Original Article

Postgraduate Research Mentorship Program: An approach to improve the quality of postgraduate research supervision and mentorship in Iranian students

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Abstract:

BACKGROUND: One of the important challenges at the Universities of Medical Sciences is the mentorship of postgraduate students' academic theses. Since 2015, the Research Mentorship Program (RMP) has been implemented with the aim of improving research knowledge and skill, thesis quality, and quantity and quality of papers of emerging from postgraduate students' theses.

METHODS: This was a prospective cohort study with census sampling method (nonprobability sampling), completed between 2015 and 2018. Twenty-eight postgraduate students participated in the program. Each trainee student is done during the research period through the supervisor and another student in a higher level of education as mentor. Questionnaire with open-ended questions and checklist was used for data gathering. For statistical analysis, Chi-square test was used.

RESULTS: 100% of the mentors and 93% of the mentee participated at the Research Mentorship Program were satisfied. In addition, the duration of the research course for the master's students participated in the RMP was reduced. Participants in this program had higher quantity and quality of papers resulting from postgraduate student's academic theses. RMP can enhance the postgraduate students' knowledge and skills in their research projects and research methods, develop personal and professional relationships, and promote interpersonal communication as a student or mentor.

CONCLUSION: This program and its similar programs can improve the quality of postgraduate students' academic theses and reduce their research period.

Keywords:
Postgraduate students, research mentorship program, research supervision

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Introduction

Both completion rates and time to completion of master's and doctoral (postgraduate) programs pose a significant challenge worldwide. The low quality of graduate theses is one concern affecting many of the world's leading universities.[1] While there are multiple factors that can affect completion rates

and time to completion, issues related to data quality can delay the scheduling of the thesis defense, and/or publication of resulting papers. Furthermore, the high degree of frustration among postgraduate degree students in the United States has led to attrition rates of up to 50%.[2]

Previous studies have shown that multiple factors can affect thesis quality, including: (1) individual characteristics of students such as knowledge, experience,

commitment, socioeconomic conditions, communicative skills, stress, and time management; (2) institutional conditions, such as cooperation, guidance, budget, and physical facilities; (3) factors associated with supervisors, such as knowledge, interest, regular communication between students and supervisors, and providing punctual feedback; and (4) factors related to the research environment, including the role research (thesis) committees, and peer support.[3] The role of the thesis supervisor is considered the most important variable influencing student success in the research process, but it can be delicate and complicated.[4] Although the supervisory model of postgraduate student supervision has long existed, there is still no agreed-upon standard for this model.[5]

While multiple factors can affect the supervisory role, including scheduling regular meetings, allocating sufficient time to students, and the supervisor's academic background to name a few,[6] many graduate students report being dissatisfied with their research supervisor. The foregoing has been attributed to the lack of adequate supervisor knowledge in the field, lack of support, and the hectic schedule of supervisors.[7] In a study by Matin and Khan, approximately 72% of supervisors and 20% of students stated that students did not have the foundational knowledge required to undertake the research.[3] In addition, 83% of supervisors and 46% of the students who participated in the study stated that regular mentor–mentee meetings were infrequent and noncomprehensive.[3]

The results of a study by Yousefi *et al*. showed that most students complained about the length of their studies.[8] The results of the qualitative study by Yousefi *et al*. 2015 showed that the main challenges and complications in the practice of supervising dissertation for the students and teachers are as follows: (1) Background problems (supervisors' hectic schedules and lack of resources); (2) obscurity of the role of supervisor (weak structure of supervising theses and ambiguity in the criteria of competence supervisor); (3) poor reflection on supervision (ineffective evaluation, lack of self-evaluation, and lack of adequate reflexes on performance); and (4) ethical issues (inadequate communication, lack of professional conduct, etc.).[8] Studies have shown that multinational communication has become more important in universities over the last few decades[9] and is one of the ways to increase the competency of postgraduate students to help them complete the coursework.[2] Bair and Haworth (2004) consider financial support, academic preparation, professional development, and communication in mentorship.[2]

Mentoring is an interaction, in which an experienced person (mentor) can help a less experienced person (mentee) through guidance, support, and feedback.[10] In this sense, the guidance of a more experienced student to a less experienced one or the guidance of the students by the professors can be mentioned. Mentoring programs in universities not only increase the level of compliance of students facing challenges but also contribute to an increase in the number of graduates. Intellectual maturity, time management, and better accountability are the positive aspects of Mentoring. Mentoring through peers can lead to an increased self-confidence and academic self-efficacy.[9] The results of a study on doctoral students in psychology counseling at the University of Maryland in 2002 showed that research Mentoring can promote the research products of students.[11] At Loyola University, Chicago, a Research Mentorship Program (RMP) was developed for students from a variety of disciplines.[12] In addition, in 2010, Purdue University implemented a mentorship to guide the research projects of pharmacy and pharmaceutical students.[13] Although there have been many programs in this respect by various universities around the world, the studies reveal that despite its high importance, a systematic program aiming to enhance the research competencies and improve the quality of graduate students' dissertations does not yet exist in Iran. Therefore, this study was carried out with the aim of investigating the effect of participation in the RMP on the research competency of postgraduate students of the Faculty of Nutrition Sciences and Dietetics of Tehran University of Medical Sciences.

Methods

This study was a prospective cohort study which employed census sampling. The study was conducted between October 2015 and October 2018 at the School of Nutrition Sciences and Dietetics of Tehran University of Medical Sciences. Twenty-eight postgraduate students (19 master's students, 8 PhD students, and 1 postdoctoral student) participated in this program. The study population included all of the postgraduate students who were selected by one of the two research supervisors who led the dissertation in the research mentorship method. Questionnaire with open-ended questions and research documentation survey (checklist) was used for data collection. Chi-square test was used for statistical analysis.

Program details
Initially, in a meeting between the supervisor and the student, the student will be informed of their mentorship conditions and the expectations of them in order to be able to enter the study program and agree with the

requirements. Otherwise, the student can use the advice of other professors of the college who usually accept the advisorship of theses. Since the research advisor has limited time to check the details of the research project of each student, an experienced senior or a postdoctoral student for each doctoral student and a doctoral student for each master's student participating in RMP considered as a mentor. The number of students considered for a mentor is determined according to the mentor's attributes and abilities. The student and the mentor meet on a weekly basis, and the mentor (peer) guides the student further according to the progress report. It should be noted that all feedback provided to the student by peer mentor should be confirmed by the research supervisor. Not only the research supervisor communicated continuously with research mentors and supervised the process adequately, but also the students required to submit the report on their progress and received feedback and advice from the research supervisor in the scheduled weekly meetings of the project. Furthermore, online sessions conducted with research faculty supervisor, mentors, and mentees monthly and the process of research projects and problem and issue at this regard were discussed and questioned. For having effective interpersonal interactions, the supervisor evaluates the students and mentors with regard to the quality of their cooperation and the mutual rate of satisfaction on a monthly basis, and in the event of dissatisfaction from either side (the student and the counterpart of the student), the relevant mentor will be replaced by the supervisor.

The educational strategies used in the program were mainly learner-centered education, problem-based, and systematic. Training sessions in this program included the following:
1. Faculty supervisor and mentor sessions: Effective teaching and learning methods and providing appropriate feedback to the student were taught by the faculty supervisor to the mentor. In addition, effective communication skills training and critical thinking training were considered and mentor reported to the supervisor the process of mentorship and the progress of the student research project (weekly, 45–60 min)
2. Faculty supervisor and mentee sessions: In these sessions, the student presented his/her performance in the research project and was given feedback from the supervisor (weekly, 45–60 min)
3. Mentor and mentee sessions: During these sessions, the mentor taught mentee how to search strategies, research methods, article writing, critique of articles, and other topics related to student's project research. Mentee reported his/her project progress and received feedback from the mentor (1–2 h, weekly)
4. Faculty supervisor, mentor, and mentee sessions: It mainly focused on discussing the issues and problems of research projects and providing available solutions (online and monthly).

The training sessions between mentor and mentee, as well as research supervisor, were held according to the timetable. Educational sessions were also interactive and as needed. RMP educational sessions are shown in Table 1.

The supervisor, mentor's peers, and students participating in the RMP were linked through the Telegram group and E-mail in addition to having weekly meetings and are all informed of the process and its progress. It is noteworthy that the RMP is not limited to a research project related to the dissertation and includes articles derived from the dissertation and other studies conducted in the course of the research in such a way that all students are encouraged and directed to conduct at least one systematic review or meta-analysis and an original study by a research supervisor and peer in addition to the associated thesis project.

Encouragement was also used to increase students' motivation. In this way, the division of tasks into group research projects was based on the student's previous activity. Students who were more active in their previous project were assigned less responsibility and vice versa.

To investigate the impact of the RMP on the student's research activities, the open-ended questionnaire and the survey of research documents, such as the number of ISI or PubMed articles derived from the thesis during the program, the duration of the research period, the quality of the dissertation, and the progress report of the research projects were used through a checklist.

The questions were as follows:
• What was your experience in the research mentorship process?
• What benefits did you gain for this program?
• During this program, what challenges did you face?

Ethical considerations
Students and peer mentors volunteer in the RMP, and they all verbally announce their consent to participate in this program. In addition, in all the articles resulting from the research project of the RMP, the names of peer mentors and their position in the article are listed as authors based on the degree of cooperation and participation in the research project mentorship.

Results

The evaluation of the mentorship program was conducted on the basis of Kirkpatrick's four-level evaluation model[14] to its third level. The focus of this

Table 1: Research Mentoring Program educational sessions

Participants	Content	Time
Faculty supervisor and mentor	Effective teaching and learning methods Effective communication skills Critical thinking Mentoring process Answering questions	45-60 min - weekly (during the research period)
Faculty supervisor and mentee	Progress report Giving feedback Answering questions	45-60 min - weekly (during the research period)
Mentor and mentee	Search strategies Research methods Writing and critique of article Progress report Giving feedback Answering questions	1-2 h - weekly (during the research period)
Faculty supervisor, mentor, and mentee	Discussion on research projects and problem Question and answer	Online - monthly (during the research period)

model on program results and its clarity has led to a high contribution to educational evaluations.[15]

Response

Mentors and mentee satisfaction and reaction were assessed through open-ended questionnaire. The results showed that the satisfaction of the peer mentors from the program was 100%. More than 93% of the mentees in the program were satisfied with this program. Students stated that participating in this program not only helped to increase their knowledge and skills in their research project, but also enabled they pass their research course faster than their peers. Similarly, the peer mentors believed that the program was able to increase their knowledge and skills in research project and research methods, in addition to enhancing their mentorship skills.

Learning

Assessing student's learning at this level was considered. Students' weekly progress reports were evaluated directly by their research supervisor and indirectly by peer mentors. Students' research project development was acceptable considering the given period of time.

Behavior

Application of student's knowledge at this level was assessed. This item was measured by evaluating the duration of the student's research period, the quality of the dissertation, and the number of ISI or PubMed articles derived from the thesis. Comparison of the duration of the research period of the students who participated in the RMP with other students showed that this duration was reduced; note to mention that the program was able to promote the quantitative and qualitative aspects of articles derived from the students' theses. This processor could improve the published papers resulted from the

thesis both regarding the impact factor of the journal which articles were accepted and the citation level of the paper. Students participating in the RMP were able to present at least three indexed articles in PubMed or ISI until graduation. The duration of the undergraduate course for the master's students participating in the RMP was four and at maximum five semesters, while the average graduation time for master's students at the Faculty of Nutrition and Dietetics is six semesters and nearly 46% of the students graduated without accepting the paper derived from the dissertation. Furthermore, doctoral students participating in the mentorship program had, in most cases, been able to progress in accordance with the Gantt chart in the proposals and have reported considerable progress in the 6-month sessions and were able to publish their papers resulted from their thesis in a shorter amount of time.

Outcomes

This level of Kirkpatrick's model emphasizes the evaluation of outcome in a larger context and at the right period of time. It was not possible to assess this level in our study. It can be addressed in a separate study in the future.

Descriptive information on education process among students participates in RMP program listed in Table 2.

Challenges

The noncompliance of the mentee student with the mentor student was one of the major challenges of the program, which in some cases was attributed to mentor student's inconsistency with the research supervisor by mentee. This issue was seen as a mentor in the mentee's obedience of a senior student and in cases where higher-level students were used as mentors, we were less likely to see this. In this regard, the supervisor tried to

Table 2: Descriptive information on education process among students participates in Research Mentoring Program and other students

	Number of students		Gender				Average graduation term		Graduation percentage with paper		Average thesis score	
	RMP	Total except RMP	RMP		Total except RMP		RMP	Total except RMP	RMP	Total except RMP	RMP	Total except RMP
			Female	Male	Female	Male						
Master's graduated students	8	112	8	-	66	46	4/3	6/7	100	54	19.8	18.9

RMP=Research mentoring program

ensure the students that all issues were in coordination with the supervisor through several meetings with mentors and mentees and that all stages of the research project will be examined by the supervisor to eliminate problems to a large extent. Diversity of competencies and the level of interest and motivation of students participating in the study as the mentee was another challenge to our study. This made some of the mentee students feel the high work pressure and lack of timely performance of some of their expected activities, due to the comparison of their research activities with other classmates.

Discussion

The main purpose of this study was to investigate the effect of RMP on the research competencies of graduate students. The results of our study showed that not only were the students participating in the program satisfied with their participation in the RMP, but also this program was able to trigger an increase in the knowledge and skills of participating students in the program as mentees in the field of research. Although the main goal of the mentorship program was to provide effective and timely guidance of postgraduate students as mentees and to develop their research competencies, the results showed that mentors accompaniment with mentees in research projects not only develops research skills in mentee students, but also provides a good opportunity to improve the mentorship skills in the mentors. They also stated that participation in the program enabled them to further enhance the knowledge and skills of the mentor students with regard to research projects and research methods. The increase in the number of articles resulting from the research project indexed in PubMed and the ISI and the reduction in the duration of the research period of the master's students participating in the mentorship program as a mentee was another study finding.

The interaction between mentor and mentee at the postgraduate level is a critical factor for having successful graduate programs.[2] Although in mentoring studies, the focus is not particularly on research, mentoring is usually an important component of research by faculty members.[11] In the Mentoring Research Program at Loyola University of Chicago, which used graduates as student mentors in research, 100% of the mentees were satisfied with their relationship with their mentors and stated that the mentors had spent enough time for research projects, and they had the necessary research skills and sufficient knowledge to guide the project and received constructive feedback on their work. Students participating in the program said that participation in this program helped them with terminology, research methodology, technical skills, and theory comprehension and concepts associated with the research project. Moreover, they believed that participating in the program contributed to the enhancement of critical reflection, problem-solving abilities, and working independently.[12] The results of Kiersma *et al.*, which was conducted to investigate the effect of mentors on increasing the interest on research at Purdue University, showed that mentorship program increased the understanding of research and mentorship skills among mentors.[13] Furthermore, the results of the study at the University of Maryland showed that mentoring by students is also mediation between the research environment and research findings, and the research education environment can have the greatest impact on the student's research achievements through the research mentors.[11] At least 75% of midwifery students attending a study at the Urban Australian University aiming to examine the benefits of mentoring for midwifery students stated that participation in the mentorship program has developed their mentoring and leadership skills.[16] Through mentoring with the aid of peers, more experienced students help less experienced ones to improve their academic performance altogether through counseling, support, and knowledge enhancement not to mention that it contributes to mentors' individual growth.[4] Mentoring through peers has positive effects on mentors and mentees. Intellectual maturity, time management, and accountability are positive aspects of mentoring. Mentoring through peers can lead to increased self-confidence and academic self-efficacy.[9] Meanwhile, mentorship can help novice faculty members and doctoral students to learn professional responsibilities and expectations. Furthermore, mentor faculty members can also direct and support students in the area of research, education, and institutional expectations and policies.[14]

In mentoring through peers, cognitive solidarity is created due to the similarity of the basic knowledge of the mentee and mentor, helping the mentee to better understand the basic concepts. Furthermore, because of the social solidarity of the mentee and mentor, it reduces stresses associated with learning new subjects and transitional difficulties.[17]

The results of the systematic review studies conducted by Sambunjak *et al.* (2010) showed that professional guidance, personal development, and ultimately increased productivity are some of the most important effects of mentorship.[18] Finally, it should be acknowledged that mentoring programs at universities not only increase students' ability to counteract problems, but it also increase their yearly graduation rates.[9]

Strengths and limitations
The strengths of this study include the participation of students in three levels of master's, doctoral, and postdoctoral degrees. In this study, we encountered some limitations, including the number of students that participated in RMP and graduated until the end of the study was limited since the mentoring program has been implemented for postgraduate students since 2015, and in the coming years, more participants can be studied in this program. The other limitation was that the PhD students enrolled in the study did not graduate until the end of the study. Therefore, it was not possible to review their research documents (the number of articles from the research period and the duration of the research period) and compare them with other students who did not participate in the mentoring program.

Conclusion and Recommendations

It should be noted that due to the long duration of the doctoral program and the lack of graduation of the doctoral students participating in the program as mentees, it is necessary that in the coming years, the impact of the participation in the RMP on the duration of the doctoral program and the number of articles indexed in PubMed and ISI derived from the thesis be studied.

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Conflicts of interest
There are no conflicts of interest.

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