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The Radiology Research Situation in the Philippines: Identifying the Barriers and Limitations for Future Directions

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Abstract

Objective: To describe the radiology research situation in the Philippines from the perspectives of the radiology residents and to determine the challenges limiting their conduct of research in the country.

Materials and methods: This descriptive-cross sectional study was conducted under the approval of an institutional review board with informed consent of the participants. The study involved a nationwide scope of radiology residents and employed the use of a validated 34-item printed questionnaire with informed consent form. Respondents were asked to grade their level of agreement with the statements using a Likert Scale. A space for free-text comments and/or opinions was provided at the end of the survey. Appropriate statistics were employed in the analysis of data.

Results: Trainees agreed that research should be part of their training (73.0%) and should be a requirement for all trainees (66.8%). Majority also agreed (82.7%) that workshops and trainings will enhance their competence in producing quality research. Protected time (86.4%), sufficient administrative (86.8%) and financial (84.7%) support and accessible facilities (90.3%) are also important in developing meaningful research. Having a research mentor (93.6%) and senior consultants who are also researchers (85.2%) are helpful in guiding trainees and motivating them to also become researchers. Respondents believe that doing research is a part of their success (57.9%) and growth as a competent radiologist (66.7%). Publishing a successful research is a greatly fulfilling (76.8%) and exciting experience (66.8%) for the trainees and is a way that they are able to contribute to society (72.4%) and help their patients (73.0%).

Conclusion: Several factors contribute to the constant problems being faced by residents in producing quality research. Total departmental, institutional and society efforts must be made in order to encourage trainees to do research and produce research-oriented specialists that will secure the future of radiology.

Keywords

Academic radiology, Radiology research, Imaging researcher

Introduction

The conduct of research is an essential skill to harness and apply to practice. The progress of radiology through remarkable imaging breakthroughs have placed the field into a key player in the diagnosis and management of innumerable diseases and conditions [1,2]. Doing research should then be given importance in every level of the organization - from the individual researcher to the administration, to the professional societies and to the government agencies. Basic research programs should be encouraged, nurtured and developed if diagnostic radiology is to continue to be considered an academic clinical discipline [3]. As of this moment, no standard research program is in place in the Philippine radiology residency training. And while majority of residents will not go on to conduct research after training, these research experiences can play an important role in counteracting the sense of isolation from research that several radiologists report [4]. Having a good research background will prepare residents to more critically evaluate reports of imaging research in the future [4,5].

Literature described several aspects of research that were identified as important in producing quality research, namely, motivation, time, space and money [3]. However, most of these are non-existent in many, if not most, of the training institutions in the country.

This paper aimed to describe the radiology research

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situation in the Philippines from the perspectives of the radiology residents through the use of a validated questionnaire. It also wanted to determine the challenges being faced by radiology residents in the Philippines limiting them in their conduct of research.

Materials and Methods

Approval from the institutional review board was obtained prior to the commencement of the study. This was a descriptive-cross sectional study that employed a validated printed questionnaire with an attached printed informed consent form. The respondents, before proceeding with the survey, were asked to sign the informed consent form, of which they also received a copy as reference.

All radiology residents in the country undergoing training in an accredited institution from all year levels were included in the study. The surveys were given out to all residents present during a general assembly and they were invited to join the study. The questionnaires were self-administered.

The first part of the survey comprised of the residents' demographics (age, gender, current year level, and institution name). The second part consisted of thirty-three (33) statements concerning radiology research and one (1) question ranking the common reasons why residents encounter difficulty in doing research. Respondents were asked to grade their level of agreement with the statements using a Likert Scale consisting of 5 options for the 33 questions: entirely disagree, partly disagree, neutral, partly agree, and entirely agree. In the third part, respondents could enter free-text comments, opinions, and/or suggestions for improving the research situation in the country.

Responses were collated and statistically analyzed to come up with the average opinion/view and frequency of response of the residents per statement in the questionnaire. Mean score, frequency and proportions at 95% confidence level were employed using Microsoft Excel.

Results

A total of 237 radiology residents participated in this study comprising of residents from first to fourth year of training. (Appendix A - Table 1) presents the demographics of the respondents. Age of respondents was in concordance with the expected data. There is almost equal distribution of year level among the respondents.

Appendix B - Table 2A, Table 2B, Table 2C and Table 2D shows the detailed results of the radiology residents' responses to each question in the survey. The statements were divided into four categories Training Requirement, Knowledge and institutional actions regarding research, Mentoring, and Personal fulfillment and future effect of research on the trainee. Each category consisted of different number of questions. The score of each question was tabulated and analyzed. Numbers in parentheses are the percentages. Those in bold represents the majority of the responses in each question. Statements with no ratings were omitted in the final count. At least 97% of the respondents answered each statement.

On training requirement

Respondents were undecided on whether the society gives priority to research. Majority of the trainees, however, do believe that research should be a part of their training (73.0%) and should be a requirement for all trainees (66.8%). More than half of the respondents (67.1%) also believe that there should be more emphasis on research projects between hospitals. An even bigger portion of the respondents agree (88.9%) that more research collaborations between radiology and other specialties should be done.

On knowledge and institutional actions regarding research

Majority of trainees agree (82.7%) that receiving research workshops and trainings will enhance their competence to produce quality research. These trainings are only available in half of the training institutions (52.5%) in the country. Trainees also agree that having protected time to do research (86.4%), sufficient administrative (86.8%) and financial (84.7%) support and accessible facilities (90.3%) will help them produce more research. They also agree (89.4%) that rewards and recognitions should be given to researchers who will be able to do innovative research and publish them. Almost two-thirds (65.8%) of the respondents believe that publishing research is financially burdening.

On mentoring

Trainees agree that having a research mentor (93.6%) and senior consultants who are also researchers (85.2%) are helpful in doing their research and motivates them to also become researchers. However, less than two-thirds (64.4%) of the trainees have a mentor or staff whom they can consult freely about research. More than half of the consultants do give priority (54.0%) and support their trainees (71.2%) in doing research as well as encourage them to present their works locally and internationally (63.3%). Two-thirds of the residents believe that doing research with their peers promotes teamwork and camaraderie (72.2%).

On personal fulfillment and future effect of research on the trainee

More than half of the trainees agree that doing research is a part of their success (57.9%) and their

growth as a competent radiologist (66.7%). Though they are not decided if they are doing research because it interests them. Half of them also believe that doing research is a matter of talent (51.3%). While around two-thirds of the trainees agree that publishing a successful research is a greatly fulfilling (76.8%) and exciting experience (66.8%), they are undecided whether publishing is only beneficial to improve their resume or in securing a position in their institutions. They are also undecided whether there is enough reward or financial gain in doing research. Yet, majority believe that they are able to contribute to society (72.4%) and see research as a way on how they can help their patients (73.0%).

Ranking of the most common reasons why residents encounter difficulty in doing research

Appendix C - Table 3 below shows the mean rank of the reasons why residents encounter difficulty in doing research. There was a statistically significant difference in the ranking of perceived reasons, X^2 = 143.922, $p < 0.001$. Post-hoc analysis (Appendix D - Table 4) with Wilcoxon signed-rank tests were conducted with a Bonferroni correction applied, resulting in a significance level set at $p < 0.003$. The median (IQR) ranking for lack of time is 2 (1 to 3), for not enough knowledge is 3 (2 to 4), for no support is 5 (3 to 5), for not interested is 4 (2 to 6), for requiring too much resources is 3 (2 to 5), and for no guidance is 4 (3 to 6). There was a significant difference between the ranking of perceived lack of time and not enough knowledge ($p < 0.001$), lack of time and no support ($p < 0.001$), lack of time and not interested ($p < 0.001$), lack of time and requires too much resources ($p < 0.001$), lack of time and no guidance ($p < 0.001$), not enough knowledge and no support ($p < 0.001$), not enough knowledge and not interested ($p = 0.001$), not enough knowledge and no guidance ($p < 0.001$), no support and requires too much resources ($p < 0.001$), and requires too much resources and no guidance ($p < 0.001$). There were no significant differences between the ranking of not enough knowledge and requires too much resources ($p = 0.300$), no support and not interested ($p = 0.014$), no support and no guidance ($p = 0.380$), not interested and requires too much resources ($p = 0.039$), and no guidance and requires too much knowledge -($p = 0.053$).

Discussion

This study is the first of its kind to describe the radiology research situation in the country and to identify the areas that need improvement in order to properly address them.

The top reason identified by the trainees as to why they encounter difficulty in research is the lack of protected time. Almost all institutions do not allot an exclusive time to doing research and is thus regarded as an extra task to be dealt with outside the usual work schedule. It is then important that time must be available on a regular basis during normal working hours for the trainees to undertake and do meaningful research and ensure completion [3]. This must be an effort and commitment by the entire department to devote this exclusive time to trainees for their pursuit of quality research [3].

Most trainees also agree that doing research should remain as a requirement and part of their training program. Spieth in his Letter to the Editor in 2003 said that "all residents should have the chance to be involved in research during their residency and should be mandatory. Residents learn about far more than simply the immediate topic. I have never heard residents complain once they presented their poster or abstract and saw their name in print. It is important professionally and personally for self-confidence" [6]. Research has been identified to contribute several important intrinsic values both to the specialty and to individual radiologists by the following: (a) Improving radiologic practice for referring clinicians, patients and radiologists (b) Validating current practices and developing new services (c) Furthering the relationships among radiology, other clinical specialties and basic sciences (d) Attracting and retaining the brightest and most talented young persons to our specialty (e) Improving the status and credibility of radiology, nationally and internationally (f) Retaining radiologists' privileges to the practice of their specialty [7].

In the global scene, there has been a general increased volume of material being published, increased publication from authors outside USA in the American radiology journals, increased publication form authors in non-radiologic specialties, and increased funded research [8]. This is definitely not the case in the Philippines. The researches produced in the country are mostly done and involve only radiologists or the radiology department where they are in. This is likely due to the fact that doing research in the trainee's own environment produces less hassle for the investigators. However, trainees do agree that more research collaborations with other departments and even hospitals are necessary to produce innovative research. Having research collaboration with other medical specialties who also routinely include research training as part of their training programs will breed greater familiarity with the requirements of high-quality research [9]. Also, research with an interdisciplinary team of individuals who will focus on a common objective or question will ultimately form a stronger approach to discovering new knowledge, developing new technologies and procedures, and delivering new methods to improve the care of patients [10]. In the end, the ultimate goals of research and as physicians are to help the society and the pa-

tients by providing the best care possible. Doing research with other specialties will likewise remove the image of radiologists as being only a service provider in the institution and replace it with the image of being a part of the medical team.

The two next reasons why there is difficulty in doing quality research are the lack of sufficient knowledge and lack of interest. Research has been a part of the college and medical school curriculum and is a requirement for graduation for each phase of education and training. Therefore, basic research knowledge and skills are already inculcated in every trainee. What is more needed are advanced research training that are directed towards radiology-specific types. Advanced research training are only offered in half of the training institutions, which are not necessarily oriented towards imaging research. More than two decades ago, the American institutions already found out that extensive training in research is not a traditional part of a radiologist's training, which resulted in disadvantages for radiologists in competing for research funding [9]. Thus, they recognized the importance of research to the continued improvement of the radiology specialty and started investing in developing more competitive imaging researchers [9]. Gunderman, in his response to a Letter to the Editor by Spieth, emphasized that the future of radiology depends on the current generation of radiologists' willingness to invest in the intellectual development of the next generation of radiologists, wherein research is clearly an aspect of the profession that should be given more attention to [6]. In another study, they also found out that trainees who took time off from clinical programs for research fellowships became 3-5 times more likely to become a researcher and published nearly twice as often as those who did not [11]. But the number of trainees or radiologists going into these further studies were less than 20% [11]. Hence, encouraging and motivating trainees to undergo additional training in research as well as provide meaningful research training and seminars for them should be a priority campaign of the society. This will enhance their competence to produce quality research with more ease and less burden. One trainee suggested that the residency training committee should include in all scientific meetings at least one lecture/topic dealing with research to supplement their knowledge. Likewise, further exposing residents to doing research, including its rewards and benefits, will increase their interests in doing research.

The next reasons identified as problems for trainees are the lack of resources and accessible facilities and inadequate financial and administrative support. These are problems experienced by 80 to 90 per cent of the trainees in the country. One study found out that individuals who attend a medical school or trained at an institution that receives more research funding produced more researchers and published 60-70% more researches [11]. Having support from effective department leadership will enable the researchers to gain adequate facilities, equipment and funding in order to make their ideas into fruitful researches. The institution and also the government should have an efficient and sufficient research grant award system in order to maintain and support the endeavors of its scientists. There should be part of the institution's funds separated for research use. This may entail cutting budget on some other parts of the operation. Yet, in order to attain the goal of research competitiveness and excellence, it is a sacrifice worth taking. Having a reliable financial support system will also offset the burden that publishing in respectable journals often entail. Very few local radiology researches make it to publication and this is likely because of inadequate funding. Providing appropriate rewards and recognitions to researchers who are doing innovative research and are able to publish them will also increase the trainees' interest in doing research. These rewards and recognitions may not be instant gratification, but the efforts are definitely worth it.

Finally, residents also identified lack of guidance as one of the barriers in doing research. Only a little more than half of the trainees have someone they can consult with regarding research or have available staff that support their research endeavors. If radiology residents are to receive a meaningful exposure to research, it is then important that radiologists must make an effort to encourage and mentor them in investigative work [6]. A trainee commented that there should be consultants or mentors whom the trainees can consult with when they encounter problems or difficulties with their research. Research works also encourages teamwork and camaraderie among peers and this in turn creates learning experiences for those involved. It encourages communication between radiologists, technologists and other members of the staff, removing misperceptions among the people in the institution.

Doing meaningful research is part of the success and growth of radiologists, and not only to improve their resume or secure a position in institutions. Although half of the residents believe that doing research needs to have talent, this is definitely not the case. Research is a skill that can be learned and enhanced through further practice of the craft and through more trainings and workshops. To be able to produce research that is of quality and be able to publish them and gain recognition for your work is one of the most fulfilling reward in research. Publishing, in turn, increases the capabilities of radiologists and gives them an advantage to obtain higher posi-

tion and more financial rewards in their institutions. But ultimately, being able to apply the results and breakthroughs acquired through research in order to alleviate a problem in the society is the ultimate reward for a scientist.

The quality of radiologic research can only be as good as the quality of people attracted to it [12,13]. The administration should continue to strive for excellence and produce the best graduates by recruiting the most promising trainees into their institution. The future of radiology relies on how the current generation of radiologists will invest in its trainees. Ideal researchers and trainees must be molded and trained in order to secure a bright future for radiology.

The radiology research situation in our country is constantly challenged by problems arising from all parts of the society. This study shall serve as a guide and wake up call to the society, the institutions and the government in formulating programs that will nurture the investigative skills of the trainees and produce research-oriented specialists in the future.

Conclusion

Several factors contribute to the constant problems being faced by residents in producing quality research such as lack of time, adequate training, and administrative support and facilities. Total departmental, institutional and society efforts must be made in order to encourage trainees to do research and produce research-oriented specialists that will secure the future of radiology.

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Appendix File

Appendix A

Table 1: Demographics of the respondents (n = 237).

Sex	
Male	129 (54%)
Female	89 (38%)
Undisclosed	19 (8%)
Age (in years)	24-48 (mean 30)
Year level	
1st Year	53 (22%)
2nd Year	49 (21%)
3rd Year	60 (25%)
4th Year	52 (22%)
Undisclosed	23 (10%)

Appendix B

Table 2: A-D: Tally of statements from the survey with the corresponding responses.

2A. Training Requirement	**Entirely Disagree**	**Partly Disagree**	**Disagree (Total)**	**Neutral**	**Agree (Total)**	**Partly Agree**	**Entirely Agree**	**Total**	**Result**
1. Priority is given to radiology research by the society	5 (2.1)	29 (12.3)	34 (14.4)	**86 (36.4)**	**116 (49.2)**	86 (36.4)	30 (12.7)	236 (100)	UNDE-CIDED
2. Radiology research should be included as part of all training programs	7 (3.0)	9 (3.8)	16 (6.8)	48 (20.3)	**173 (73.0)**	93 (39.2)	80 (33.8)	237 (100)	YES
3. Radiology research should be a requirement for all trainees	11 (4.7)	8 (3.4)	19 (8.1)	59 (25.1)	**157 (66.8)**	86 (36.6)	71 (30.2)	235 (100)	YES
4. There should be more emphasis on radiology research projects between hospitals	0 (0.0)	6 (2.6)	6 (2.6)	71 (30.3)	**157 (67.1)**	104 (44.4)	53 (22.6)	234 (100)	YES
5.There should be more research collaborations between radiology and other specialties	0 (0.0)	2 (0.9)	2 (0.9)	24 (10.2)	**209 (88.9)**	112 (47.7)	97 (41.3)	235 (100)	YES

2B. Knowledge and institutional actions regarding research	Entirely Disagree	Partly Disagree	Disagree (Total)	Neutral	Agree (Total)	Partly Agree	Entirely Agree	Total	Result
6. My knowledge about radiology research is sufficient	13 (5.5)	62 (26.3)	**75 (31.8)**	**111 (47.0)**	50 (21.2)	47 (19.9)	3 (1.3)	236 (100)	UNDE-CIDED
7. Radiology research workshops and trainings will enhance my competence to produce quality research	1 (0.4)	3 (1.3)	4 (1.7)	37 (15.6)	**196 (82.7)**	92 (38.8)	104 (43.9)	237 (100)	YES
8. The institution I am in provides constant research activities and workshops for their trainees	6 (2.5)	35 (14.8)	41 (17.4)	71 (30.1)	**124 (52.5)**	83 (35.2)	41 (17.4)	236 (100)	YES
9. I will be able to produce more research if given a protected time to do it	0 (0.0)	7 (3.0)	7 (3.0)	25 (10.6)	**204 (86.4)**	81 (34.3)	123 (52.1)	236 (100)	YES
10. There should be more administrative support for radiology research	1 (0.4)	1 (0.4)	2 (0.8)	29 (12.3)	**204 (86.8)**	95 (40.4)	109 (46.4)	235 (100)	YES
11. Sufficient financial support is needed in order to help me produce more research in radiology	1 (0.4)	3 (1.3)	4 (1.7)	32 (13.6)	**199 (84.7)**	98 (41.7)	101 (43.0)	235 (100)	YES
12. Rewards and recognitions should be given to those who are able to do innovative radiology research and publish them	0 (0.0)	2 (0.8)	2 (0.8)	23 (9.7)	**211 (89.4)**	67 (28.4)	144 (61.0)	236 (100)	YES
13. Accessible facilities and equipment will help me construct better research in radiology	0 (0.0)	1 (0.4)	1 (0.4)	22 (9.3)	**213 (90.3)**	90 (38.1)	123 (52.1)	236 (100)	YES
14. Publishing research in radiology is financially burdening	1 (0.4)	9 (3.8)	10 (4.2)	71 (30.0)	**156 (65.8)**	92 (38.8)	64 (27.0)	237 (100)	YES

2C. Mentoring	Entirely Disagree	Partly Disagree	Disagree (Total)	Neutral	Agree (Total)	Partly Agree	Entirely Agree	Total	Result
15. Having a research mentor in radiology is helpful	0 (0.0)	1 (0.4)	1 (0.4)	14 (5.9)	**221 (93.6)**	53 (22.5)	168 (71.2)	236 (100)	YES
16. Having senior consultants who are also researchers motivates me to become a researcher	2 (0.8)	6 (2.5)	8 (3.4)	27 (11.4)	**202 (85.2)**	70 (29.5)	132 (55.7)	237 (100)	YES
17. I have a mentor/ staff whom I can ask freely anything about research	4 (1.7)	17 (7.2)	21 (8.9)	63 (26.7)	**152 (64.4)**	86 (36.4)	66 (28.0)	236 (100)	YES
18. My consultants are supportive of me doing research	2 (0.8)	6 (2.5)	8 (3.4)	60 (25.4)	**168 (71.2)**	96 (40.7)	72 (30.5)	236 (100)	YES

19. My consultants encourage me to present our research locally and internationally	1 (0.4)	9 (3.8)	10 (4.2)	77 (32.5)	**150 (63.3)**	96 (40.5)	54 (22.8)	237 (100)	YES
20. My consultants give priority to doing radiology research	3 (1.3)	23 (9.7)	26 (11.0)	83 (35.0)	**128 (54.0)**	87 (36.7)	41 (17.3)	237 (100)	YES
21. Doing research with my peers in radiology promotes teamwork and camaraderie	2 (0.9)	5 (2.1)	7 (3.0)	58 (24.8)	**169 (72.2)**	114 (48.7)	55 (23.5)	234 (100)	YES

2D. Personal fulfillment and future effect of research on the trainee	**Entirely Disagree**	**Partly Disagree**	**Disagree (Total)**	**Neutral**	**Agree (Total)**	**Partly Agree**	**Entirely Agree**	**Total**	**Result**
22. Research is an integral part of my success as a radiologist	7 (3.0)	17 (7.3)	24 (10.3)	74 (31.8)	**135 (57.9)**	102 (43.8)	33 (14.2)	233 (100)	YES
23. I believe research will help me grow as a more competent radiologist	4 (1.7)	11 (4.7)	15 (6.4)	63 (26.9)	**156 (66.7)**	106 (45.3)	50 (21.4)	234 (100)	YES
24. Doing research in radiology is a matter of talent	10 (4.3)	32 (13.9)	42 (18.3)	70 (30.4)	**118 (51.3)**	90 (39.1)	28 (12.2)	230 (100)	YES
25. There is no reward in doing research in radiology	38 (16.3)	63 (27.0)	**101 (43.3)**	**85 (36.5)**	47 (20.2)	38 (16.3)	9 (3.9)	233 (100)	UNDE-CIDED
26. There is not enough financial gain in doing research in radiology	6 (2.6)	38 (16.4)	44 (19.0)	**99 (42.7)**	**89 (38.3)**	73 (31.5)	16 (6.9)	232 (100)	UNDE-CIDED
27. Having a radiology research paper published is greatly fulfilling	0 (0.0)	5 (2.1)	5 (2.1)	49 (21.0)	**179 (76.8)**	95 (40.8)	84 (36.1)	233 (100)	YES
28. The only benefit of publishing is to improve my resumé	28 (12.0)	61 (26.2)	**89 (38.2)**	**83 (35.6)**	61 (26.2)	51 (21.9)	10 (4.3)	233 (100)	UNDE-CIDED
29. Publishing a radiology research paper is valuable in securing a position in my institution	12 (5.2)	19 (8.2)	31 (13.4)	**100 (43.1)**	**101 (43.5)**	80 (34.5)	21 (9.1)	232 (100)	UNDE-CIDED
30. Being able to publish a successful radiology research is an exciting experience	3 (1.3)	10 (4.3)	13 (5.6)	64 (27.6)	**155 (66.8)**	104 (44.8)	51 (22.0)	232 (100)	YES
31. I am able to contribute to the society when I do research	4 (1.7)	5 (2.2)	9 (3.9)	55 (23.7)	**168 (72.4)**	114 (49.1)	54 (23.3)	232 (100)	YES
32. Doing research is also a way on how I can help patients	2 (0.9)	5 (2.2)	7 (3.0)	54 (23.3)	**171 (73.7)**	116 (50.0)	55 (23.7)	232 (100)	YES
33. I do research because it is interesting	16 (6.9)	31 (13.4)	47 (20.3)	**94 (40.5)**	**91 (39.2)**	75 (32.3)	16 (6.9)	232 (100)	UNDE-CIDED

Appendix C

Table 3: Common reasons why residents encounter diffculty in doing research.

Reasons	Mean Rank
Lack of time	2.32
Not enough Knowledge	3.11
No support	4.28
Not interested	3.77
Requires too much resources	3.34
No guidance	4.19

Appendix D

Table 4: Post-hoc analysis comparing each reason showing Z and p-values.

	Not enough Knowledge	No support	Not interested	Requires too much resources	No guidance
Lack of time	-3.981 < 0.001*	-9.451 < 0.001*	-6.383 < 0.001*	-6.058 < 0.001*	-8.544 < 0.001*
Not enough Knowledge	-	-6.014 < 0.001*	-3.418 0.001*	-1.036 0.300	-5.374 < 0.001*
No support	-6.014 < 0.001*	-	-2.445 0.014	-5.700 < 0.001*	-0.878 0.380
Not interested	-3.418 0.001*	-2.445 0.014	-	-2.063 0.039	-1.931 0.053
Requires too much resources	-1.036 0.300	-5.700 < 0.001*	-2.063 0.039	-	-4.704 < 0.001*