

Research Article

Academic productivity and obstacles encountered during residency training: A survey among residents in orthopedics and traumatology programs in Turkey

Abdullah Demirtaş¹ , Hilmi Karadeniz² , Yunus Emre Akman³ , Tahir Mutlu Duymuş⁴ , Engin Çarkçı² , İbrahim Azboy⁵ 

¹Department of Orthopaedics and Traumatology, Medeniyet University, School of Medicine, İstanbul, Turkey

²Department of Orthopaedics and Traumatology, Bahçelievler Medical Park Hospital, İstanbul, Turkey

³Department of Orthopaedics and Traumatology, Metin Sabancı Baltalimanı Bone and Joint Diseases Training and Research Hospital, İstanbul, Turkey

⁴Clinic of Orthopedics and Traumatology, Özel Saygı Hospital, İstanbul, Turkey

⁵Department of Orthopaedics and Traumatology, Medipol University, School of Medicine, İstanbul, Turkey

ARTICLE INFO

Article history:

Submitted 31 May 2018

Received in revised form

21 August 2019

Accepted 9 February 2020

Keywords:

Academic productivity

Orthopedic

Resident

Turkey

Obstacle

ORCID IDs of the authors:

A.D. 0000-0003-0833-0752;

H.K. 0000-0001-8662-7485;

Y.E.A. 0000-0003-2939-0519;

T.M.D. 0000-0002-9610-2188;

E.Ç. 0000-0002-3918-4498;

İ.A. 0000-0003-0926-3029.

ABSTRACT

Objective: This study aimed to investigate the academic productivity of and the obstacles encountered by orthopedic residents in Turkey.

Methods: Overall, 220 orthopedic specialists who were registered in the Ministry of Health and had started orthopedic residency between 2009 and 2010 were invited to participate in a survey through e-mail. The survey comprised a total of 19 questions to evaluate the academic works conducted and obstacles encountered during residency. Academic work was defined as an article published in the peer-reviewed journals as well as an oral or poster presentation at a national or international congress. Case reports, letters to the editor, and technical notes were excluded.

Results: Data were obtained from 116 respondents who completed the survey. In peer-reviewed journals in Science Citation Index (SCI) or SCI-Expanded, the mean number of articles published with and without the first name per resident was 0.09 and 0.73, respectively. In peer-reviewed journals other than those in SCI and SCI-Expanded, the mean number of articles published with and without the first name per resident was 0.37 and 1, respectively. The mean number of oral and poster presentations per resident at national and international congresses was 2.63 and 4.67, respectively. No significant difference in the number of academic works was noted between the regions and institutions ($p>0.05$). A significant positive correlation was observed between the number of associate professors and assistant professors in the clinic and the total number of academic works (article plus presentation) ($p<0.01$ and $p=0.017$, respectively). Regarding encouragement and support to academic works, 6.9% of the respondents found the clinic to be excellent, 20.7% good, 24.1% moderate, and 48.3% bad. No significant difference in encouragement and support to academic works was noted among the institutions ($p=0.115$). The most common obstacle encountered in conducting academic works was long working hours (74.5%).

Conclusion: Regardless of the region and institution, the participation of orthopedic residents in academic works is low in Turkey. Several obstacles were encountered in conducting academic works, with the most common being long working hours.

Level of Evidence: Level IV, Diagnostic study

Academic work is an integral part of any residency training program (1-5). One of the aims of orthopedic residency training programs is to enable the residents to participate in academic works to further their academic career, thereby contributing to their orthopedic knowledge (6).

Academic works are delivered to the community through scientific publications. Notably, those who continue their academic careers after graduating from orthopedic residency publish more academic works during their residency than those who do not advance their academic careers (4).

Therefore, to increase academic productivity, it is imperative to know the number of academic works and identify the obstacles encountered during orthopedic residency. To our knowledge, only one study has investigated the current situation regarding the training, working conditions, future plans, interests, and satisfaction of orthopedic residents in Turkey (7). Nonetheless, no study has investigated the academic works conducted and obstacles encountered during residency.

This study aimed to investigate the number of academic works conducted by orthopedic residents

Corresponding Author:

Abdullah Demirtaş

drademirtas@hotmail.com



Content of this journal is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

Cite this article as: Demirtaş A, Karadeniz H, Akman YE, Duymuş TM, Çarkçı E, Azboy İ. Academic productivity and obstacles encountered during residency training: A survey among residents in orthopedics and traumatology programs in Turkey. Acta Orthop Traumatol Turc 2020; DOI: 10.5152/j.aott.2020.03.243.

and the obstacles encountered by them during their residency in Turkey.

Materials and Methods

Our survey was modeled on a similar survey conducted in Turkey (7). The questions in our survey were created under the supervision of five experienced orthopedists and an expert statistician. The reliability of the survey was measured using Cronbach's alpha value, which was 0.78, revealing that the survey has an acceptable level of reliability. The survey comprised a total of 19 questions that investigated the academic works and obstacles encountered during orthopedic residency (Table 1). Questions 2, 3, 6, 7, 8, 9, and 13 were open-ended questions. Other questions were multiple-choice questions. Overall, 220 orthopedists who were registered in the Ministry of Health Residency Training in Medicine Department and had started their orthopedic residency between 2009 and 2010 were invited to participate in the survey via e-mail. Respondents from all seven regions of Turkey were included in the study. Academic work was defined as articles published in peer-reviewed journals as well as oral and poster presentations. Case reports, letters to the editor, and technical notes were excluded.

Long working hours were defined as working longer than the standard working hours (08:00 to 17:00) because of the continuation of work after on-call days or prolongation of working hours on non-on-call days.

Statistical analysis

All data were assessed using the software program Statistical Package for Social Sciences, version 15.0 (SPSS Inc.; Chicago, IL, USA). The Chi square test was used to perform intergroup comparisons, Mann-Whitney U test was used to perform between-group comparisons, and Spearman correlation analysis was used to evaluate the association between two sequential variables. A value of $p < 0.05$ was considered statistically significant.

Results

Overall, 116 orthopedists completed the survey. Of these, 98.3% (n=114) were men and 1.7% (n=2) were women. The mean age of residency onset was 25.5 years (range: 23–34 years). Notably, 50.9% (n=59) of residents completed their residency at the state

university and 49.1% (n=57) at the Ministry of Health Training and Research Hospital (MHTRH). When the residency was completed, on mean, there were 2.22 professors, 2.28 associate professors, 1.37 assistant professors, 5.23 specialists, and 11.24 residents in their clinics.

The mean number of articles published with and without the first name per resident in peer-reviewed journals in Science Citation Index (SCI) or Science Citation Index Expanded (SCI-E) was 0.09 and 0.73, respectively. No significant differences were noted between residents who completed their residency at the state university or at MHTRH in terms of the mean number of articles published in peer-reviewed journals in SCI or SCI-E ($p=0.095$ and $p=0.059$, respectively). The mean number of articles published with the first name and without the first name per resident in peer-reviewed journals other than those in SCI and SCI-E was 0.37 and 1, respectively. No significant differences were observed between residents who completed their residency at the state university or at MHTRH in the mean number of articles published in peer-reviewed journals other than those in SCI and SCI-E ($p=0.495$, $p=0.258$, respectively). Details are presented in Tables 2 and 3.

Overall, 15.5% (n=18) of respondents presented oral presentations at international congresses and 35.3% (n=41) at national congresses. The mean number of oral and poster presentations published per resident at national or international congresses was 2.63 and 4.67, respectively. No significant differences were noted between residents who completed their residency at the state university or at MHTRH in the mean number of oral and poster presentations ($p=0.991$ and $p=0.444$, respectively). Details are presented in Table 4.

No significant difference was noted between the regions in the mean number of articles and presentations during the residency ($p=0.694$ and $p=0.946$, respectively). Details are shown in Table 5.

Furthermore, no significant correlation was noted between the number of professors and specialists at the clinic and the total number of academic works (articles + presentations) ($p=0.810$ and $p=0.596$, respectively). Nevertheless, a significant positive correlation was noted between the number of associate professors and assistant professors at the clinic and the total number of academic works ($p<0.01$ and $p=0.017$, respectively). Oral presentations were the only significant type of academic work that increased in direct proportion to the number of residents at the clinic ($p=0.027$). Details are provided in Table 6.

The respondents' contributions to academic work were as follows: collecting data, 78.4%; statistical analysis, 28.4%; interpretation of data and analysis, 34.4%, writing of the article, 27.6%; and no contribution to any study, 12.9%. Overall, 19% of respondents stated that they were trained in article writing. It was found that those who received training in article writing produced more academic works overall ($p=0.049$) (Table 7). Notably,

MAIN POINTS

- Regardless of the region and institution, the participation of orthopedic residents in academic works is low in Turkey.
- No differences were observed between institutions concerning the encouragement and support for academic works.
- There are several obstacles to conducting academic works, the most common of which is long working hours. New regulations are needed to overcome these obstacles.

Table 1. Survey questions asked to determine the academic works conducted and the obstacles encountered by the orthopedic residents during their residency in Turkey

1. What is your gender?
2. What was your age when you started to work as a resident?
3. What was the year when you started to work as a resident?
4. Which institution did you complete the residency from?
5. In which area is the institution where you completed your residency located?
6. What was the number of professors, associate professors, assistant professors, specialists, and residents in the clinic that you worked in when you finished your resident training?
7. What is the number of your first name articles (except case reports, letters to the editor, and technical notes) published in peer-reviewed journals in SCI or SCI-E during your residency?
8. What is the number of your other than first name articles (except case reports, letters to the editor, and technical notes) published in peer-reviewed journals in the SCI or SCI-E during your residency?
9. What is the number of your first name articles (except case reports, letters to the editor, and technical notes) published in national or international peer-reviewed journals other than those in SCI and SCI-E during your residency?
10. What is the number of your other than first name articles (except case reports, letters to the editor, and technical notes) published in national or international peer-reviewed journals other than those in SCI and SCI-E during your residency?
11. Did you present oral presentations at international congresses during your residency?
12. Did you present oral presentations at national congresses during your residency?
13. What is the number of oral and poster presentations presented at national or international congresses during your residency?
14. Do you think that you need education on “how to write an article?” or “how to conduct an academic study” during your residency?
15. Have you been trained to write an article during your residency?
16. In what ways did you express your contributions to academic works during your residency?
17. How do you evaluate your clinic in terms of the encouragement and support that you receive in conducting academic work?
18. Do you think that there were obstacle/obstacles to your academic work during your residency?
19. What obstacles do you think occur in academic works during your residency?

SCI: Science Citation Index; SCI-E: Science Citation Index Expanded

Table 2. First name articles (except case reports, letters to the editor, and technical notes) published in peer-reviewed journals in SCI or SCI-E during the residency in Turkey

	Institution			p*
	State university (n=59)	MHTRH (n=56)	Total (n=115)	
Mean number of articles published with first name per resident in peer-reviewed journals in SCI or SCI-E	0.14	0.04	0.09	0.095

*Chi Square test

MHTRH: Ministry of Health Training and Research Hospital; SCI: Science Citation Index; SCI-E: Science Citation Index Expanded

86.2% of respondents stated that knowledge of “how to write an article?” or “how to conduct an academic study” was necessary. When asked regarding the encouragement and support that they received from their clinic to conduct the academic work, 6.9% responded “excellent,” 20.7% responded “good,” 24.1% responded “moderate,” and 48.3% responded “bad.” No significant differences were found in encouragement and support received from the clinic to conduct the academic work between residents who completed their residency at the state university and at MHTRH ($p=0.115$) (Table 8).

Notably, 94% of respondents stated that they encountered obstacles while conducting academic work. The most common obstacle encountered was long working hours (74.5%). Details are presented in Figure 1.

Discussion

The number of publications in scientific journals and oral and poster presentations is a commonly used criterion to evaluate academic productivity (8, 9).

Table 3. Other than first name articles (except case reports, letters to the editor, and technical notes) published in peer-reviewed journals in SCI or SCI-E and in national or international peer-reviewed journals other than those in SCI or SCI-E during residency in Turkey

	Institution		Total (114)	p*
	State university (n=59)	MHTRH (n=55)		
Number of articles published without first name per resident in peer-reviewed journals in SCI or SCI-E (mean±SD)	0.63±0.99	0.84±1.27	0.73±1.13	0.059
Number of articles published with first name per resident in national or international peer-reviewed journals other than those in SCI or SCI-E (mean±SD)	0.48±0.99	0.26±0.64	0.37±0.84	0.495
Number of articles published without first name per resident in national or international peer-reviewed journals other than those in SCI or SCI-E (mean±SD)	1.09±1.30	0.91±1.40	1.000±1.34	0.258

*Mann-Whitney U test

SD: standard deviation; MHTRH: Ministry of Health Training and Research Hospital; SCI: Science Citation Index; SCI-E: Science Citation Index Expanded

Table 4. Correlation between the institution where the residency is completed and the total number of national or international presentations

	Institution		Total (116)	p*
	State university (n=59)	MHTRH (n=57)		
Total number of oral presentations (mean±SD)	2.80±3.69	2.46±3.35	2.63±3.52	0.991
Total number of poster presentations (mean±SD)	5.22±5.76	4.11±4.89	4.67±5.35	0.444
Total number of oral+poster presentations (mean±SD)	8.02±8.98	6.56±7.52	7.30±8.29	0.632

*Mann-Whitney U test

SD: standard deviation; MHTRH: Ministry of Health Training and Research Hospital

Therefore, residents must conduct academic works during their residency, evaluate the literature in detail, and contribute information to the field of orthopedics to further their academic career after graduation (10-12). However, conducting academic works is time-consuming and can be influenced by several factors (8). This study revealed that the participation of orthopedic residents in academic works in Turkey was low regardless of the region and institution. Nonetheless, no differences in encouragement and support for conducting academic works were noted among institutions. Several obstacles were encountered in conducting academic works, with the most common being long working hours.

Academic success largely depends on the publication of articles in scientific journals (13-18). Macknin et al. reported that those who published articles in a peer-reviewed journal during their residency were more likely to continue publishing articles in the future during their career as orthopedic surgeons (6). Namdari et al. reported that physicians who continued their academic career after graduating from orthopedic residencies in the USA had a mean of 4.8 publications during their residency, whereas non-academics had 2.4 publications (4). William et al. reported that the mean number of publications per resident between the third and fifth years of their residency was 1.2 in the USA (19). In the same study, it was observed that at least 38.4% of publications

were published in the journals in SCI, although the exact percentage was not reported. Johnson et al. reported that a mean of 0.290 publications was published per resident during the period 2008–2011 in the USA (20). In our study, the mean number of publications per resident was 2.2 in Turkey, with most published in peer-reviewed journals other than those in SCI and SCI-E. Although a precise comparison could not be performed, the total number of publications of residents in Turkey was determined to be similar to or lower than that reported in the literature. Notably, this number was very low when publications in peer-reviewed journals in SCI and SCI-E were considered.

Oral and poster presentations presented at national or international congresses are an accepted method of reporting the results of research, and it is desirable to publish them in a peer-reviewed journal. However, it has been reported that only 36%–66% of presentations can be published in peer-reviewed journals (9, 21-25). To the best of our knowledge, no study has investigated the number of oral and poster presentations of orthopedic residents. This study revealed that the number of oral and poster presentations published in national or international congresses was 7.3 per resident in Turkey. The overall number of oral and poster presentations in our study was three to four times the total number of articles. Nevertheless, if half of the presentations could be

Table 5. Relationship between regions where residency was completed and academic works conducted during residency

Region		Total number of articles	Total number of presentations	Total number of academic works (article+presentation)
The Mediterranean (n=11)	Mean±SD	1.63±1.74	6.81±6.44	8.45±7.56
	Median	2	4	5
	Min–Max	0–4	0–21	1–25
East Anatolia (n=6)	Mean±SD	0.66±0.81	6.83±4.75	7.50±4.96
	Median	0,5	8.5	9
	Min–Max	0–2	0–12	0–12
Aegean (n=15)	Mean±SD	1.93±2.08	4.46±5.1	6.40±5.12
	Median	1	4	6
	Min–Max	0–7	0–12	0–19
Southeastern Anatolia (n=5)	Mean±SD	1.80±1.92	5.20±5.93	7.00±7.64
	Median	1	4	6
	Min–Max	0–5	0–14	0–19
Central Anatolia (n=17)	Mean± SD	3.47±3.62	11.17±12.39	14.64±15.85
	Median	2	5	7
	Min–Max	0–10	0–32	0–41
Black Sea (n=10)	Mean±SD	2.30±2.54	6.40±6.96	8.70±8.98
	Median	2	3.5	5.5
	Min–Max	0–7	0–18	0–22
The Marmara (n=52)	Mean±SD	2.05±2.68	7.38±8.55	9.44±10.41
	Median	1	5.5	6.5
	Min–Max	0–10	0–34	0–41
p*		0.694	0.946	0.976

SD: standard deviation; Min: minimum; Max: maximum

*KW: Chi square: Kruskal–Wallis test

Table 6. Correlation between the number of academicians, specialists, and residents at the institution where the residency was completed and number of academic works

Academic works		Number of Professors	Number of Associate Professors	Number of Assistant Professors	Number of specialists	Number of residents
Total number of articles (except case reports, letters to the editor, and technical notes)	r	0.096	0.283	0.106	0.036	0.176
	p	0.308	0.002**	0.260	0.704	0.059
Total number of oral presentations	r	0.046	0.302	0.139	0.118	0.205
	p	0.623	0.001**	0.139	0.208	0.027*
Total number of poster presentations	r	0.028	0.350	0.279	0.009	0.127
	p	0.764	0.000**	0.003*	0.927	0.173
Total number of oral+poster presentations	r	0.023	0.358	0.251	0.042	0,165
	p	0.809	0.000**	0.007**	0.656	0.077
Total number of academic works (articles+presentations) (except case reports, letters to the editor, and technical notes)	r	0.023	0.344	0.222	0.050	0.169
	p	0.810	0.000**	0.017*	0.596	0.070

*p<0.05

**p<0.01

Spearman correlation analysis

published in peer-reviewed journals, it would increase the number of publications in peer-reviewed journals in Turkey in the coming years-a promising observation.

In our study, most respondents (94%) stated that there were some obstacles in conducting academic works. In the literature, during orthopedic residency, study time, mentoring support, and dedi-

Table 7. Relationship between article writing training and academic works

Untrained or trained in article writing		Total number of articles	Total number of presentations	Total number of academic works (article+presentation)
Untrained (n=94)	Mean±SD	1.77±2.37	6.32±6.90	8.09±8.70
	Median	1	4	6
	Min.-Max.	0–10	0–30	0–37
Trained (n=22)	Mean±SD	3.77±3.09	11.50±11.93	15.27±14.29
	Median	4	7	8.5
	Min.-Max.	0–10	0–34	0–41
p*		0.003	0.160	0.049

SD: standard deviation; Min: minimum; Max: maximum

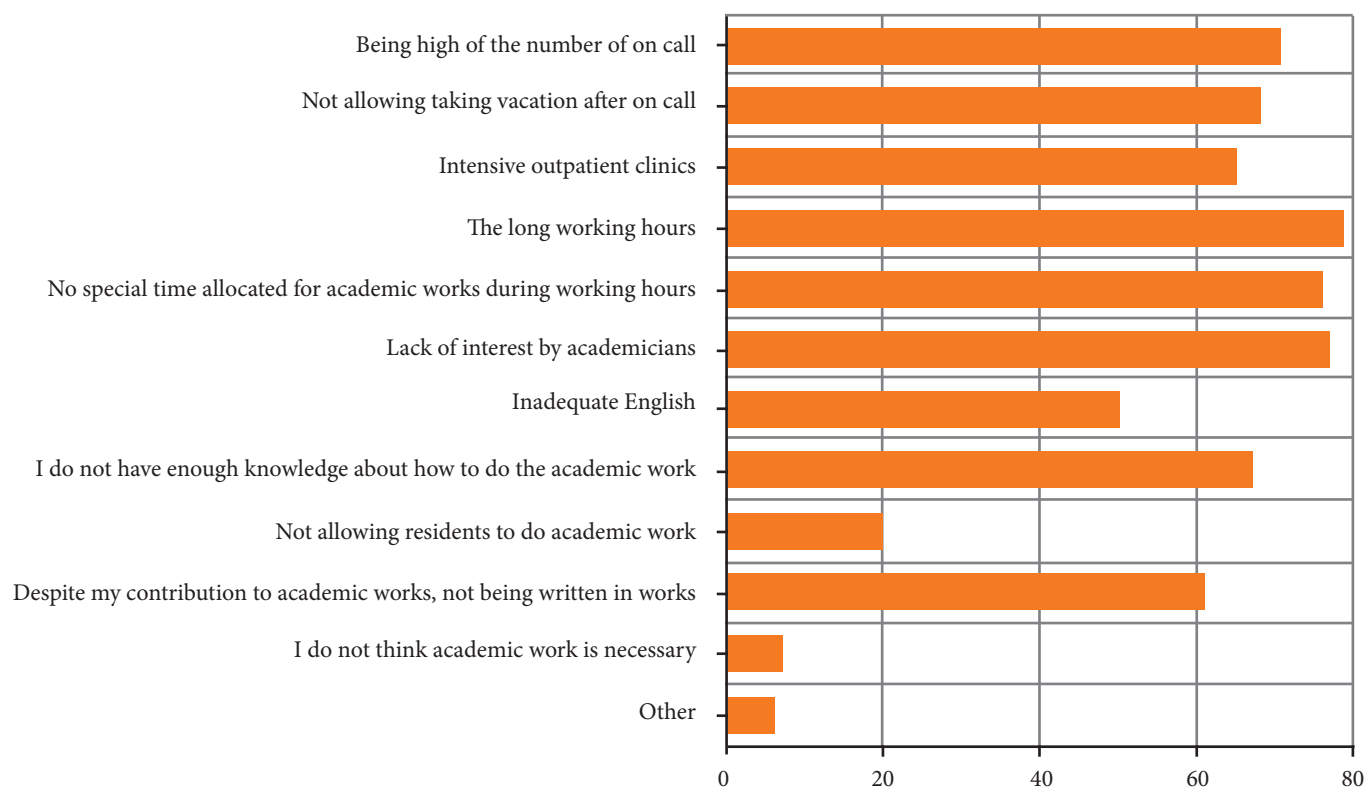
*Mann–Whitney U test

Table 8. Relationship between encouragement and support for academic works and institutions offering residency training

Question		State University n (%)	MHTRH n (%)	p*
How do you evaluate your clinic in terms of the encouragement and support that you received in conducting academic work?	Bad	23 (39.0)	33 (57.9)	0.115
	Moderate	16 (27.1)	12 (21.1)	
	Good + Excellent	20 (33.9)	12 (21.1)	

MHTRH: Ministry of Health Training and Research Hospital

*KW Chi square: Kruskal–Wallis test

**Figure 1.** Obstacles encountered in academic works during the residency

cated time were the frequently reported factors that affected the participation of residents in academic works (2, 5, 19, 20, 26-28). Study time is one of the most crucial factors affecting academic

productivity. As per the literature, changes in study time were reported to affect patient care, resident's health, and training (29-33). However, only few publications exist regarding changes in

study time (20). Johnson et al. investigated the variability in academic productivity before and after limiting working hours to 80 hours per week during residency programs in the USA (20). They reported that the number of publications increased significantly when the new regulation was compared with the previous one. The Turkish Ministry of Health's circular, dated April 15, 2011, noted a regulation regarding the working conditions of residents. Accordingly, it was forbidden to be on-call as block or every other day and for charges to be paid for being on-call without a vacation. However, to our knowledge, no study has investigated the effect of the regulation of working conditions on academic productivity in Turkey. In our study, the most common obstacle encountered in conducting academic works was long working hours. However, we could not provide quantitative data on the exact working hours and the number of on-call residents. It was challenging to specify an exact number as these data depend on several factors, such as the resident's seniority, the city of work, and the work intensity of the hospital. Future studies involving quantitative data can obtain more objective results. We believe that even though the Ministry of Health made some regulations, the working conditions of residents may not have improved sufficiently because these regulations are either inadequate or not fully implemented in practice. We suggest that if working conditions are improved, residents will have more time to conduct academic work and their academic productivity may increase accordingly.

Mentoring is one of the main elements of resident training. Institutions should be able to provide adequate mentoring to residents for both patient care and research. The personal and professional development of residents and their academic career planning primarily depend on the research environment and guidance by mentors. We did not find any study in the literature that investigated the academic efficiency associated with having or not having mentors. However, Flint et al. reported that residents with a mentoring program or those who selected their mentor were more satisfied than those with non-mentoring programs, and 96% of residents thought that mentors were either critical or helpful in their training (27). Despite no formal mentoring concept in institutions offering residency training in Turkey, generally, the academicians serve as mentors. In our study, the second most significant obstacle encountered in conducting academic work during residency was the lack of interest by academicians. Moreover, 48.3% of residents evaluated the encouragement and support of the clinic for academic works as poor, with no significant differences noted among those who completed their residency at the state university or at MHTRH. This finding was confirmed by the fact that no difference was observed in the number of academic works between those who completed their residency at the state university or at MHTRH. We think that probably because the number of academicians is less and the workload is high, they do not have sufficient time to encourage and support residents' academic works. Furthermore, the reduction of academic productivity with increasing academic seniority may influence these results in Turkey. This

study demonstrated that although a significant positive correlation was observed between the number of associate professors and assistant professors in the clinic and the total number of academic works per resident, no significant relationship related to the number of professors was identified. We believe that the academic productivity of residents will increase if they are provided an environment in which they get mentored by all the academicians in the clinic and in which professional mentoring support can be obtained from outside the institution when necessary.

The increase in the number of residents in the clinic is one of the factors that may affect academic productivity during the residency. In our study, oral presentations were the only significant type of academic work that increased in direct proportion to the number of residents in the clinic. We think that academic works in the form of oral presentations are preferred more by residents because they are easier and can be performed with minimal effort. More importantly, this may also be related to ghost authorship.

During orthopedic residency, one of the factors that increase academic productivity is the time dedicated for academic works. Williams et al. demonstrated that residents who completed their residency in a program with dedicated time for research had a significantly higher number of publications than those who did not (19). Chan et al. reported that orthopedic residents who completed their residency in programs with a protected block research time in Canada had a higher number of publications than those who did not (34). Nonetheless, the concept of dedicated time for research does not exist in Turkey. In our study, the third obstacle encountered in conducting academic works was the lack of dedicated time allocated for conducting academic works during working hours. We believe that if dedicated time can be provided for research as block or intermittent periods, the academic productivity of residents will increase.

One of the factors that can influence the participation of residents in research during their residency is the first name authorship (2). Johnson et al. reported that between 2008 and 2011, orthopedic residents in the USA were the first name authors in 60.4% of publications they participated in (20). In contrast, our study revealed that the orthopedic residents in Turkey were the first name authors in 45.5% of the publications they participated in. The number of first name authors in publications is lower as per the literature. We think that this is probably because of the low level of contribution of residents to academic works. This finding is supported by the fact that respondents' contribution to academic work was most observed (78.4%) in the "collecting data" category. Another reason could be the inappropriateness of residents being the first name authors in terms of academic seniority. We think that the number of first name resident authors in publications can be increased if academicians provide adequate support and the residents take a more active role in writing and finalizing their work. Interestingly, 57.5% of residents stated that their names were not mentioned in the publications despite their contribution. This situation could be

because of the expectation that every resident contributing to the academic work will be mentioned as an author at the publication stage of the study. Nonetheless, this expectation may have arisen because of the lack of information regarding authorship. We did not inform the respondents regarding authorship, honorary or ghost authorship, and the views of the International Committee of Medical Journal Editors on these issues. Although we did not provide respondents with direct information on issues regarding authorship, the answer options for question 16 (A. Data collection; B. Statistical analysis; C. Interpretation of data and analysis; D. Writing of the article; E. I did not contribute to any academic works) included the criteria regarding residents' authorship.

Notably, one of the factors that could affect academic productivity during orthopedic residency was training in article writing. In our study, it was observed that those who had formal training in article writing produced more academic works than those who had no training. In our study, 86.2% of respondents stated that knowledge of "how to write an article?" or "how to conduct an academic study" was necessary. However, only 19% of them were trained to write articles. This finding reveals that institutions offering residency training programs lack training programs for article writing, even though the residents believed that it was necessary to conduct training for academic works and article writing to excel in conducting academic works. We believe that this situation should be reviewed and corrected by institutions offering residency training programs.

Furthermore, one of the factors that may affect the number of academic works published during the residency was the region where the residency is completed. In our study, no differences were noted among the regions in the mean number of articles published and presentations presented during the residency. Our study revealed that although residents completed their residency in different regions of Turkey, they experienced similar circumstances in conducting academic work.

This study had several limitations. First, we included only academic works that were published during the residency. The delay between the completion of the academic work and its publication may reveal a number lower than the actual number of academic works completed during the residency. Additional information could be obtained through studies that have been completed during residency and published after graduation. Second, we did not investigate the effect of seniority on authorship during the residency. Additional information can be obtained by investigating the effect of the resident's seniority on authorship. Third, we were unable to obtain quantitative data regarding the exact working hours and the number of on-call residents. Nevertheless, future studies involving quantitative data can obtain more objective results. Fourth, we prepared our article based on the data obtained from the perspective of the newly completed residency. However, in the survey, we did not ask questions to investigate this issue from the perspective of educators. Hence, more objective and accurate data can be obtained if future sur-

veys include questions to evaluate the perspective of educators. Finally, we did not enquire at which stage of residency the articles were published. Therefore, future studies should analyze the periods during residency when publications are intensively pursued, thereby providing valuable information to regulate the residency training programs and making them productive.

This study that the participation of orthopedic residents in academic works in Turkey was low regardless of the region and institution. Moreover, no differences were observed between institutions in encouragement and support provided for academic works. Notably, several obstacles were encountered during conducting academic works, with the most common being long working hours. However, academic productivity may be increased by establishing conducive working conditions, providing dedicated time for conducting academic works, mentoring the resident, providing encouragement and support to the resident to conduct academic work, and providing training for article writing. Nevertheless, additional studies are needed to confirm the findings of this study.

Ethics Committee Approval: N/A.

Informed Consent: This study is a questionnaire study. For this reason, informed consent was not obtained.

Author Contributions: Concept - İ.A., A.D.; Design - İ.A.; Supervision - İ.A., A.D.; Resources - E.Ç., H.K.; Materials - T.M.D.; Data Collection and/or Processing - H.K., Y.E.A., E.Ç.; Analysis and/or Interpretation - H.K., Y.E.A., İ.A., T.M.D.; Literature Search - A.D., E.Ç.; Writing Manuscript - A.D.; Critical Review - A.D., E.Ç.

Conflict of Interest: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declare that this study has received no financial support.

References

1. Accreditation council for graduate medical education. ACGME program requirements for graduate medical education in orthopaedic surgery: Approved focus revision. Chicago, IL: ACGME; 2013.
2. Ahn J, Donegan DJ, Lawrence JT, Halpern SD, Mehta S. The future of the orthopaedic clinician-scientist: Part II: Identification of factors that may influence orthopaedic residents' intent to perform research. *J Bone Joint Surg Am* 2010; 92: 1041-6. [\[CrossRef\]](#)
3. Bernstein J, Ahn J, Iannotti JP, Brighton CT. The required research rotation in residency: The University of Pennsylvania experience, 1978-1993. *Clin Orthop Relat Res* 2006; 449: 95-9. [\[CrossRef\]](#)
4. Namdari S, Jani S, Baldwin K, Mehta S. What is the relationship between number of publications during orthopaedic residency and selection of an academic career? *J Bone Joint Surg Am* 2013; 95: e45. [\[CrossRef\]](#)
5. Robbins L, Bostrom M, Marx R, Roberts T, Sculco TP. Restructuring the orthopedic resident research curriculum to increase scholarly activity. *J Grad Med Educ* 2013; 5: 646-51. [\[CrossRef\]](#)

6. Macknin JB, Brown A, Marcus RE. Does research participation make a difference in residency training? *Clin Orthop Relat Res* 2014; 472: 370-6. [\[CrossRef\]](#)
7. Huri G, Cabuk YS, Gursoy S, Akkaya M, Ozkan S, Oztuna V, Aydingoz O, Senkoylu A. Evaluation of the orthopaedics and traumatology resident education in Turkey: A descriptive study. *Acta Orthop Traumatol Turc* 2016; 50: 567-71. [\[CrossRef\]](#)
8. Namdari S, Baldwin KD, Weinraub B, Mehta S. Changes in the number of resident publications after inception of the 80-hour work week. *Clin Orthop Relat Res* 2010; 468: 2278-83. [\[CrossRef\]](#)
9. Hamlet WP, Fletcher A, Meals RA. Publication patterns of papers presented at the Annual Meeting of The American Academy of Orthopaedic Surgeons. *J Bone Joint Surg Am* 1997; 79: 1138-43. [\[CrossRef\]](#)
10. Bernstein J. CORR Insights: Does research participation make a difference in residency training? *Clin Orthop Relat Res* 2014; 472: 377-8. [\[CrossRef\]](#)
11. Bishop JA. CORR Insights: A dedicated research program increases the quantity and quality of orthopaedic resident publications. *Clin Orthop Relat Res* 2015; 473: 1522-3. [\[CrossRef\]](#)
12. Atesok KI, Hurwitz SR, Egol KA, Ahn J, Owens BD, Crosby LA, Pellegrini VD Jr. Perspective: Integrating research into surgical residency education: Lessons learned from orthopaedic surgery. *Acad Med* 2012; 87: 592-7. [\[CrossRef\]](#)
13. Camp M, Escott BG. Authorship proliferation in the orthopaedic literature. *J Bone Joint Surg Am* 2013; 95: e44. [\[CrossRef\]](#)
14. Hillman BJ, Witzke DB, Fajardo LL, Fulginiti JV. Research and research training in academic radiology departments. A survey of department chairmen. *Invest Radiol* 1990; 25: 587-90. [\[CrossRef\]](#)
15. Newman A, Jones R. Authorship of research papers: Ethical and professional issues for short-term researchers. *J Med Ethics* 2006; 32: 420-3. [\[CrossRef\]](#)
16. Smith E, Williams-Jones B. Authorship and responsibility in health sciences research: A review of procedures for fairly allocating authorship in multi-author studies. *Sci Eng Ethics* 2012; 18: 199-212. [\[CrossRef\]](#)
17. Thompson DE, Callen EC, Nahata MC. Publication metrics and record of pharmacy practice chairs. *Ann Pharmacother* 2009; 43: 268-75. [\[CrossRef\]](#)
18. Tornetta P III, Siegel J, McKay P, Bhandari M. Authorship and ethical considerations in the conduct of observational studies. *J Bone Joint Surg Am* 2009; 91(Suppl 3): 61-7. [\[CrossRef\]](#)
19. Williams BR, Agel JA, Van Heest AE. Protected time for research during orthopaedic residency correlates with an increased number of resident publications. *J Bone Joint Surg Am* 2017; 99: e73. [\[CrossRef\]](#)
20. Johnson JP, Savage K, Gil JA, Eberson CP, Mulcahey MK. Increased academic productivity of orthopaedic surgery residents following 2011 duty hour reform. *J Surg Educ* 2018; 75: 884-7. [\[CrossRef\]](#)
21. Elder NC, Blake RL Jr. Publication patterns of presentations at the Society of Teachers of Family Medicine and North American Primary Care Research Group annual meetings. *Fam Med* 1994; 26: 352-5.
22. Jasko JJ, Wood JH, Schwartz HS. Publication rates of abstracts presented at annual Musculoskeletal Tumor Society meetings. *Clin Orthop Relat Res* 2003; 415: 98-103. [\[CrossRef\]](#)
23. Murrey DB, Wright RW, Seiler JG III, Day TE, Schwartz HS. Publication rates of abstracts presented at the 1993 annual academy meeting. *Clin Orthop Relat Res* 1999; 359: 247-53. [\[CrossRef\]](#)
24. Scherer RW, Dickersin K, Langenberg P. Full publication of results initially presented in abstracts: A meta-analysis. *JAMA* 1994; 272: 158-62. [\[CrossRef\]](#)
25. Donegan DJ, Kim TW, Lee GC. Publication rates of presentations at an annual meeting of the American Academy of Orthopaedic Surgeons. *Clin Orthop Relat Res* 2010; 468: 1428-35. [\[CrossRef\]](#)
26. Segal LS, Black KP, Schwentker EP, Pellegrini VD. An elective research year in orthopaedic residency: How does one measure its outcome and define its success? *Clin Orthop Relat Res* 2006; 449: 89-94. [\[CrossRef\]](#)
27. Flint JH, Jahangir AA, Browner BD, Mehta S. The value of mentorship in orthopaedic surgery resident education: The residents' perspective. *J Bone Joint Surg Am* 2009; 91: 1017-22. [\[CrossRef\]](#)
28. Konstantakos EK, Laughlin RT, Markert RJ, Crosby LA. Assuring the research competence of orthopedic graduates. *J Surg Educ* 2010; 67: 129-34. [\[CrossRef\]](#)
29. Baldwin K, Namdari S, Donegan D, Kamath A, Mehta S. Early effects of resident work-hour restrictions on patient safety: A systematic review and plea for improved studies. *J Bone Joint Surg Am* 2011; 93: e5. [\[CrossRef\]](#)
30. Jamal M, Doi SA, Rousseau M, et al. Systematic review and meta-analysis of the effect of North American working hours restrictions on mortality and morbidity in surgical patients. *Br J Surg* 2012; 99: 336-44. [\[CrossRef\]](#)
31. Philibert I, Nasca T, Brigham T, Shapiro J. Duty-hour limits and patient care and resident outcomes: Can high-quality studies offer insight into complex relationships? *Ann Rev Med* 2013; 64: 467-83. [\[CrossRef\]](#)
32. Reed D, Fletcher K, Arora VM. Systematic review: Association of shift length, protected sleep time, and night float with patient care, residents' health, and education. *Ann Intern Med* 2010; 153: 829-42. [\[CrossRef\]](#)
33. Moonesinghe SR, Lowery J, Shahi N, Millen A, Beard JD. Impact of reduction in working hours for doctors in training on postgraduate medical education and patients' outcomes: Systematic review. *BMJ* 2011; 342: d1580. [\[CrossRef\]](#)
34. Chan RK, Lockyer J, Hutchison C. Block to succeed: The Canadian orthopedic resident research experience. *Can J Surg* 2009; 52: 187-95.