

Identification of stressors and quantification of stress among veterinary students in India using a cross-sectional questionnaire survey

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Abstract

As an intensive professional training program veterinary education presents high academic and non-academic stressors to students. Identifying the stressors responsible and measuring the stress among veterinary students can prove useful to design any coping strategies to safeguard the mental health of students. The study aimed to identify the responsible stressors, measure the level of stress caused by each kind of stressor, the relation of stress with variables such as gender and family income. For this, 44 items based cross-sectional questionnaire survey was designed and distributed among veterinary students of India. On statistical analysis, the questionnaire yielded high internal consistency. More than 95% of students were found to be under stress. Maximum students reported the highest stress due to academic-related stressors. Female students reported high overall stress, academic stress, and intrapersonal and interpersonal-related stress than male students. Students with lower family incomes experienced more overall stress as well as family responsibilities-related stress. Gender, family income, academic stressors, intrapersonal, interpersonal, and conflict-related stressors, and social activities-related stressors positively predicted the overall stress among the students and thus these factors should be given special emphasis while designing any stress combating or reducing measures for veterinary students of India.

Introduction

Stress is defined as a nonspecific response or reaction shown by the body to the various events or demands made on it. It can be considered as a process by which individuals perceive and cope with adversities in both physical and social environments (Gelberg and Gelberg, 2005). The events including personal or environmental that cause stress is considered stressors. The relationship between the response of an individual to a possible stressful stimulus is complex and is mediated by several variables, such as socio-cultural, psychological, physical, environmental as well as individual factors (Williams et al., 2005).

Veterinary education is a rigorous professional degree program with a heavy workload that demands significant personal time. Although challenges are part of every professional curriculum and in the subsequent phases of life transition, veterinary education has its pattern of situations that may cause students to feel pressured and overwhelmed (Kogan et al., 2005). Due to such a challenging environment, concerns have risen for the mental well-being of veterinary students, specifically the assessment of the impact, prevalence, and management of stress, anxiety, and depression among students (Nahar et al., 2019). Academic stress has been reported as one of the main stressors impacting veterinary medical students' well-being that leads to adverse outcomes such as depression and anxiety (Reisbig et al., 2012). Academic stressors primarily include the speed and the bulk of content to be learned, lack of clinical, study, and time management skills, concerns about being compared with peers, and ethical problems related to learning (McLennan and Sutton, 2005; Killinger et al., 2017). Significant correlations exist between stress, anxiety, and depression, which suggest that veterinary students increasingly experience a significantly higher level of such stressors (Rawson et al., 1994). Veterinary students experience higher

levels of psychological stress as compared to medical students (Yang et al., 2019). Certain reports have claimed that the veterinary student population, experiences stress as a result of information overload, with an emphasis on the need for rote learning, and that students can be at risk of burn-out as they have been loaded with a lot of demands on them (Bushby, 1994).

Students may also have stressors outside of their academic studies, such as family issues or relationships, personal health concerns, and financial concerns (Killinger et al., 2017). For some students, these stressors are associated with mental health problems such as debilitating stress, anxiety, and depression (Reisbig et al., 2012; McArthur et al., 2019). Veterinary students face stress due to academic, interpersonal, intrapersonal, and professional or work-related interactions as well as conflicts between animal and human interests (Williams et al., 2005; Wells et al., 2021). Additionally, students in the fourth and final year of under graduation, postgraduate students involved in clinical practice at university/college clinics can experience emotional aspects of patient and client care when dealing with the death of animals, dealing with particularly challenging clients (angry or volatile) or managing various aspects of the death of animals, due to lack of time for recreation, due to conflicts with staff, and mistakes in diagnosis (Williams et al., 2005).

The stress experienced at graduation level may expand into the professional lives of veterinarians as practicing veterinarians and as academicians (Nahar et al., 2019). Although manageable levels of stress for a reasonable duration might serve an important function in motivating us to meet life's challenges. However, chronic stress can have a deleterious effect on emotional, psychological, and physical health. More and more studies are surfacing now to map the stress, anxiety, and their effects on veterinary students worldwide, but little research about the identification of stressors and quantification of stress associated with these stressors is still lacking worldwide, including in India. In the Indian context, there is hardly any scientific report, about stress, anxiety, or stressors among veterinary students. Veterinary faculties must be aware of the effects of the educational system on students so that they can encourage and assist them whenever possible. Therefore, this study was carried out to collect and analyze the responses of veterinary students of India to various selected academic and nonacademic stressors. To the best of our knowledge and available literature search, this is the first Indian study quantifying the stress and mapping various stressors among veterinary students in India.

Methods

Study design, Sampling, and Procedure

For the present study, a cross-sectional questionnaire survey was designed using Google forms with 50 items initially. After analysis of formal testing responses by a pilot survey on 20 undergraduate (UG) students of the Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India (LUVAS), six items due to irrelevant and controversial nature were excluded, leading to 44 closed items. These were grouped into 6 categories viz. academic-related stressors, teaching, and learning-related stressors, interpersonal, intrapersonal, and expectation related stressors, social and group activities

related stressors, patient, owner, and other conflicts related stressors and practice and career-related stressors based on previous literature and authors' assumptions (Yusoff et al., 2010; Gupta et al., 2015; Jayarajah et al., 2020). Students currently enrolled in various veterinary universities/colleges of India in undergraduate (BVSc & AH) and post-graduate (MVSc and Ph.D.) degree courses were asked to participate in the survey. Participation in the study was voluntary, and consent was obtained to participate in the study. Students who had just completed the final year exam were excluded from the survey as they have just completed the curriculum and could act as a confounding factor. Data collection took place for 5 weeks from July 2021-August 2021, with sharing and reminder messages sent on social media such as WhatsApp groups, LinkedIn, Instagram accounts, and emails.

Survey Instrument

The survey instrument used was made up of 44 web-based items organized into six categories as mentioned above. The first section collected socio-demographic data of students specifically gender, age, religion, family income and degree year, state of residence, and college/university currently studying. The remainder of the items were based on rating the intensity of stress caused by each item on a Likert scale of 0 (causing no stress) to 4 (causing extreme stress) (Likert, 1932). For example, "How much stress heavy workload causes to you?" with a response option on the scale (0-no stress at all; 1-causes mild stress; 2-causes moderate stress; 3- causes high stress; 4- causes severe stress). The items were placed randomly to avoid the carryover effect of responses. Students' responses to all items were anonymous, and the survey instrument was designed to take 10-15 min to complete. The scoring of values for quantification of stress level was done by obtaining the mean values for each of the categories/subscales and the scores are rated as mild (0.00-1.00), moderate (1.01-2.00), high (2.01-3.00), and severe (3.01-4.00).

Data Analysis

All data analyses were performed using the Statistical Package for Social Science (SPSS) v. 20. The questionnaire utilized exploratory factor analysis to determine whether new factors (subscales) could be created and to examine the structure of the relationship between questionnaire items. Principal component analysis using Promax rotation and scree plot was used to extract the factors with an Eigenvalue of more than one. Correlation analysis was used to examine the independence of the factors as a measure of construct validity, and Cronbach's alpha was used to measure each factor's internal reliability and alpha value if an item was deleted (Downing, 2004). The reliability of the new subscales was tested by performing the Cronbach's alpha for each new subscale separately. The new subscales generated were adopted in place of our construct for further analysis. Degree of stress along various domains such as gender, income, professional degree year, and age was done using the Chi-square test, where $p < 0.05$ was taken as significant. The correlation matrix was run to study the inter-item correlations of all factors as well as non-demographic variables. The anti-image correlation was performed to measure sample adequacy for individual items. Internal consistency and reliability of the questionnaire were measured using Cronbach's alpha. The Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity

were used to determine the sampling adequacy and to assess the factorability of the correlation matrix. To justify factor analysis Bartlett's test should be significant and KMO values should exceed 0.60 (Tabachnick and Fidell, 2019).

Results

A total of 611 veterinary students of India from 14 states and 27 colleges/universities provided their consent to participate in the study. Table 1 concludes the participants' demographic breakdown. The mean age of respondents was 23.2 ± 2.8 years old with the majority identified as male (63.6%) respondents. A total of 247 (40.4%) students had family income below 2 lakhs. Maximum students (67.10%) were from undergraduate (BVSc and AH) degree years, followed by MVSc students (27.33%) and Ph.D. students (5.57%).

Construct validity

The exploratory factor analysis was used to determine the construct validity of the questionnaire. The Kaiser-Meyer-Olkin test (KMO) that measures the adequacy of sampling adequacy was applied and the value was found to be 0.957. KMO is a statistic that indicates the proportion of variance in the variables that might be caused by underlying factors and a high value (close to 1.0) generally indicates that factor analysis may be useful with our data. The KMO value obtained for the present study thus indicated the very high sampling adequacy. Bartlett's test of sphericity was found highly significant (chi-square = 1222, $p=0.000$) which again indicated that factor analysis may be useful with our data. The total numbers of components were extracted using principal component analysis and Promax rotation (oblique rotation). The initial exploratory factor analysis resulted in the extraction of 8 factors with Eigenvalue > 1 that collectively explained 56.98% of the overall variance of the data. As several of the 8 factors comprised only two factors and there was shared variance between factors, items were forced to a 6-factor reduction, with suppression of coefficients below 0.30. The 6-factor reduction explained 51.98% of the total variance. The loading of each item to the new factors was based on the factor loading and our construct as in the method section. Factor structure along with communalities and internal consistency of each item along with factors is detailed in Table 2. In this study, the scores of the items within each subscale were summed, and the mean score of each subscale was used to represent the stress level of the students in six newer categories: academic-related stressors (ARS), Interpersonal, intrapersonal, and conflict-related stressors (IPCS), Teaching and learning-related stressors (TLRs), Examination and evaluation stressors (EES), Social activities related stressors (SARS) and Family responsibilities stressors (FRS). A mean score of more than 1.0 was taken as stress and more than 2.0 was taken as a high score. Overall stress was calculated by summing up the mean score values from each subscale and taking the average and then evaluating by the same method as used for each subscale.

Reliability

The questionnaire showed high internal consistency or reliability owing to its Cronbach's alpha value at 0.957 which lies in excellent grade. Moreover, Cronbach's alpha values of subscales ranged from 0.647 to

0.892, indicating good internal consistency (Table 3). When individual items were removed, Cronbach's alpha ranged from 0.578 to 0.889 showing that all the items contributed to the adequacy of the scale (Table 2). Additionally, an anti-image correlation with individual items also confirmed that the sampling was adequate ($p < 0.001$) for further analysis. Inter-factor correlations, as well as correlations of factors with other variables of the questionnaire (gender, income, and degree year), were examined using bivariate variation (Spearman's rho) as shown in Table 4. Inter-factor correlations ranged from between 0.006 and 0.608, which indicates generally acceptable independence. The highest correlation between ARS and IPES (0.608) indicates some overlap between these two factors. All the factors, except IPCS, had a higher discriminant ability and were statistically significant ($p < 0.05$). All the factors were significantly correlated with overall stress except for FRS and TLRs, and these two seem to have a lower discriminant ability to measure overall stress than other factors. Correlation between factors and other variables varied from .006 to .280. ARS and overall stress were significantly correlated to gender and income but not to degree year. The inter-item total correlation value was more than 0.3 for 20 items. The rest of the items, however, had a lower but statistically significant correlation and there was no considerable change in Cronbach's alpha with the deletion of any item, which indicates acceptable reliability. Therefore, all 44 items were included in the questionnaire. Cronbach's alpha value of each stressor group is shown in Table 3 and Cronbach's alpha value if scale item deleted value for an individual item is shown in Table 2.

Stress and its relations with other variables

All the students reported some degree of overall stress. Students with a mean score of more than 1.0 i.e., those who reported scores in the moderate, high, and severe category were considered under stress. Overall, for 611 students, 94.10% (575) were under stress (mean score more than 1.0), out of which 59.65% (343/575) students had high to severe stress (mean score more than 2.0). A total of 11.45% (70/611) were under severe stress. The most important stressors group among veterinary students was ARS (95.58%) followed by IPCS, TLRs, EES, SARS, and FRS as shown in Table 5. In summary, Table 6 shows that female students significantly experienced more overall stress, ARS, and IPCS than male students. The students who had less than 2 lakhs of annual family income significantly experienced high overall stress and FRS as compared to students having a higher family income. The students of the second year of bachelor's degree experienced significantly higher SARS as compared to others and students of the first year of bachelor's reported significantly higher stress due to FRS.

Hierarchical regression analyses

A series of hierarchical regression analyses were conducted to investigate which stressors significantly predicted the overall stress among the students. In the regression, analysis gender was entered in step 1, as according to the chi-square test it has a significant association with stress. In step 2, degree year was added assuming that it might predict the stress among undergraduate students. In step 3, family income was added as chi-square has shown significant association with overall stress. Finally, in step 4, the six stressors (EES, ARS, FRS, SARS, IPCS, and TLRs) were added. Only a single dependent variable (i.e. overall stress) was used.

The results of the hierarchical regression analysis indicated that in step 1, gender positively predicted and accounted for 3% of the variance ($p < .001$). In step 2, the degree year was not significant. In step 3, the family income positively predicted and accounted for 6 % of the variance ($p < .001$). In step 4, the six stressors significantly accounted for an additional 68% of the variance ($p < .001$), with only ARS, IPCS, and SARS positively predicting overall stress.

To summarize, female students had a higher level of overall stress than male students. The students with lower family income have reported high overall stress and the students who reported high levels of ARS, IPCS, and SARS, were more likely to be included in the high overall stress category.

Discussion

The major yield of this study included the generation of subscales by factor analysis. All the six subscales or factors generated after forced reduction had a good internal consistency with an overall Cronbach's alpha of 0.957 which explained a cumulative 51.98% variance. Sampling size was adequate for factor analysis and other statistical analysis as established with KMO, Bartlett's test of sphericity, and anti-image correlation.

Other major findings of this study are that female students experienced higher overall stress as well as ARS and IPCS stress compared to male students. Students with lower family income had reported significantly higher overall stress as well as FRS. ARS was found a major source of overall stress followed by other factors. The regression analysis found that among the six factors of the questionnaire ARS, IPCS and SARS positively predicted the overall stress ($p < 0.01$). Gender and family income also positively predicted the variance within overall stress. These findings can be used to design coping strategies and measures to reduce stress among veterinary students of India. The construct designed and validated in this study can be used effectively with high consistency to measure the stress level among veterinary students in veterinary colleges or universities across India. The study also found a higher number of students in severe overall stress which is a serious concern and needs immediate interventions to safeguard the mental health of such students. Although there is no similar research on the pattern of items used in this study for measuring stress and to identify stressors among veterinary students for comparison, yet various studies abroad have assessed different parameters than ours. For instance, Williams et al., 2005, found that more than 85% of veterinary students experienced academic-related stress, including academic and practical workload. In our study, we also found that academic-related stressors are a major source of stress among veterinary students of India. In a study on depression and anxiety among veterinary students, it was reported that female students experienced higher levels of depression and academic stress as compared to male students, which is in line with our findings (Reisbig et al., 2012). The academic performance of female students in Asia (including India) plays a decisive role in higher education and career, which might create a pressure additional to regular convincing for getting married by parents which might affect their academics and other activities, and the reason for high academic, IPCS and overall stress (Rentala et al., 2019). Gender positively predicted 3% of the variance in hierarchal regression analyses. The students with lower family income in this study experienced higher

overall stress as well as family responsibility related to stress, which might be justified by the fact that in India middle class and lower-middle-class family students have many responsibilities than students of the upper class or high-income families, which might have reflected in the response to questionnaire items. In a study of stress among medical students at Kolkata, India by Gupta et al., 2015 (Cronbach's alpha = 0.8) the authors reported that 91.1% of medical students experienced stress, and academic-related stressors were identified as a major source of stress for 94.9% of students, which is in line with our findings.

This questionnaire will help identify the stressors in different subscales/domains which might be useful in determining the source of stress among veterinary students (Helalah et al., 2015). Veterinary students can self-evaluate their level of stress using this instrument, prompting to aiding early interventions. To the best of our knowledge, this is the first study using a questionnaire survey designed and validated to map out the stress among veterinary students of India. The low response rate from some of the veterinary colleges seems to limit the more accurate results, which could be obtained by involving every veterinary college/university in India. Further, the study was based on a single parameter of stress and other components such as anxiety and depression could have been included.

High overall stress among veterinary students of India is a serious concern and most of this stress is due to various academic stressors which fulminate within the parameter of veterinary colleges/universities' campuses and classrooms. There is thus an urgent need to address such issues and to design coping strategies to minimize the stress among veterinary students. This study can be taken as a basis for further evaluation of stressors and the levels of stress among veterinary students of India. This study also showed that this construct with six factors had acceptable psychometric properties and is a valid and reliable instrument that can be used in local settings for the assessment of stress among medical students.

Declarations

Financial disclosures

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Ethics Approval

As written consent from all the participants was obtained before participating in the survey and all the participants had veterinary medical background no approval was sought from ethical committee.

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Declaration of Competing Interest

None.

Conflicts of interest

The authors declare that they have no conflicts of interests regarding publication, authorship order and any other aspect.

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Tables

Table 1. Descriptive statistics (n=611)

	M (SD)	n (%)
Age	23.2 (2.8)	
Gender		
Male		388 (63.50)
Female		223 (36.50)
Religion		
Hindu		558 (91.32)
Muslim		19 (3.10)
Christian		13 (2.12)
Buddhist		10 (1.63)
Sikh		7 (1.14)
Others		4 (0.65)
Veterinary degree year		
BVSc and AH 1 st year		59 (9.65)
BVSc and AH 2 nd year		80 (13.09)
BVSc and AH 3 rd year		98 (16.04)
BVSc and AH 4 th year		78 (12.76)
BVSc and AH 5 th year		95 (15.55)
MVSc		167 (27.33)
Ph.D.		34 (5.56)
Family income		
Below 2 lakhs		247 (40.42)
2-5 lakhs		191 (31.27)
More than 5 lakhs		173 (28.31)

Table. 2. Loading of variables on factor from the rotated component matrix

Name of Factor	Item Label	Factors (can be adjusted in a single column)						Communalities	Cronbach's alpha if item deleted
		1	2	3	4	5	6		
ARS	Rude behavior of college staff	.785	.572	.882					
	Ignorance of problems by administration	.760	.567	.882					
	Lack of teaching skills of teachers	.750	.553	.882					
	Biasness/favors of teachers for selected students	.644	.451	.885					
	Lack of guidance regarding future jobs by university/college	.607						.589	.883
	Perception of a gap in learning and practice	.520	.565	.880					
	Conflicts with animal owners and activists	.487						.458	.886
	Lack of professional skills	.449						.565	.883
	Leniency in evaluations in other colleges	.436	.459	.889					
	Deviation of actual protocols in treatment by teachers	.423						.451	.886
	Lack of guidance from teachers in the study	.357	.518	.884					
	Not enough study material	.308						.503	.883
	Conflicts with other students	.356						.381	.891
	Verbal/physical abuse by other students	.318						.516	.889
IPCS	Perception of failure to establish a career	.767	.614	.848					
	Unable to answer questions from pet owners	.635	.558	.853					
	Fear of getting poor marks	.625	.655	.846					
	Facing the death of an animal at clinics		.599					.408	.865
	Lack of time for revision of content		.573					.607	.851
	Need to do well (by others)		.481					.527	.852
	Self-expectation to do well		.474					.464	.860
	Preparing competitive exams		.445					.410	.861
	Difficulty in understanding content/course	.337	.531	.852					
TLRS	Lack of recognition/praise for your work	.657	.536	.828					

	Frequent interruption of work by others	.619	.500	.827			
	Stress while working with computers	.609	.549	.838			
	Difficulty in finding a person to talk to	.568	.550	.825			
	No feedback by teachers			.564		.547	.821
	Conflict with teachers			.551		.511	.821
	Unable to answer in class			.431		.599	.822
	Lack of communication among teachers			.412		.570	.824
	Self-Unwillingness to study veterinary science discipline	.318	.342	.839			
EES	The stress of examination or tests/viva	.848	.615	.782			
	Frequent examinations	.697	.591	.779			
	Heavy workload	.663	.567	.770			
	The stress of class presentation/discussion				.620	.545	.802
	Falling behind in study schedule	.450	.557	.779			
	Inappropriate assignments by teachers				.402	.530	.791
SARS	Talking to animal owner's history taking	.722	.584	.578			
	Fear of clinical practice (injection/surgery)				.473	.491	.604
	Parental wish to study the field other than veterinary science				.399	.376	.638
	Lack of time for family and friends	.354	.403	.595			
FRS	Financial problems (family debt)	.637	.536	.592			
	Family responsibilities/expectations	.585	.526	.593			

Communalities are estimates of the variance accounted for by each variable in the factor solution

Table. 3. Questionnaire factors with mean score and reliability estimates (Cronbach's alpha)

Stressor Groups	Number	Mean (SD)	Cronbach's alpha
ARS	14	2.88 (0.79)	0.892
IPCS	9	2.82 (0.86)	0.868
TLRS	9	2.46 (0.89)	0.843
EES	6	2.64 (0.86)	0.813
SARS	4	1.95 (0.84)	0.670
FRS	2	2.54 (1.05)	0.647

Table: 4. Correlation among all main measures (N=611)

	1	2	3	4	5	6	7	8	9	10	
1. ARS		–	.608**	-.006	-.093*	-.011	.018	.701**	.220**	-.081*	.063
2. IPCS			–	.018	-.010	-.070	.054	.748**	.280**	-.008	-.049
3. TLRS				–	.531**	.500**	.532**	-.022	.057	-.047	-.079*
4. EES					–	.488**	.368**	-.083*	-.010	-.035	-.069
5. SARS						–	.358**	-.098*	-.043	-.130**	-.068
6. FRS							–	.034	.016	-.114**	-.098*
7. Overall Stress								–	.172**	-.141**	-.006
8. Gender									–	.197**	.204**
9. Income										–	.155**
10. Year											–

*p<0.05

**p<0.01

Table. 5. Stress due to each Factor*

Factors	n (%)
ARS	584 (95.58)
IPCS	569 (93.12)
EES	556 (90.99)
TLRS	536 (87.72)
FRS	486 (79.54)
SARS	404 (66.12)

*N=61, Mean score more than 1.0

Table 6. Significant relation of gender, family income, and degree year with overall stress and individual factors.

Variables		Frequency, n (%)	p-value (Chi-square)
Gender			
Overall stress	Male (389)	356 (91.51)	0.000
	Female (222)	219 (98.64)	
ARS	Male	363 (93.31)	0.000
	Female	221 (99.54)	
IPCS	Male	350 (89.97)	0.000
	Female	219 (98.68)	
Income			
Overall stress	Below 2 lakhs (247)	234 (94.73)	0.000
	2-5 lakhs (191)	179 (93.71)	
	More than 5 lakhs (173)	162 (93.64)	
FRS	Below 2 lakhs	208 (84.21)	0.004
	2-5 lakhs	142 (74.34)	
	More than 5 lakhs	136 (78.61)	
Degree year			
SARS	First-year (59)	31 (52.54)	0.000
	Second-year (80)	65 (81.25)	
	Third-year (98)	69 (70.40)	
	Fourth-year (78)	52 (66.66)	
	Final Year (95)	69 (68.42)	
	MVSc (167)	95 (56.88)	
	Ph.D. (34)	23 (67.64)	
FRS	First-year (59)	59 (100)	0.000
	Second-year (80)	70 (87.50)	
	Third-year (98)	88 (89.79)	
	Fourth-year (78)	54 (69.23)	
	Final Year (95)	73 (76.84)	
	MVSc (167)	121 (72.45)	
	Ph.D. (34)	21 (61.76)	

Table 7: Hierarchical regression of independent variables on overall stress among veterinary students*

Variable	B	SE B	Beta	Sig.	R ²	Adjusted R ²	Δ R ²	F change in R ²
Step 1								
Gender	.28	.06	.17 [¶]	.000	.03	.03	.03	20.00 [¶]
Step 2								
Degree Year	-.01	.01	-.02	.470	.03	.02	.00	.52
Step 3								
Income	-.17	.03	-.18 [¶]	.000	.06	.06	.03	20.78 [¶]
Step 4								
ARS_AVG	.36	.02	.37 [¶]	.000	.68	.68	.62	201.05 [¶]
IPES_AVG	.46	.02	.52 [¶]	.000				
Teach Grad	.02	.02	.02	.405				
Exam Grad	-.01	.02	-.01	.526				
Social Grad	-.06	.02	-.07 [¶]	.008				
Family Grad	.00	.02	.01	.667				

*N=611

[¶] p<0.001

[¶] p<0.01

Figures

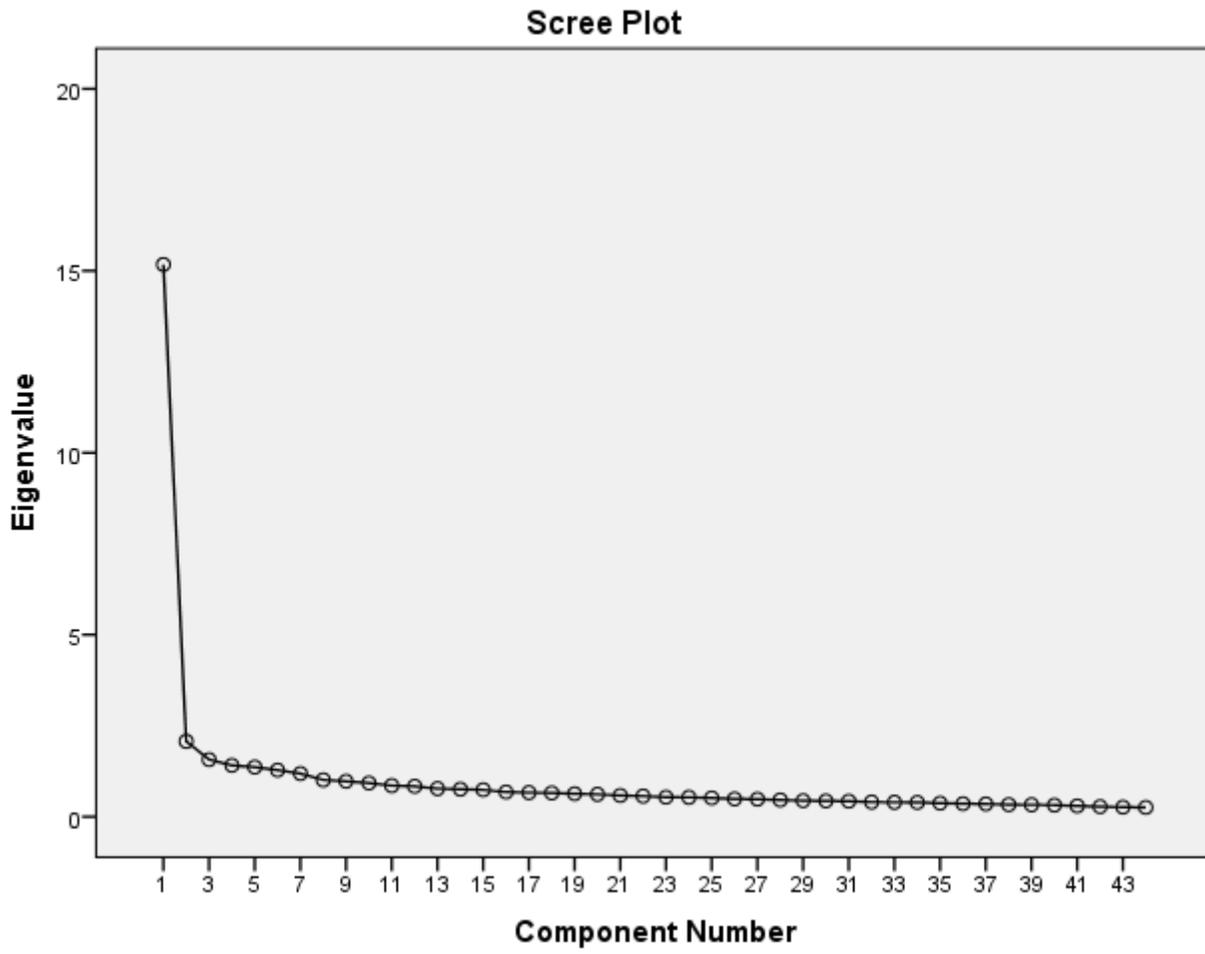


Figure 1

Scree plot