To Join or Not to Join: An Investigation of Individual Facilitators and Inhibitors of Medical Faculty Participation in Interdisciplinary Research Teams

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Abstract

Interdisciplinary research (IDR) teams are an important mechanism for facilitating medical breakthroughs. This study investigates the role of individual-level predictors of the choice to join a new IDR team at a major medical institution. We collected survey data from a sample of 233 faculty members who were given the opportunity to participate in IDR teams that had recently formed around a wide range of medical topic areas. Our results suggest that even under supportive organizational conditions, some medical experts were more likely to participate than others. Specifically, basic and translational researchers, associate professors, and faculty with distinctive topic area expertise and with more experience collaborating across departmental boundaries participated at a greater rate than their peers. Our findings have implications for research, practice, and policy focused on overcoming the challenges of drawing together diverse medical experts into IDR teams with the potential to advance knowledge to prevent, cure, and treat complex medical conditions. Clin Trans Sci 2011; Volume 4: 274–278

Keywords: team science, interdisciplinary research (IDR), translational research

Introduction

Interdisciplinary research (IDR), "a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines," has become increasingly important to "solve problems whose solutions are beyond the scope of a single discipline or area of research practice" (Ref. 1, p. 188). Support for IDR is evident from large funding initiatives such as the National Academies Keck Futures Initiative launched in 2003, and the subsequent National Academies of Science report *Facilitating Interdisciplinary Research*.[1,2] Many medical research institutions have created Clinical and Translational Science Initiatives in part to facilitate the integration of research and practice to advance science and clinical care.[3] Research on the Science of Team Science, an emerging field focused on understanding and managing facilitators and inhibitors of interdisciplinary collaborative science, has also increased.[4–9]

A key IDR challenge is getting experts with the breadth and depth of skills to join interdisciplinary teams. The right mix of skills is an essential precondition for teams working on complex tasks[10] such as advancing medical knowledge. Research to date has identified a number of contextual factors that affect IDR success such as funding, training, and institutional support,[1,2,11] which, in turn, may foster participation. Several studies have investigated the attitudes, perceptions, and characteristics of individuals already working in IDR teams.[7,12,13] However, research has not clarified individual factors that differentiate faculty who choose to join interdisciplinary endeavors from those who do not, in contexts where experts have autonomy over their own work activities. Furthermore, whether these factors influence the choice to join an IDR team beyond the effect of a supportive institutional context is an open question.

Opportunities for IDR teams are increasing as medical research institutions respond to the call to support IDR and funding agencies target interdisciplinary initiatives.[14] Consequently, understanding how to facilitate successful IDR in medicine necessitates a closer look at medical experts and what motivates their choice of whether or not to join an IDR team. Our field study draws on social psychological research suggesting that people join groups when membership fosters individual goals and needs[15] to answer this question. We predict that individual factors such as type of work, organizational rank, previous training, and work-related experience will influence the choice to participate in an IDR team. This research aims to provide insight about which medical experts are likely to participate in IDR teams, given that they are working in an organization supportive of such participation. This resulting knowledge should lay an important foundation for researchers, policy makers, and organizational leaders who seek to motivate participation in collaborative science and create IDR teams with the breadth and depth of knowledge and skills necessary to advance medical research and practice.

Methods

We investigated the choice to join IDR teams at a major medical institution focused on creating world-class scientific knowledge and providing cutting-edge clinical care. The time period for data collection was well suited for the research question because it was concurrent with a large-scale intervention aimed at encouraging faculty, from physicians to basic researchers and across disciplinary-based departments, to form IDR teams focused on disease topics. Top management at the medical center promoted IDR team formation by offering substantial ongoing funding as well as research center status to those teams whose proposals were most innovative and likely to advance medical knowledge. In response to these incentives, hundreds of faculty self-organized into dozens of IDR teams that collectively spanned a range of 20 general disease topic areas (for a list, see Appendix footnote 2). These faculty-formed IDR teams were inclusive of the full range of medical work, from clinically oriented to research-oriented experts, with 90% of topic areas attracting members representing

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	Study sample		Medical center population	
	Frequency	Percentage	Frequency	Percentage
Gender				
Female	78	33%	301	36%
Male	155	67%	527	64%
Type of work				
Researcher (basic, translational, or clinical)	157	67%	394	48%
Clinical care provider (physician or surgeon)	76	33%	434	52%
Academic rank				
Assistant professor	88	38%	413	50%
Associate professor	68	29%	183	22%
Professor	77	33%	232	28%
Total	233†		828‡	
Choice to join IDR team				
Yes	97	42%	450	54%
No	136	58%	380	46%

†Total number of survey respondents.
‡Total possible number of respondents.

Table 1. Sample description and representativeness.

all types of medical work. Of the two topic areas that did not (i.e., Medical Education and Public Health; Genomic Medicine), one was clinically focused (did not have any basic or translational researchers) and the other was research focused (did not have any clinical care providers).

Procedures and Data Collection

After background interviews with key informants and within weeks of the formation of the IDR teams, an anonymous survey was administered to medical center faculty. Due to its anonymity, the survey was deemed exempt by the relevant IRB. The online survey, which was distributed via e-mail to 828 faculty members, asked respondents to indicate whether they had joined an IDR team, and also to answer questions assessing individual factors expected to influence participation. The survey yielded 233 complete responses out of 416 collected surveys; these respondents are representative of the population (see *Table 1*). We tested for nonresponse bias; there was no statistically significant difference between respondents and nonrespondents in terms of gender, type of work, or academic rank. However, fewer clinical care providers responded to our survey (32%) than would have been expected based on their representation in the population (52%). Of the 233 usable surveys, 42% of respondents indicated they had joined an IDR team, and 58% indicated they had not. This pattern of responses provides sufficient variation in our dependent variable to yield reliable estimates of the effects of independent variables.

Independent variables were measured with survey items that asked respondents to indicate: (1) the type of work that best described their daily work-related activities (e.g., basic researcher, clinical researcher, translational researcher, clinical care provider); (2) their academic rank (e.g., assistant professor, associate professor, professor); (3) the distinctiveness of their topic area of expertise (range: –6 to 6; mean, 0.33, and standard deviation, 2.09); and (5) the extent of their experience collaborating across departments (range: 1 to 7; mean, 4.69, and standard deviation, 1.88). Respondents also indicated their primary topic area of research expertise, gender, and length of employment at the medical center (range: 1 to 50 years; mean, 23, and standard deviation, 16), which were entered as control variables. For details for these survey items and measures, please see the Appendix. *Table 2* presents correlations among the variables.

Results

We conducted a logistic regression analysis to assess the relative influence of each of the independent variables on the likelihood of medical faculty joining at least one of the new IDR teams. Dummy variables controlling for each respondent's primary topic area of expertise were included in our analysis. Neither the control variable for gender nor length of employment was found to have a significant effect on participation. The independent variables in our model yielded a correct classification of the dependent variable of 73.25% of the time. As shown in *Table 3*, results suggest that type of work, academic rank, distinctive expertise, and experience collaborating across disciplinary boundaries had a significant impact on the choice to join an IDR team. Our interpretation of these findings follows.

Type of Work

The type of work that medical experts conduct can be arrayed along a spectrum with research activities at one end and clinical care activities on the other (i.e., basic research, translational research, clinical research, clinical care provision). Our findings suggest that where a medical expert's work falls along this biomedical work spectrum affects their choice to participate in an IDR team. The odds of joining were 6.90 times greater for a basic researcher than for a clinical care provider; 3.88 times greater for a translational researcher compared to a clinical care provider and there was no significant difference between clinical researchers and clinical care providers. We believe that several factors may underlie this finding of increased participation toward the research end of the spectrum. First, the continuum of work practices varies from exploring new knowledge to exploiting existing knowledge.[14] The high incidence of participation observed for basic and translational researchers might be due to their focus on investigative activities, especially those that are at the forefront of knowledge from which emerging fields form. By contrast, clinicians, whose orientation is toward leveraging existing methods and applications, may not be as interested in working with a team whose activities tend to focus on creating new knowledge. Second, researchers tend to have protected research time. In contrast, clinicians and clinically

	1	2	3	4	5	6	7	8	9	10	11
Type of work											
1. Basic research	1.00										
2. Translational research	−0.24*	1.00									
3. Clinical research	−0.33*	−0.28*	1.00								
4. Clinical care provider	−0.31*	−0.26*	−0.35*	1.00							
Academic rank											
5. Assistant professor	−0.08	−0.17*	0.04	0.21*	1.00						
6. Associate professor	0.04	0.03	−0.08	−0.04	−0.50*	1.00					
7. Professor	0.06*	0.13	0.12	−0.22*	−0.48*	−0.39*	1.00				
Work-related experience											
8. Boundary-spanning collaboration experience	0.08	0.24*	0.02	−0.28*	−0.31*	0.19	0.21*	1.00			
9. Distinctive expertise	0.13*	0.14*	0.04	−0.27*	−0.14*	0.02	0.23	0.22*	1.00		
Control variables											
10. Gender§	−0.16*	0.02	0.07	0.08	0.16*	−0.03	−0.17*	−0.14	−0.08	1.00	
11. Length of employment	0.00	−0.02	0.06	−0.01	0.08	−0.14	0.06	0.01	−0.09	0.02	1.00
Dependent variable											
12. Joined IDR team†	0.22*	0.13*	0.03	−0.32*	−0.19*	0.18*	0.11*	0.26*	0.25*	−0.01	−0.11

Pearson pair-wise correlation coefficients, n = 233.
*p-value < 0.05.
§Coding: male = 1, female = 0.
†Coding: 1 = joined IDR team, 0 = did not join IDR team.

Table 2. Bivariate correlations.

	B	SE B.	*p*-value	Exp B.
Type of work§				
Basic research	1.93	0.52	0.01	6.90
Translational research	1.36	0.52	0.01	3.88
Clinical research	0.68	0.41	0.10	1.98
Academic rank†				
Assistant professor	−0.05	0.39	0.90	0.95
Associate professor	0.93	0.42	0.03	2.56
Work-related experience				
Boundary-spanning collaboration experience	0.29	0.10	0.01	1.34
Distinctive expertise	0.19	0.09	0.03	1.21
Control variables				
Gender‡	0.58	0.38	0.13	1.79
Length of employment	−0.02	0.01	0.08	0.98

Results represent a logistic regression analysis, n = 233. Joined IDR team coded as 1, did not join IDR team coded as 0.
§Clinical care provider is the omitted (referent) category, such that a positive regression coefficient indicates that individuals conducting this type of work are more likely to join than clinical care providers; and exponent B reflects the change in the odds ratio of joining a team associated with the focal type of work compared to providing clinical care.
†Professor is the omitted (referent) category.
‡Coding: male = 1, female = 0.

Table 3. Factors influencing choice to join IDR team.

oriented researchers have great demands on their time due to their clinical responsibilities.[16]

Academic Rank

Academic rank was also a significant predictor of joining an IDR team. The odds of joining were 2.56 times greater for associate professors compared to full professors, whereas there was no significant difference between assistant and full professors. We believe that this finding might reflect that IDR teams fit the goals, needs, and schedules of associate professors more than those of assistant and full professors. One might assume that the potential innovative discoveries that may be attained from working in IDR teams would be attractive to faculty of all ranks. However, tenure affords associate and full professors with the job security needed to take on the career risks,[17] such as participating in interdisciplinary collaborations. But, the time constraints due to administrative and institutional responsibilities may inhibit participation by full professors. Alternatively, full professors might be highly invested in their established area of work and be concerned with maintaining their high status in their area of expertise. Our findings are consistent with an interpretation that individuals at the associate professor rank may be at a career "sweet spot" for participating in an IDR team.

Boundary-Spanning Collaboration Experience

Medical experts with greater experience collaborating across departmental boundaries were more likely to join an IDR team than their counterparts with less boundary-spanning experience. A one-unit increase in the extent of such collaborative experience increased the odds of joining by a factor of 1.34. Because they have experience interacting across different groups, boundary spanners are likely to feel more confident and less apprehensive about their ability to engage in behaviors that facilitate intergroup

interactions.[4] These skills are likely to be important in IDR teams because working with medical experts outside of one's area requires additional effort in order to learn about the others' knowledge, to find common areas of interest, and to coordinate joint work.[18,19] Previous experience spanning departmental boundaries may also be advantageous to medical experts who can leverage these skills when collaborating with experts from other disciplinary, training, and work domains. Similarly, a positive attitude toward collaboration has been shown to be a predictor of participation in community-based participatory research,[20] and has been associated with successful interdisciplinary endeavors.[8,21] Our results provide corroborating evidence and go a step further by suggesting that a source of such skill and an enabling attitude is prior boundary-spanning collaboration experience.

Distinctive Expertise

Our findings suggest that medical faculty with distinctive topic area expertise were more likely to join an IDR team, such that a one-unit increase in distinctive expertise enhanced the odds of participating by 1.21. The attraction to IDR teams may stem from the degree to which these individuals believe that they have the knowledge and skills to contribute to the team. A match between the content of a team's work and an individual's distinctive expertise can motivate participation because it can be fulfilling to the individual. The motivation to join such a team may arise from a desire to align with one's personal or social identities[22] or reach a self-defined goal.[23] People with distinctive knowledge about a topic area may be more likely to join an IDR team focused on this topic because of the belief that their contributions will advance the group's goals.[15] In addition, these individuals may encounter challenges when trying to find collaborators in their own area: they may feel a lack of similarity with others in their department or discipline. If so, then they may feel they have little choice but to engage with those in different areas.

Discussion

Although interest in and research on IDR teams in medicine has increased in recent years, we have yet to develop a good understanding of what influences the choice of medical experts to participate in these teams. This is an important question for two reasons. First, teams must be composed of the right mix of expertise in order to achieve their goals. Second, medical experts have significant autonomy over how they allocate their time and attention. Our research provides an empirical examination of several factors that influence medical experts' choice to join IDR teams. Conducting this study within an organization engaged in an intervention to promote interdisciplinary team science provided a unique opportunity to identify variation in participation among diverse medical experts. Our results suggest that even under organizational conditions that have been theorized to support the IDR teams,[8,11,13] some medical experts were more likely to participate than others. Specifically, basic and translational researchers, associate professors, and faculty with distinctive topic area expertise and with more experience collaborating across departments participated at a greater rate than their peers.

Although our research provides initial insight, future research is needed to better understand the processes through and conditions under which these individual-level factors influence participation. Studies that investigate underlying mechanisms such as professional expectations, time demands, related prior experience, and IDR competencies would be quite informative, especially, if they did so across organizations that varied in the degree and type of IDR support. Our research was conducted in a supportive setting at a time when experts were incentivized to develop and join IDR teams focused on topics of their own interest. Additional research is needed to examine how generalizable our findings are to settings that are less or more supportive, in which faculty have varying control over the IDR team topic area.

Finally, before developing policy interventions based on our findings, it is important to gain a better understanding of the diversity of membership most valuable for IDR teams. Some compositional tendencies observed in this study may be more problematic than others. Experts with more boundary-spanning experience may contribute more than their counterparts. The less frequent participation by clinical care providers may limit the performance of IDR teams that are more focused on some problems, such as disease topics, than on others. Alternatively, insights may arise from examining whether and when clinical and/or translational researchers bring the needed clinical perspective to teams. Our findings and the aforementioned paths for future research have the potential to lead to a richer model of IDR participation that can be used to develop interventions that create conditions for IDR teams to develop cutting-edge science and improved patient care.

Conclusion

This field research leveraged a unique opportunity to study the process of interdisciplinary team formation to better understand the variation in the choice to participate across a population of medical experts. We found that medical experts varied in their decision to join an interdisciplinary team, even within a supportive institutional environment. Our findings are suggestive of several factors that may influence this choice: rank, type of work, distinctive expertise, and collaborative experience. Further investigation of these factors has the potential to inform policy and practice about how to improve the formative conditions and effectiveness of IDR teams.

Conflict of Interest

The authors have no conflict of interest.

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Appendix: Survey Items and Response Options[1]

	Item	Response options
Type of work	• Which of the following best describes your research or practice?	• Basic researcher
		• Translational researcher
		• Clinical researcher
		• Clinical care provider (i.e., physician or surgeon)
Academic rank	• Please indicate your academic rank at [the] medical center.	• Assistant professor
		• Associate professor
		• Professor
Boundary-spanning collaboration experience	• How much experience do you have collaborating with people from other departments on projects related to your topic area?	• Likert scale ranging from 1 (none at all) to 7 (very much)
Primary topic area of expertise	• From this list of 20 medical research topic areas, please select the one that best describes your research.	• Select from list of 20 research topic area[2]
Distinctive expertise[3]	• How much experience do you have working in the topic area you selected?	• Likert scale ranging from 1 (none at all) to 7 (very much)
	• How much experience do people in your department at [the] medical center have working in this topic area?[3]	
Gender	• Please indicate your gender.	• Male
		• Female
Length of employment	• Please indicate the number of years you have been employed at [the] medical center.	• Open-ended, numerical response
Joined IDR Team	• Are you participating in a research-focus program developing a center of excellence in a particular area of scientific focus?	• Yes/No

[1]These are the items included in the analysis for this study. A full survey is available upon request.

[2]Leadership of the medical center provided the following general research topic areas: allergy and immunology; auditory; cancer; cardiovascular therapeutics; diabetes, obesity, and metabolism; drug design, screens, and technology; environmental sciences; genomic medicine; global health; hepatology; infectious disease and microbiology; medical education and public health; musculoskeletal and limbs; neurology; pain research and treatment; psychiatry and population health research; radiology; stem cells; women's health; urology.

[3]The difference between the responses to these two questions yielded the measure of distinctive topic area expertise.