Q-Q plots, skewness and kurtosis as well as Kolmogorov-Smirnov and  
168 Shapiro-Wilk tests. In order to reduce the length of the questionnaire and distil its  
169 component structure, EFA was performed using principal axis factoring with oblique rotation  
170 (oblimin with Kaiser normalisation). Items were removed in a iterative procedure to

171 stepwise eliminate items with weak loading (less than 0.4), generalised loading onto  
172 multiple factors, or poor fit to other items in emergent factors (*i.e.*, poor content validity and  
173 interpretability).<sup>23,24</sup> Sampling adequacy was assessed using the Kaiser-Meyer-Olkin test and  
174 Bartlett's test of sphericity. Validity of factors was established from scree plot (Cattell's test)  
175 and eigenvalues of  $\geq 1$ . Cronbach's alpha was used to establish internal consistency of final  
176 factors; an alpha of 0.7-0.9 was considered good.<sup>23</sup> Effect of item removal was also tested  
177 (*i.e.*, that item deletion did not result in improvement of alpha for the remainder). A  
178 minimum of three items were retained per factor.<sup>24</sup> Using the same method, EFA was  
179 independently repeated for the short-form questionnaire data from survey 3.

180

181 Item means were compared by gender, and for new graduate versus experienced  
182 veterinarians (*i.e.*, survey 2 versus survey 1+3 combined) by independent Student's *t*-tests.  
183 Correlations between factor subscales were determined by Pearson's correlation coefficient  
184 from the combined (surveys 1-3) sample, and also correlations against the global satisfaction  
185 and motivation measures where included (surveys 1 and 2). The effect of demographic  
186 factors (age, gender, practice type) on factor subscales was tested by multivariate general  
187 linear regression with age in years as a covariate. Practice type was categorised into small  
188 animal practice, large animal practice (including production animal, equine and mixed  
189 practice), and non-clinical work (government, industry, academia, research, etc.). The  
190 treatment of Likert ratings as interval data and the use of parametric tests followed Rattray  
191 & Jones<sup>23</sup> and Norman<sup>25</sup> who found these tests robust to violations of assumptions. *P*-values  
192 of  $<0.05$  were considered statistically significant.

193

194

## 195 **RESULTS**

196

197 Across the three surveys, 1081 participants provided sufficiently complete responses for  
198 inclusion; 69% of all respondents were female. The mean (median) age of respondents was  
199 43.6 (43.0) years in survey 1 ( $N=305$ ), 25.6 (24.0) years in new graduate survey 2 ( $N=53$ ), and  
200 45.5 (43.0) years in survey 3 ( $N=751$ ). In the first survey the nationality or location of  
201 respondents was not known, but most were graduates of Australian veterinary schools, with  
202 a minority from schools in the UK and Europe (13%), USA (4%), New Zealand (2%) and  
203 elsewhere ( $<1\%$ ). In survey 3, nearly all respondents were registered in Australia (98%),  
204 though some were trained elsewhere including the UK and Europe (5%), New Zealand (2%),

205 and the USA (1%). Because of the open survey distribution via third parties, response rates  
206 could not be calculated.

207

208 For the initial EFA, the Kaiser-Meyer-Olkin statistic (0.815) and Bartlett's sphericity test  
209 ( $P < 0.0005$ ) confirmed adequacy of sample size and correlation assumptions. Although  
210 acceptable normality of data was confirmed for all items, some items showed some mild-  
211 moderate skewness towards higher ratings. However, this was considered acceptable for  
212 EFA which does not require strict assumptions of normality. EFA extracted 6-8 valid factors  
213 at each stage of stepwise item reduction, which was performed in seven steps. The  
214 predominant themes of factors transiently identified at each iterative step included: *animal*  
215 *orientation, people orientation, love of challenge and learning, problem-solving, variety,*  
216 *social contribution, vocational identity, job security/stability, and job opportunity.* Several of  
217 these themes coalesced during stepwise item reduction to yield a final structure with 22  
218 items loading to six factors: *social purpose, animal orientation, vocational identity, challenge*  
219 *and learning, career affordances, and people orientation (Table 1).* These factors explained  
220 70.4% of the variance. Cronbach's alpha coefficients indicated good internal consistency that  
221 could not be improved by item deletion for most factors, albeit marginal for *career*  
222 *affordances*, potentially indicating some heterogeneity in this construct. The item '*I want to*  
223 *help people*' cross-loaded onto *people orientation* and *social purpose*, but was retained in  
224 *people orientation* due to its high content validity. Identical factor structure and similar  
225 internal consistency were found when EFA was repeated with the reduced 22-item  
226 questionnaire in survey 3.

227

228 *TABLE 1 NEAR HERE*

229

230 A number of highly-rated items eliminated during the EFA aligned to the intrinsic motivation  
231 subtypes of the AMS, for *knowledge ('I am interested in the science (biology, physiology,*  
232 *medicine)'*,  $4.30 \pm 0.86$ ), for *achievement ('I like achieving good outcomes for patients'*,  
233  $4.38 \pm 0.80$ ; '*I like achieving good outcomes for clients'*,  $4.22 \pm 0.79$ ) and for *stimulation ('It is*  
234 *an interesting job'*,  $4.22 \pm 0.76$ ; '*I find veterinary work stimulating'*,  $4.07 \pm 0.87$ ). While  
235 consistent with theories of motivation, these items failed to load with the final factors.

236

237 The most highly rated items in the final derived questionnaire (**Table 1**) comprised the  
238 *animal orientation* and *challenge and learning* factors, while the lowest rated items were in

239 *career affordances*. Items in *vocational identity* had the most variable responses (*i.e.*, highest  
240 standard deviation), with over a quarter of respondents rejecting (*i.e.*, score 1 or 2) the  
241 statements '*I've always wanted to be a veterinarian*' and '*It is all I've ever wanted to be*'.  
242 Item ratings in the new graduate cohort (survey 2) were significantly higher compared to  
243 more experienced veterinarians for multiple items, but significantly lower for two items  
244 within *vocational identity* ('*I've always wanted to be a veterinarian*' and '*It was a childhood*  
245 *dream to become a veterinarian*') and the item '*It provides a decent income*'. Item ratings by  
246 female respondents were higher compared to males for all items in the *vocational identity*  
247 and *animal orientation factors*, but significantly lower for '*It provides a decent income*' and  
248 '*There are lots of career opportunities as a veterinarian*'. These gender effects were  
249 confirmed at subscale level by multivariate regression (**Table 2**). Respondent age was  
250 positively correlated with subscale scores for *vocational identity*, *challenge and learning*,  
251 *people orientation*, and *social purpose*. Compared to small animal practice, large animal  
252 practice was positively associated with higher subscale ratings for *challenge and learning*.  
253 Compared to clinical (small animal and large animal) practice, non-clinical practice was  
254 associated positively with motivations in *challenge and learning*, *social purpose* and *career*  
255 *affordances*, and negatively with *people orientation*.

256

257 **TABLE 2 NEAR HERE**

258

259 Bivariate correlations between subscales (**Table 3**) showed that while all correlations were  
260 statistically significant, *vocational identity* correlated most strongly with *animal orientation*,  
261 while the *people orientation*, *social purpose* and *career affordances* subscales correlated  
262 most strongly with each other. While all factor subscales were significantly correlated with  
263 the global motivation and global satisfaction items included in surveys 1 and 2 (treated as  
264 respective global estimates), the *vocational identity* and *animal orientation* subscales were  
265 found to correlate mostly weakly with these global measures. Cronbach's alpha values for  
266 the global motivation and global satisfaction measures were 0.72 and 0.88 respectively.

267

268 **TABLE 3 NEAR HERE**

269

270

271 **DISCUSSION**

272

273 This study aimed to develop and provisionally validate a veterinary career motivations  
274 questionnaire, in order to survey the quality of motivations (*i.e.*, subtypes or patterns of  
275 motivation, rather than general level of motivation) underpinning veterinary career choices.  
276 The breadth and factorial pattern of the motivations included in the final derived instrument  
277 generally support the motivational taxonomy and conclusions of the precursor exploratory  
278 study by Cake *et al.*,<sup>9</sup> namely that there are multiple strong motivations for veterinary work  
279 including, but clearly not limited to, early vocational identity and affinity for animals. This  
280 only partially supports the predominant view from earlier literature, that the major  
281 veterinary career motivations are a strong sense of vocational identity<sup>1-6</sup> developed  
282 alongside a love of animals.<sup>1-4,7</sup> While *vocational identity* was indeed found to be correlated  
283 with *animal orientation* and endorsed as a career motivation by a large subset, identity-  
284 based motivations were rejected by over a quarter of respondents and rated significantly  
285 lower by younger and recently graduated veterinarians. This suggests that vocational  
286 identity forms a relatively stronger motivation for older veterinarians; alternatively this may  
287 possibly indicate a generational shift in the importance of formative/childhood experiences  
288 as motivations for pursuing veterinary careers. Motivations formed around *vocational*  
289 *identity*, and to a lesser extent *animal orientation*, were also found to have the weakest  
290 correlation to global motivation and satisfaction, subject to the caveat that these simple  
291 global estimates were unvalidated.

292

293 By contrast, motivations based in *challenge and learning* (*e.g.*, love of learning and problem-  
294 solving) were found to be among the highest rated, most universal, and most influential (*i.e.*,  
295 most strongly correlated to global motivation and satisfaction). This aligns with the  
296 conception of Armitage-Chan *et al.*<sup>26</sup> of the veterinary professional as one who navigates  
297 challenges and solves problems in order to help animals, people and society. Results also  
298 suggest that motivations in *challenge and learning* may become increasingly important for  
299 older veterinarians, and are positively associated with career choices in large animal and  
300 non-clinical practice. Motivations comprising *animal orientation* were also highly rated, in  
301 line with previous literature<sup>1-5,7,9</sup> and as might be expected in predicting why intelligent,  
302 medically-minded people might choose to pursue veterinary rather than human healthcare.  
303 Since many veterinary entrants might potentially have also satisfied entry requirements for  
304 medical or paramedical courses, they may have already decided significant life choices based  
305 on their stronger motivations for animal versus human care. Importantly though, *animal*  
306 *orientation* motivations should not be viewed as inversely correlated with human-oriented

307 or social motivations, since these were instead found to be (weakly) positively correlated.  
308 While motivations around *people orientation* and *social purpose* may become more  
309 important with age and experience as suggested by Cake *et al.*,<sup>9</sup> *animal orientation*  
310 motivations apparently remain very strong across veterinary careers. In line with prior  
311 literature,<sup>3,15,27-30</sup> extrinsic motivations here comprising *career affordances*, particularly '*It*  
312 *provides a decent income*', were found to be comparatively less important, except perhaps  
313 for those pursuing non-clinical careers. This adds to already comprehensive evidence that  
314 veterinarians are not strongly motivated by financial gain,<sup>31</sup> a point noted as being  
315 potentially at odds with the status of many veterinarians as fee-for-service providers within  
316 small businesses.<sup>32</sup>

317

318 As predicted from previous studies<sup>2,3,5,7,10</sup> gender significantly influenced the pattern of  
319 veterinary career motivations, with female respondents rating *vocational identity* and  
320 *animal orientation* more highly, and some aspects of *career affordances* (income,  
321 opportunities) lower. This closely aligns to various reports that female veterinary students  
322 are more likely to indicate a love of animals,<sup>3,5,7,10</sup> a sense of vocational identity<sup>5,11</sup> and  
323 concern for animal welfare,<sup>2,5,10</sup> while male students are more likely to be attracted to the  
324 profession by potential income<sup>5,10</sup> or status.<sup>5,7,11</sup> Similar patterns have been reported for the  
325 academic motivations of medical students, with females higher in intrinsic motivation  
326 subscales, while males are more extrinsically motivated.<sup>19,33</sup> However gender effects were  
327 notably absent in surveys of French and Belgian students using a comparable instrument the  
328 Veterinary Motivation Test,<sup>20</sup> suggesting a difference in either that sample population, or  
329 the items and subscale structure of that questionnaire.

330

331 Cake *et al.*<sup>9</sup> found that the stated motivations of newly graduated veterinarians included  
332 multiple intrinsic and extrinsic motivations as defined by SDT,<sup>18</sup> but that this dichotomy was  
333 somewhat forced, for example in splitting the love of animals (intrinsic) from the desire to  
334 reduce animal suffering (extrinsic). Such motivations comprised a single factor in the present  
335 study, supporting the internalised, autonomously-regulated nature of motivations based in  
336 helping animals and people. Similarly while intrinsic motivations for learning,  
337 accomplishment and stimulation were strong, these did not resolve into distinct factors as in  
338 some academic motivation scales.<sup>19,20,34</sup> Rather, the factors resolved in this study reflected  
339 more the *subject* of the motivations (*i.e.*, animals, people, society or self). Nevertheless, the  
340 motivations broadly aligned with SDT macrotheory in reflecting fundamental needs for

341 competence (*challenge and learning*), relatedness (*people orientation*), and autonomy (in  
342 the sense of personally congruent and meaningful purpose). Motivations that are intrinsic or  
343 autonomously-regulated in the SDT continuum are predictive of positive psychological  
344 outcomes.<sup>18,35</sup> These findings again demonstrate the potential alignment of veterinary  
345 career motivations with known sources of work satisfaction,<sup>14-16</sup> job characteristics  
346 associated with positive outcomes,<sup>30</sup> and predictors of eudaimonic wellbeing (*i.e.*, wellbeing  
347 based in self-actualisation and meaningful fulfillment)<sup>18,36</sup> as outlined conceptually by Cake  
348 *et al.* (2015).<sup>14</sup> For example, motivations based in helping others (animals, people) align to  
349 the elements of meaning or purpose prominent in the models of wellbeing used in positive  
350 psychology.<sup>14,36</sup>

351

352 This study provisionally established the validity of a 22-item questionnaire measuring the  
353 quality of veterinary career motivations. Content validity was established since the items  
354 were derived from authentic responses, and matched key predictors of motivation and work  
355 satisfaction identified in the literature.<sup>14,30</sup> Construct validity was demonstrated by the  
356 stability of factor structure across multiple cohorts, and by sensitivity and specificity at  
357 subscale level to known gender differences predicted from previous studies, as well as other  
358 demographic factors. Convergent validity was demonstrated by correlation with global  
359 estimates, though the unvalidated and *ad hoc* nature of these global measures is  
360 acknowledged. However, this questionnaire should not be considered to be fully validated  
361 and cautious use is recommended with further validation in other contexts. Several  
362 limitations of this study are acknowledged. Like the AMS, the instrument measures the  
363 quality or type of motivation, and has not been validated as a measure of strength of  
364 motivation. The sample population was mainly Australian, hence the findings and  
365 questionnaire validity may not be generalisable to other cultural contexts. All measures  
366 were self-reported, and subject to possible bias such as social desirability or evaluator  
367 apprehension bias. Some skewness of ratings towards the maximum may have affected  
368 analyses, although EFA, alpha coefficients<sup>37</sup> and the parametric statistics applied to ordinal  
369 Likert scales are generally considered robust to non-normality.<sup>23,25</sup> Future use of a 7-point  
370 scale may resolve skewness towards maximal scores. Inter-item correlations and alphas for  
371 *vocational identity* were high, indicating likely redundancy in the three retained items; one  
372 of these items could be safely removed, or this subscale omitted if not a variable of interest  
373 in future studies.

374

375

376 **CONCLUSION**

377

378 This study provides fresh insights into the career motivations of veterinarians, which are not  
379 well studied beyond veterinary student studies and scant data on job satisfaction.<sup>6,14-16</sup>

380 Cross-sectional surveys using a provisionally validated veterinary career motivations  
381 questionnaire confirmed that there are multiple strong motivations for veterinary work,  
382 beyond the early vocational identity and love of animals typically stated in existing  
383 literature. Rather, the major motivations for pursuing a veterinary career may best be  
384 represented as an intrinsic passion for animal care and for learning through solving varied  
385 challenges. People- and community-oriented social purpose are also important motivations,  
386 which may become stronger in older, experienced veterinarians.

387

388 These findings have implications for educational and workplace interventions around the  
389 work satisfaction and wellbeing of veterinarians. Veterinary career motivations should not  
390 be viewed as one-dimensional or fixed by prior experiences. Rather, they are broad and  
391 multifactorial and vary between different people, most notably in distinct gender differences  
392 but also for veterinarians pursuing different career paths. A strong sense of vocational  
393 identity is expressed by many veterinarians but is not necessary or predictive. Importantly,  
394 the career motivations of veterinarians are shown to be largely intrinsically oriented and  
395 autonomously regulated, thus likely to be supportive of work satisfaction and wellbeing. This  
396 points to the value of appreciating and enabling the motivations underpinning veterinary  
397 work. Raised awareness and facilitation of an individual's particular set of motivations  
398 potentially supports the fulfillment and satisfaction they gain from work, with positive  
399 effects on mental health and wellbeing as well as flow-on benefits to work engagement and  
400 performance.<sup>18,30</sup> The veterinary career motivations questionnaire developed and  
401 provisionally validated in this study may facilitate awareness by providing insights into the  
402 motivation patterns of individuals and demographic groups.

403

404

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411

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416

#### 417 **COMPETING INTERESTS**

418 None declared

419

#### 420 **ETHICS APPROVAL**

421 This study was approved by the University of Adelaide Human Research Ethics Committee  
422 (H-2015-257, H-2016-206, H-2017-073)

423

#### 424 **REFERENCES**

425 1 Heath TJ, Lynch-Blosse M, Lanyon A. A longitudinal study of veterinary students and  
426 recent graduates. 1. Backgrounds, plans, and subsequent employment. *Aust Vet J*  
427 1996;74:291–6.

428 2 Serpell JA. Factors influencing veterinary students' career choices and attitudes to  
429 animals. *J Vet Med Educ* 2005;32:491–6.

430 3 Tomlin JL, Brodbelt DC, May SA. Influences on the decision to study veterinary  
431 medicine: variation with sex and background. *Vet Rec* 2010;166:744–8.

432 4 Amass SE, Davis KS, Salisbury SK, Weisman JL. Impact of gender and race-ethnicity  
433 on reasons for pursuing a career in veterinary medicine and career aspirations. *J Am*  
434 *Vet Med Assoc* 2011;238:1435–40.

435 5 Sans P, Mounier L, Benet J-J, Lijour B. The motivations and practice-area interests of  
436 first-year French veterinary students (2005-2008). *J Vet Med Educ* 2011;38:199-206.

437 6 Cardwell JM, Lewis EG. Vocation, belongingness, and balance: a qualitative study of  
438 veterinary student wellbeing. *J Vet Med Educ* 2017;44:29–37.

439 7 Ilgen DR, Lloyd JW, Morgeson FP, Johnson MD, Meyer CJ, Marrinan M. Personal  
440 characteristics, knowledge of the veterinary profession, and influences on career  
441 choice among students in the veterinary school applicant pool. *J Am Vet Med Assoc*  
442 2003;223:1587–94.

- 443 8 Lenarduzzi R, Sheppard GA, Slater MR. Factors influencing the choice of a career in  
444 food-animal practice among recent graduates and current students of Texas A&M  
445 University, College of Veterinary Medicine. *J Vet Med Educ* 2009;36:7–15.
- 446 9 Cake MA, Mansfield CF, McArthur ML, Zaki S, Matthew SM. An exploration of the  
447 career motivations stated by early career veterinarians in Australia. *J Vet Med Educ*  
448 *(in press)*.
- 449 10 Heath TJ, Lanyon A. A longitudinal study of veterinary students and recent  
450 graduates. 4. Gender issues. *Aust Vet J* 1996;74:305–8.
- 451 11 Tomlin JL, Broadbelt DC, May SA. Veterinary students' understanding of a career in  
452 veterinary practice. *Vet Rec* 2011;166:781–6.
- 453 12 Capner A, Lascelles BDX, Waterman-Pearson AE. Current British veterinary attitudes  
454 to perioperative analgesia for dogs. *Vet Rec* 1999;145:95–9.
- 455 13 Raekallio M, Heinonen KM, Kuussaari J, Vainio O. Pain alleviation in animals:  
456 attitudes and practices of Finnish veterinarians. *Vet J* 2003;165:131–5.
- 457 14 Cake MA, Bell MA, Bickley N, Bartram DJ. The life of meaning: A model of the  
458 positive contributions to well-being from veterinary work. *J Vet Med Educ*  
459 2015;42:184–93.
- 460 15 Robinson D, Hooker H. The UK veterinary profession in 2006. The findings of a  
461 survey of the profession conducted by the Royal College of Veterinary Surgeons.  
462 London: RCVS, 2006.
- 463 16 Shibly S, Roedel CA, Tichy A. Vet - a 'dream job'? Survey of work-related satisfaction  
464 and possible emotional stressors of veterinarians in a university setting. *Wien*  
465 *Tierarztl Monatsschr* 2014;101:43–9.
- 466 17 Cake MA, McArthur ML, Matthew SM, Mansfield CF. Finding the balance: uncovering  
467 resilience in the veterinary literature. *J Vet Med Educ* 2017;44:95–105.
- 468 18 Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic  
469 motivation, social development, and well-being. *Am Psychol* 2000;55:68–78.
- 470 19 Vallerand RJ, Pelletier LG, Blais MR, Briere NM, Senecal C, Vallieres EF. The Academic  
471 Motivation Scale: A measure of intrinsic, extrinsic, and amotivation in education.  
472 *Educ Psychol Meas* 1992;52:1003–17.
- 473 20 Vandeweerd J-M, Dugdale A, Romainville M. Validation of a psychometric  
474 instrument to assess motivation in veterinary Bachelor students. *J Vet Med Educ*  
475 2014;41:265–74.

- 476 21 Klassen RM, Al-Dhafri S, Hannok W, Betts SM. Investigating pre-service teacher  
477 motivation across cultures using the Teachers' Ten Statements Test. *Teach Teach*  
478 *Educ* 2011;27:579–88.
- 479 22 Watt HMG, Richardson PW. Motivational factors influencing teaching as a career  
480 choice: development and validation of the FIT-Choice scale. *J Exp Educ* 2007;75:167–  
481 202.
- 482 23 Rattray J, Jones MC. Essential elements of questionnaire design and development. *J*  
483 *Clin Nurs* 2007;16:234–43.
- 484 24 Costello AB, Osborne JW. Best practices in exploratory factor analysis: four  
485 recommendations for getting the most from your analysis. *Pract Assess Res Eval*  
486 2005;10:1–9.
- 487 25 Norman G. Likert scales, levels of measurement and the “laws” of statistics. *Adv*  
488 *Health Sci Educ* 2010;15:625–32.
- 489 26 Armitage-Chan E, Maddison J, May SA. What is the veterinary professional identity?  
490 Preliminary findings from web-based continuing professional development in  
491 veterinary professionalism. *Vet Rec* 2016;178:318.
- 492 27 Brown JP, Silverman JD. The current and future market for veterinarians and  
493 veterinary medical services in the United States. *J Am Vet Med Assoc* 1999;215:161–  
494 83.
- 495 28 Cron WL, Slocum JV, Jr., Goodnight DB, Volk JO. Executive summary of the Brakke  
496 management and behavior study. *J Am Vet Med Assoc* 2000;217:332–8.
- 497 29 Heath T. Longitudinal study of veterinarians from entry to the veterinary course to  
498 10 years after graduation: attitudes to work, career and profession. *Aust Vet J*  
499 2002;80:474–8.
- 500 30 Warr P. Work, happiness, and unhappiness. Mahwah NJ: Lawrence Erlbaum  
501 Associates, 2007.
- 502 31 Cake MA, Rhind S, Baillie S. The need for business skills in veterinary education:  
503 Perceptions versus evidence. In: Henry C (Ed). *Veterinary business and enterprise*.  
504 Theoretical foundations and practical cases. London: Saunders Elsevier, 2014:9-22.
- 505 32 Lowe P. Unlocking potential. A report on veterinary expertise in food animal  
506 production. London: Department of Environment, Food and Rural Affairs, 2010.
- 507 33 Kusurkar RA, Croiset G, Galindo-Garré F, Ten Cate OTJ. Motivational profiles of  
508 medical students: association with study effort, academic performance and  
509 exhaustion. *BMC Med Educ* 2013;13:87.

510 34 Orsini C, Binnie V, Evans P, Ledezma P, Fuentes F, Villegas MJ. Psychometric  
511 validation of the Academic Motivation Scale in a dental student sample. *J Dent Educ*  
512 2015;79:971–81.

513 35 Wigfield A, Eccles JS. Expectancy-value theory of achievement motivation. *Contemp*  
514 *Educ Psychol* 2000;25:68–81.

515 36 Boniwell I. Positive psychology in a nutshell. London: PWBC, 2006.

516 37 Sheng Y, Sheng Z. Is coefficient alpha robust to non-normal data? *Front Psychol*  
517 2012;3:34.

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**Table 1:** Items of the final veterinary career motivations questionnaire with subscale reliability (Cronbach's alpha) and factor loadings from exploratory factor analysis, mean ratings (max.=5) by career stage cohort and gender, and percentage agreement (*i.e.*, score 4-5/5).

	Survey sample N=	alpha		Loading		Experienced 1,3 1057	Mean (SD)		% agree 1-3 1110	
		1,2 359	3 751	1,2 359	3 751		New grad. 2 53	Males 1-3 341		Females 1-3 768
<i>I am motivated to be a veterinarian because...</i>										
<b>Vocational Identity</b>		0.94	0.87							
I've always wanted to be a veterinarian				0.94	0.85	3.93 (1.27)	3.42 (1.34)**	3.57 (1.36)	4.05 (1.21)**	69
It was a childhood dream to become a veterinarian				0.93	0.88	3.63 (1.51)	3.17 (1.58)*	3.10 (1.51)	3.84 (1.46)**	60
It is all I ever wanted to be				0.89	0.87	3.39 (1.42)	3.00 (1.43)	2.98 (1.63)	3.55 (1.41)**	52
<b>Challenge &amp; Learning</b>		0.75	0.87							
I like the challenge of veterinary work				0.78	0.73	4.09 (0.85)	4.26 (0.83)	4.16 (0.84)	4.08 (0.86)	78
I like learning new things				0.76	0.68	4.46 (0.70)	4.70 (0.50)*	4.44 (0.68)	4.49 (0.69)	91
I like solving problems				0.64	0.66	4.40 (0.69)	4.60 (0.63)*	4.44 (0.69)	4.40 (0.69)	89
I like the variety of veterinary work				0.47	0.58	4.05 (0.81)	4.42 (0.75)**	4.07 (0.81)	4.07 (0.82)	78
<b>Animal Orientation</b>		0.85	0.89							
I like working with animals				0.82	0.76	4.40 (0.75)	4.58 (0.66)	4.20 (0.84)	4.51 (0.69)**	88
I want to help animals				0.81	0.82	4.27 (0.81)	4.53 (0.67)*	3.98 (0.87)	4.41 (0.75)**	84
I like interacting with animals				0.77	0.86	4.37 (0.76)	4.75 (0.52)**	4.12 (0.82)	4.51 (0.69)**	88
I love animals				0.70	0.81	4.14 (0.96)	4.57 (0.75)**	3.74 (1.05)	4.35 (0.85)**	77
I want to prevent animal suffering				0.63	0.54	4.19 (0.91)	4.57 (0.64)**	3.93 (0.98)	4.33 (0.84)**	81
<b>People Orientation</b>		0.82	0.76							
I like working with people				0.85	0.87	3.61 (1.00)	3.75 (1.04)	3.68 (1.00)	3.59 (0.99)	57
I like interacting with clients				0.83	0.85	3.57 (1.05)	3.87 (1.06)*	3.63 (1.08)	3.56 (1.03)	58
I want to help people				0.64	0.61	3.79 (0.95)	4.08 (1.00)*	3.74 (0.94)	3.84 (0.96)	65
<b>Social Purpose</b>		0.84	0.83							
I want to contribute to society				0.91	0.77	3.95 (0.94)	4.26 (0.96)*	3.90 (0.95)	4.00 (0.93)	72
I can make a difference to society				0.76	0.82	3.60 (0.99)	4.11 (0.99)**	3.61 (1.04)	3.63 (0.97)	55
I can contribute to the community				0.69	0.87	3.75 (0.94)	4.02 (1.11)*	3.79 (0.93)	3.75 (0.96)	62
<b>Career Affordances</b>		0.71	0.63							
It provides a decent income				0.70	0.61	3.01 (1.11)	2.58 (1.01)*	3.23 (1.11)	2.87 (1.08)**	33
It is a respected profession				0.60	0.42	3.48 (1.01)	3.70 (1.03)	3.54 (1.06)	3.47 (0.98)	53
There are lots of career opportunities as a veterinarian				0.59	0.55	3.26 (1.10)	4.00 (0.88)**	3.52 (1.14)	3.20 (1.07)**	44
It offers job security				0.54	0.59	3.57 (1.03)	3.49 (1.03)	3.63 (1.08)	3.54 (1.00)	57

Independent *t*-test \* *P* < 0.05, \*\* *P* < 0.005

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524 **Table 2:** Multiple linear regression analysis (unstandardised  $\beta$  coefficient estimates) for the effect of demographic factors within motivation subscales, including  
 525 practice with a large animal component (*i.e.*, production animal, equine, or mixed practice;  $N=249$ ) and non-clinical practice (*i.e.*, industry, government, research,  
 526 academia;  $N=148$ ). Statistically significant effects are highlighted in bold.  
 527

Factor	Age			Gender			Practice type						Model
	$\beta$	Years F	<i>P</i>	$\beta$	Female F	<i>P</i>	Large animal			Non-clinical			
							$\beta$	F	<i>P</i>	$\beta$	F	<i>P</i>	R
Vocational Identity	<b>0.025</b>	50.90	0.031	<b>2.053</b>	4.65	<0.001	-0.163	0.318	0.573	-0.404	1.32	0.573	0.23
Challenge & Learning	<b>0.020</b>	2.17	0.004	0.258	8.34	0.141	<b>0.398</b>	5.09	0.024	<b>0.539</b>	6.34	0.012	0.14
Animal Orientation	0.019	84.47	0.052	<b>2.222</b>	3.79	<0.001	-0.505	4.30	0.052	-0.181	0.38	0.539	0.30
People Orientation	<b>0.033</b>	2.18	<0.001	0.289	17.5	0.140	-0.028	0.02	0.888	<b>-0.490</b>	4.21	0.040	0.14
Social Purpose	<b>0.020</b>	3.69	0.008	0.366	6.98	0.055	0.044	0.05	0.818	<b>0.959</b>	16.99	<0.001	0.17
Career Affordances	0.016	7.47	0.080	<b>-0.610</b>	3.07	0.006	0.239	1.13	0.288	<b>1.084</b>	15.80	<0.001	0.19

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**Table 3:** Bivariate correlations between motivation subscales ( $N=1108$ ) and global correlates (†survey 1 and 2 only,  $N=352$ ).

	1	2	3	4	5	6	7
1. Vocational Identity	-						
2. Challenge & Learning	0.170**	-					
3. Animal Orientation	0.407**	0.292**	-				
4. People Orientation	0.107**	0.361**	0.182**	-			
5. Social Purpose	0.118**	0.369**	0.263**	0.582**	-		
6. Career Affordances	0.071*	0.352**	0.155**	0.380**	0.425**	-	
7. Global Motivation†	0.130*	0.535**	0.264**	0.418**	0.429**	0.395**	-
8. Global Satisfaction†	0.183**	0.546**	0.255**	0.433**	0.387**	0.440**	0.819**

532 Pearson's correlation \*  $P < 0.05$ , \*\*  $P < 0.005$ .