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ORIGINAL

Early Career Researchers' Self-Reported Interest in Participating in Interdisciplinary Research: A Mixed-Method Study

Interés Autodeclarado de los Investigadores Noveles en la Investigación Interdisciplinar: un Estudio de Métodos Mixtos

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ABSTRACT

Introduction: interdisciplinary research teams, combining diverse perspectives and methodologies, are essential for solving complex problems and generating innovative solutions. This study aimed to identify researcher-centered attributes that influence Early Career Researchers in their interest toward interdisciplinary research participation.
Method: the study was conducted among 330 Early Career Researchers, who had recently participated in an interdisciplinary research project. The 24-month study was conducted in two parts: a cross-sectional questionnaire and in-depth interviews with selected participants. The participants, who were multidisciplinary professionals (e.g., physicians, nurses, therapists, engineers, and pharmacists), were working or studying for their master's degrees during the study period. The post-participation questionnaire assessed participants' interest in future interdisciplinary studies and their attitudes towards initiating similar projects. Six questions addressed ease of participation, emotional status during participation, and willingness to engage in future studies.
Results: mood of the day, participatory satisfaction, curiosity level, and ease of participation were positively correlated to interest in future participation, whereas physical fatigue was negatively correlated. Spearman's rho correlation of moderate intensity was observed between mood of the day and participatory satisfaction (0,550, $p < 0,001$); curiosity level and ease of participation (0,532, $p < 0,001$); ease of participation and interest in participation in other studies (0,577, $p < 0,001$).
Conclusion: acknowledging researcher-centered attributes in creating supportive environments fosters interest in interdisciplinary research participation and essential for developing a collaborative academic ecosystem.

Keywords: Early Career Researchers; Self-Reported Interest; Interdisciplinary Research.

RESUMEN

Introducción: los equipos de investigación interdisciplinarios, que combinan diversas perspectivas y metodologías, son esenciales para resolver problemas complejos y generar soluciones innovadoras. El objetivo de este estudio es identificar los atributos centrados en el investigador que influyen en el interés de los investigadores noveles por participar en investigaciones interdisciplinares.

Método: el estudio se realizó entre 330 investigadores noveles que habían participado recientemente en un proyecto de investigación interdisciplinar. El estudio, de 24 meses de duración, se realizó en dos partes: un cuestionario transversal y entrevistas en profundidad con los participantes seleccionados. Los participantes, que eran profesionales multidisciplinares (por ejemplo, médicos, enfermeros, terapeutas, ingenieros y farmacéuticos), estaban trabajando o cursando estudios de máster durante el periodo de estudio. El cuestionario posterior a la participación evaluó el interés de los participantes en futuros estudios interdisciplinarios y su actitud hacia la iniciación de proyectos similares. Seis preguntas abordaban la facilidad de participación, el estado emocional durante la participación y la disposición a participar en futuros estudios.
Resultados: el estado de ánimo del día, la satisfacción participativa, el nivel de curiosidad y la facilidad de participación se correlacionaron positivamente con el interés por participar en el futuro, mientras que el cansancio físico se correlacionó negativamente. Se observó una correlación rho de Spearman de intensidad moderada entre el estado de ánimo del día y la satisfacción participativa (0,550, $p < 0,001$); el nivel de curiosidad y la facilidad de participación (0,532, $p < 0,001$); la facilidad de participación y el interés por participar en otros estudios (0,577, $p < 0,001$).
Conclusión: el reconocimiento de los atributos centrados en el investigador en la creación de entornos de apoyo fomenta el interés en la participación en la investigación interdisciplinaria y esencial para el desarrollo de un ecosistema académico de colaboración.

Palabras clave: Investigadores Noveles; Interés Autodeclarado; Investigación Interdisciplinar.

INTRODUCTION

Multidisciplinary and interdisciplinary research teams are essential for addressing complex problems and generating innovative solutions in today's fast-paced world.[1,2] They bring together diverse perspectives, expertise, and methodologies to tackle multifaceted challenges that no single discipline can address alone.[3] The formation of these research teams requires a continuous supply of equipped manpower, such as Early Career Researchers (ECRs).[4,5] As a preliminary step towards team formation, cultivating interest in ECRs to participate in interdisciplinary studies within academia will foster a collaborative and conducive environment.[6] Currently, these are achieved through mentorship programmes, networking events, and interdisciplinary training workshops that expose ECRs to different fields of study.[7] By nurturing a culture of collaboration and breaking down disciplinary silos, institutions can support the development of interdisciplinary research teams that are well-equipped to tackle complex problems.[8]

Though passive training is fruitful, the development of interdisciplinary research teams requires active engagement and participation from all members.[9] In this survey, we asked 330 ECRs who had recently participated in an interdisciplinary study as participants, to express their interest to participate in future similar studies, to analyse the requirements for increasing participation and enhancing the probability of like-minded researchers identifying themselves as potential collaborators in future projects.

The aim of this study was to identify the researcher- centred attributes that leads to interest towards interdisciplinary research participation.

METHOD

Setting

The study was conducted in an academic institution where a conducive ecosystem to pursue science with consilience approach is promoted for a decade with translational practices to move research outcome towards practice and social impact. The practices of translational research along with the innovation incubation ecosystem has rendered fruitful collaboration towards organising multidisciplinary studies. To promote further integration among researchers, with the mission to cocreate multidisciplinary researchers' community within the institutional ecosystem, not just to enhance research outcomes, rather to develop collective thinking, exploring, finding integrated unique solutions with multifaceted intervention, and to increase inclusion of ECRs into community activities, this study was designed to evaluate the current scenario as reflective evaluation for continuous design improvement. A community which can act on its own, challenging complex problems with tangled feasible solutions helps in improving sustainable practices, apart from producing self and social impact.

Study Design

The study was conducted in two parts - a cross-sectional questionnaire-based study, followed by an in-depth interview for 10 minutes with interested candidates. The study participants consisted of 330 multidisciplinary professionals (physicians, nurses, therapists, engineers and pharmacists) who gave their informed consent, who were working or studying their postgraduate degree at the college during the study period, and who were

engaged in research related activities within 2 years and completed participation in interdisciplinary research as a participant.

Post participation questionnaire was designed to assess the interest of multidisciplinary professionals in participating in future similar interdisciplinary studies, their knowledge of challenges and benefits in conducting interdisciplinary research, and attitudes towards initiation to conduct one by themselves. There were six questions in all (two related to ease of participation in an interdisciplinary study, two related to their emotional status during their participation as this is an add-on workload during their productive time, and two related to willingness to participate in future similar studies). 5 questions were indirect, whereas one question was direct to determine their interest in participation. These questions were designed with minimal questions to elicit unbiased response post participation in an interdisciplinary study.

Among 330 who completed a post participation survey, 93 consented for an in-depth interview for a 10 minutes time period. Twenty randomly chosen health experts from the institute participated in the questionnaire's pre testing. After modifying unclear questions in light of the pretest results, the final version of the questionnaire was utilised.

Data Collection

Two Data collectors approached interdisciplinary researchers in the institution and worked along with their timeline of data collection. Immediately after participation in the primary project, data collectors approached the participants for a quick questionnaire survey with six questions, and if interested for a 10 minute in depth interview.

Statistical Analysis

Information from the questionnaire and in-depth interview was coded and entered into Statistical Package for Social Sciences (SPSS, version 21; IBM Corporation, Armonk, USA) software. After testing for normality, non-parametric Spearman's, Kendall's correlations were used to determine any relationship between curiosity, ease of participation, physical, mental and emotional wellbeing and interest in participation. Bartlett's test of sphericity and Cronbach's alpha for Internal consistency were used to check questionnaire validity and reliability. Finally, a regression equation was developed.

RESULTS

Socio- demographic characteristics

The study included 330 early career researchers as participants, 70 % of whom were women, while men accounted for 30 %. The participants age ranged from 19 to 40 with mean age 23,6 $\pm$ 3,4 standard deviation. The largest proportion of participants came from the age group 19 – 25 years. Detailed gender and age distribution were tabulated in Table 1. Table 2 shows the breakdown of disciplinary status of the participants.

Table 1. Demographic Details of Multidisciplinary Professionals

	Frequency (N = 330)	Distribution %
Gender		
Female	231	70 `
Male	99	30
Age (in Years)		
19-25	275	83,3
26-30	38	11,5
31-35	12	3,6
36-40	5	1,5

Table 2. Disciplinary status of Participants

Discipline	Number of participants
Biotechnologist	7
Dentist	50
Nursing professionals	50
Optometrist	7
Occupational Therapist	29
Pharmacist	54

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Physical Educators	24
Physiotherapist	50
Public Health professionals	28
Speech Language Pathologist	31

Researcher-centred attributes

Researcher centred attributes such as mood of the day, physical fatigue, participatory satisfaction, curiosity level, ease of participation and interest in future participation and their frequencies are tabulated in table 3.

Table 3. Attributes Evaluated in Quick Questionnaire; n (%)

Mood of the day		Sad	unhappy	Neutral	Happy	Excited
		2 (0,6)	5 (1,5)	53 (16,1)	184 (55,8)	86 (26,1)
	0 (least)	1	2	3	4	5(most)
Physical Fatigue	48 (14,5)	55 (16,7)	67 (20,3)	75 (22,7)	62 (18,8)	23 (7)
Participatory satisfaction	5 (1,5)	9 (2,7)	23 (7)	80 (24,2)	127 (38,5)	86 (26,1)
Curiosity Level	6 (1,8)	11 (3,3)	26 (7,9)	67 (20,3)	97 (29,4)	123 (37,3)
Ease of Participation	2 (0,6)	9 (2,7)	15 (4,5)	33 (10)	101 (30,6)	170 (51,5)
Interest in participating in other studies	2 (0,6)	6 (1,8)	16 (4,8)	25 (7,6)	93 (28,2)	188 (57)

Correlation

Other than physical fatigue, which is negatively correlated to interest in participation in future studies, all other researcher- centred attributes are positively correlated. Correlation of moderate intensity are observed between mood of the day and participatory satisfaction (Spearman rho = 0,550, p < 0,001; Kendall's tau-b = 0,50, p < 0,001); curiosity level and ease of participation (spearman's rho = 0,532, p < 0,001); ease of participation and interest in participation in other studies (spearman's rho = 0,577, p < 0,001; Kendall's tau = 0,544, p < 0,001). Detailed correlation results are tabulated in table 4.

Table 4. Non-Parametric correlations

	Mood of the day	Physical Fatigue	Participatory Satisfaction	Curiosity Level	Ease of Participation	Interest in participating in other studies
Mood of the day	-	-0,071	0,550	0,242	0,144	0,129
		0,195	0,000	0,000	0,009	0,019
Physical Fatigue	-0,060	-	-0,011	0,031	-0,021	-0,050
	0,194		0,843	0,573	0,699	0,365
Participatory Satisfaction	0,501	-0,013	-	0,481	0,325	0,395
	0,000	0,780		0,000	0,000	0,000
Curiosity Level	0,213	0,024	0,418	-	0,532	0,440
	0,000	0,596	0,000		0,000	0,000
Ease of Participation	0,130	-0,018	0,290	0,477	-	0,577
	0,008	0,691	0,000	0,000		0,000
Interest in participating in other studies	0,117	-0,042	0,263	0,391	0,544	-
	0,019	0,360	0,000	0,000	0,000	

Upper Right Triangle – Spearman's rho (Correlation Coefficient, sig 2 tailed)
Lower left triangle - Kendall's tau-b (Correlation Coefficient, sig 2 tailed)

Validity and reliability

Table 5 shows the results of good KMO measures, and acceptable Cronbach's alpha. The Cronbach's alpha increased to 0,788 after removing physical fatigue variable.

Table 5. Questionnaire Validity and Reliability Statistics

Tests	Results	Interpretation
KMO measure of Sampling adequacy	0,718	Good
Bartlett's test of sphericity	0,001	Significant
Cronbach's alpha for Internal consistency	0,649	Acceptable

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Regression model building

After removing outliers, a regression model was built to generate the regression equation. This equation shows the relationship between the predictors and the dependent variable, Interest in participating in other studies.

Interest in participating in other studies =1,676 + 0,057(Mood of the day) − 0,028(Physical fatigue) + 0,048(Participatory Satisfaction) + 0,089(Curiosity level) + 0,545(Ease of participation)

DISCUSSION

This study aimed to identify the researcher-centred attributes that lead to interest towards inter multidisciplinary research among 330 ECRs who recently participated in an interdisciplinary study. The term ECR not only includes young graduates who recently initiated research activities, but also the clinicians who enter the research arena after years of practice experience. In this study, ECR denotes anyone who is in the early stage of research exposure or willing to explore different areas of research beyond borders. This research is conducted in an academic environment which thrives to foster a collaborative environment for research participants. It is the facility which already has specialised translational research, clinical trial, statistics support centre and innovation ecosystem. Irrespective of all the efforts to promote inter and multidisciplinary research, we still struggle with research team formation, and incorporation of ECRs in research teams, particularly in relation to their inbound numbers and self-initiated team formation. To identify the root cause of this problem, the data were collected to identify the attributes of the interest in participation.

The study employs a mixed method approach, involving a quick questionnaire to assess baseline study participation and an in-depth interview with randomly volunteered participants. The quantitative questionnaire focuses on mood of the day, physical fatigue, participation satisfaction index, curiosity, ease of participation, and interest. The results show that researchers show a positive attitude and curiosity to participate in future studies, which increases with ease in participation and satisfaction post-participation. In-depth interviews provided a deeper understanding of the quantitative data collected, including the importance of understanding vocabulary, the relationship between curiosity and interest, and the need for clarifying the ethics in academic settings.

Hidi and Renninger (2006) proposed a four-phase model of interest development. They considered triggered situational interest and maintained situational interest as earlier phase of interest development and emerging individual interest and well-developed individual interest as later phase of interest development.[10] The triggered situational interest stands in the forefront of these stages, and this study is majorly focused to assess the triggers (both positive and negative) of the situational interest.

Extending the work, Hidi and Renninger (2019) assessed the interest development and its relationship to curiosity. They explain interest as a psychological state and as a cognitive and motivational factor which can be supported to develop; whereas curiosity is the motivation to close a knowledge gap driven by uncertainty.[11] Majority of the participants in this study stated that being a researcher themselves, they would like to know the results of the study that they have participated in, and follow up measures. This curiosity to know triggers situational interest. In order to develop this preliminary interest into more sustained individual interest, the institution must encourage study conductors to disclose the results at the appropriate time or share the publication details with the research participants.

Ainley (2019) suggested methods to capture real-time unfolding of experiences, to analyse the significance of curiosity and interest in educational practice.[12] In this study, we attempted to capture the immediate post-participation curiosity. Some participants pinpointed that their curiosity prior to participation is different from the post participation. At prior, they are curious to know about the study itself, the procedures involved and the need for the study, whereas at post, their curiosity changed to know about the results and in-depth reasoning regarding certain principles followed. This ascertains the change in curiosity content with different knowledge gaps. It can be hypothesised that the level of ease in participation and understanding the content must have closed the knowledge gaps that existed prior to the study participation, which in turn triggered situational interest to know more about the involved study, and as a follow up, curiosity to know about the results post participation emerged. Evidence supports potential for the reciprocal development of curiosity and interest, which recognises that resolving curiosity may lead to interest and that interest may spark self- generated curiosity questions.[13]

Ease of Participation encompasses the ability to comprehend terminology, regardless of its domain-specific nature, with the assistance of a mediator who can provide translation support and promptly address any arising questions. Accessibility comprises booklets, printed materials, pictures, and videos that provide a detailed explanation of the procedures involved. Moreover, furnishing explicit instructions and advice throughout the participation process can further enhance the simplicity of participation. Employing diverse media formats, such as brochures and films, helps enhance comprehension of the operations involved. Overall, clear communication is key to ensuring a smooth and successful participation process. It helps build trust and transparency between

all parties involved. Umoquit et al. (2011) conducted a multidisciplinary systematic review and discovered that the decision to use diagrams for data collection is typically influenced by the specific demands of the research topic.[14] These demands may include the need to comprehend the knowledge or cognitive structure of research subjects, to bridge cultural and linguistic gaps, or to grasp highly intricate subject matter. The review highlighted several advantages of utilising diagrams in data gathering, such as the method's adaptability to complement other data collection approaches and its capacity to concentrate discussion.

Ashley (2020) insisted the importance of accounting research fatigue in research ethics.[15] To mitigate the research fatigue among the academic researcher's population, their mood for the day of research participation, tiredness factor and the satisfaction post participation are evaluated. Though the mood of the day and satisfaction index post participation are highly correlated, only post participation satisfaction showed statistically meaningful association with interest in Participation. Participants majorly reported physical tiredness as a factor that hinders their involvement in participating study and minimally reported mental exhaustion in comprehending the interdisciplinary studies, which majority of times is alien from their disciplinary perspective. Though the pamphlets and videos eased their involvement, the involvement of a moderator who bridges the gap between disciplinary understanding is highly appreciated. In their opinion, a common person who knows about their research discipline and the interdisciplinary study can elaborately explain the details in easily understandable language.

In a similar study conducted by Sheik et al. (2013), evaluated the factors contributing to the lack of interest in research among medical students, twenty-three factors such as curriculum overload, sleep loss, fatigue, idea about research usefulness, past experience, internet facilities, incentives and faculty- forced research are evaluated.[16] Considering research usefulness and lack of internet facilities emerged as two significant factors in their study. Similar to their results, the participants of our study also commented on their perspectives of finding the participating interdisciplinary research useful, and correlated it to their current scenario or related important research conducted within their academic disciplines. Analysis of this depth is reflected in scoring the scale of satisfaction index post participation. This unique difference between the general mood of the day and their satisfaction levels scoring in terms of satisfaction index must have reflected as associated results in the interest in participation in future studies.

In- depth interviews, specifically put forth that mood of the day changed post-participation depending on the requirement of participant involvement necessitated by individual interdisciplinary studies, and interest depends on recruitment strategies, particularly when they consented to participate secondary to peer involvement or pressure. Other challenges faced by participants include monetary benefits, time off from work, supervisor and department support. Overall, the study highlights the importance of understanding the factors influencing participants' attitudes and motivations to participate in future studies.

Limitation

Though the results can be used as valuable data in research team formation, the generalisability is limited to those institutions which already created some conducive environment.

CONCLUSION

Acknowledging researcher - centric attributes of interest in inter and multidisciplinary research participation is crucial in developing a conducive environment in academic settings for multi, inter and trans disciplinary research. The participants, multidisciplinary early career researchers showed a positive attitude and increased curiosity to participate in future studies which is enhanced by ease of participation. The study suggests that the level of ease in participation and understanding the content may have closed knowledge gaps, leading to increased curiosity triggering situational interest. We recommend future studies to identify researcher-centric attributes for long standing interest cultivation in research engagement and team formation.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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