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KINESIOLOGY

Starting to Uncover the Mystery of Interdisciplinary Research in Kinesiology

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Abstract

The multidisciplinary nature of kinesiology seems to be an ideal configuration for conducting interdisciplinary research. Proposed as a potential solution to overcome fragmentation, interdisciplinary research has a role within kinesiology that remains unknown. In this study, we explored kinesiologists' perceptions of interdisciplinary research, including perceived benefits and limitations. Kinesiologists (n = 45) from academia, the majority from Europe and North America (76.2%), answered a primarily open-ended, seven-question Internet survey. The overarching themes determined via open coding were Benefits (i.e., the positive aspects to conducting interdisciplinary research) and Limitations (i.e., the challenges to conducting interdisciplinary research), each with eight subthemes. Overall, the participants felt interdisciplinary research was valuable, but each had legitimate reservations, creating a contradictory environment that causes tension between the perceived benefits and limitations. Until the tension can be resolved, interdisciplinary research will continue to remain on the fringes of kinesiology research.

Interdisciplinary research (IDR) is becoming an important and much discussed topic in higher education (Basken, 2012b; Jacobs, 2009; Ruse, 2010). However, IDR is more than scholastic rhetoric;

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it is being adopted and operationalized by funding agencies. For example, the National Science Foundation (Basken, 2012a) and the National Institutes of Health (Freedson, 2009; Giacobbi, Buman, Romney, Klatt, & Stoddard, 2012) strongly encourage an interdisciplinary component in grant proposals.

Despite the growing importance of IDR, the term remains ambiguous and misunderstood. The confusion may stem from the numerous and often competing definitions that abound (Klein, 1990). Amid the ambiguity, several scholars have suggested operationalized "working definitions" by combining characteristics of several theoretical definitions (Aboelela et al., 2007; Lattuca, 2001; National Academy of Science, National Academy of Engineering, & Institute of Medicine, 2005). Although the working definitions vary, they have common characteristics, such as (a) grouping together two or more distinct disciplines for a project, (b) integrating knowledge that is not limited to any one field, (c) and using the perspective and skills of all involved disciplines throughout the research process. In addition, IDR can be conceptualized as a continuum with levels spanning from disciplinary to transdisciplinary (Lattuca, 2001).

Perhaps a more imminent concern for faculty members is the barriers deterring them from pursuing interdisciplinary projects. Carayol and Thi (2005) stated that traditional academic career incentives do not encourage interdisciplinary collaboration. For example, the tension between professional advancement (e.g., tenure, promotion, establishing oneself as an authority in field) and IDR may discourage unestablished junior faculty and graduate students from conducting such projects (Rhoten & Parker, 2004). Likewise, interdisciplinary projects often take longer to complete than do disciplinary-based research projects (Campbell, 2006; Rhoten & Parker, 2004), which can complicate logistics, strain funding, and make such work unattractive to those facing promotion.

Despite its potential barriers, IDR has advantages. Klein (1990) argued that it can produce results that are not possible in a disciplinary framework. Echoing her sentiment, Rhoten and Parker (2004) showed that young academics thought IDR could help science address large societal issues (e.g., obesity, poverty, quality education) more effectively than disciplinary approaches alone. The idea that collaboration may help to solve large and complex problems is re-

flected in the growing support in academia of IDR. In fact, many universities have started interdisciplinary centers through "cluster hiring," or the simultaneous hiring of multiple faculty members from different disciplines, with a goal of collaboratively exploring complex problems (Severin, 2013).

Kinesiology has long had an inherent interdisciplinary nature (Bories & Swanson, 2005). Since Henry's (1964) urgent call for kinesiology (then physical education) to become more "academic," the field has evolved into numerous subdisciplinary areas representing the physical sciences (e.g., biomechanics, physiology), social sciences (psychology, sociology), and humanities (e.g., history, philosophy). With so many academic areas in which physical activity is studied, IDR appears to be a natural fit for the field.

Yet many concerns surround IDR in kinesiology. The benefits of IDR in kinesiology are still unknown, perhaps because of the dearth of research surrounding it in kinesiology. Before the potential of IDR can be determined, kinesiologists' perceptions of IDR, including its perceived importance, barriers, and incentives, must be understood. Therefore, we explored kinesiologists' perceived barriers and incentives to conducting IDR within academia.

Method

Sample

Prior to sampling, we received approval from the institutional review board. The sampling frame (N = 315) was restricted to corresponding authors of research articles randomly selected from 10 kinesiology-focused, peer-reviewed journals published from 2008–2012 (see Table 1). Every author included in the sampling frame was invited via e-mail to take an online survey. The selected participants received up to three e-mails over 2 weeks. In total, 315 initial e-mails were sent, 30 e-mails were returned as undeliverable, 240 authors opted out of participation, 45 authors provided at least one usable answer, and 34 authors answered all questions. The final response rate was 14.29% for at least one usable answer and 10.79% for all questions answered. Information used for selecting and contacting the sample was publicly available.

Table 1
Selected Kinesiology-Focused Journals

Journal	Established	Number of issues per year	2012 impact factor
European Journal of Sport Science	2001	6	1.146
International Journal of Behavioral Nutrition and Physical Activity	2004	12	3.577
International Journal of Sports Medicine	1979	12	2.268
Journal of Physical Activity and Health	2004	8	N/A
Journal of Science and Medicine in Sport	1998	6	2.899
Journal of Sports Sciences	1983	16	2.082
Medicine and Science in Sports and Exercise	1969	12	4.475
Research Quarterly for Exercise and Sport	1930	4	1.108
Scandinavian Journal of Medicine and Science in Sports	1991	6	3.214
The Physical Educator	1940	4	N/A

Survey

Participants completed a seven-question Internet survey, consisting of five open-ended, qualitative questions; one quantitative question; and one quantitative and qualitative question. The survey was developed using Berg and Lune's (2012) recommendations for creating qualitative research questions and Dillman, Smyth, and Christian's (2009) recommendations for Internet surveys. The authors were asked about their research experience and opinion of IDR in kinesiology. Following the seven questions, participants were asked demographic information (i.e., highest degree earned, field of highest degree, year highest degree was awarded, academic rank, length of time at current institution, interdisciplinary training, and gender).

The survey was designed and distributed using the Qualtrics Research Suite (http://www.qualtrics.com). Because participation was completed entirely online, the directions and inclusion criteria were given before the survey. By completing the survey, each participant agreed to the stated terms.

Data Analysis

Following the data collection, themes were uncovered from each open-ended question using an open-coding protocol. The protocol followed Glaser and Strauss' (1967) guidelines: (a) ask a specific and consistent set of questions, (b) analyze the data minutely, (c) frequently interrupt the coding to write a theoretical note, and (d) never assume the analytic relevance of any traditional variable. The lead author then thematically coded the data. To help minimize bias, the second author independently reviewed the coding and suggested revisions. A consensual agreement between the authors produced the final thematic coding.

Following the analyses, all 45 participants were asked to member-check the initial results. Seventeen participants (37.77% response rate) reviewed the results with the understanding that they may include more information than any one individual submitted. There were no reported discrepancies or concerns regarding the results. Of the study participants who member-checked the data, a representative comment was, "the results reflect clearly the ideas written in the survey."

Results

Demographics

The sample demographics are shown in Table 2. Although every participant did not answer every question, enough information was available for an adequate description of the sample. Men composed approximately two thirds of the sample. All participants held a doctoral degree and came from an academic environment. Because the titles associated with academic rank vary by country of employment, the academic titles shown should be interpreted with caution. The majority of participants were from Europe and North America (76.2%). Only a minority of participants self-identified as being a

disciplinary-focused researcher (23.2%). Finally, all of the respondents (n = 42) felt that IDR was important to kinesiology.

Table 2
Demographic Information of Sample

Demographic information	*N* (%)
Gender (n = 42)	
Male	27 (64.3)
Female	15 (35.7)
Highest Degree (n = 39)	
Doctor of Philosophy (PhD)	38 (97.4)
Doctor of Physical Therapy (DPT)	1 (2.6)
Academic Rank (n = 35)	
Graduate Student	7 (20.0)
Post-Doctoral Fellow	2 (5.7)
Lecturer/Senior Lecturer	7 (20.0)
Assistant Professor	8 (22.9)
Associate Professor	9 (25.7)
Professor	2 (5.7)
Region (n = 42)	
Australia/New Zealand	9 (21.4)
Europe	13 (31.0)
North America	19 (45.2)
South America	1 (2.4)
Self-Identified Research Focus (n = 43)	
Disciplinary	3 (6.9)
Mostly Disciplinary	7 (16.3)
Neutral	12 (27.9
Mostly Interdisciplinary	14 (32.6)
Interdisciplinary	7 (16.3)

Themes

As seen in Table 3, sixteen subthemes emerged from the participants' responses, and these were organized under the larger thematic areas of benefits and limitations. Benefits refers to the positive

aspects of IDR, and limitations refers to the difficulties surrounding IDR. Although every participant thought IDR was beneficial and limiting, the responses were slightly skewed toward beneficial. Furthermore, several participants justified a negative statement by stating the limitation was not "major" or "I really don't see any [problems]. Unless. . ." Similar rationalizations were not attached to beneficial comments.

Table 3
Themes and Subthemes From Faculty Perceptions of Interdisciplinary Research in Kinesiology

Theme	Subtheme
Benefits	New Perspectives (*n* = 32)
	Better Results (*n* = 27)
	Collaboration Potential (*n* = 16)
	Funding Potential (*n* = 14)
	Better Methodology (*n* = 11)
	Increased Publication and Application (*n* = 10)
	Movement Is Multidimensional (*n* = 5)
	Benefits the Field (*n* = 5)
Limitations	Collaboration Problems (*n* = 15)
	Challenging Methodology (*n* = 13)
	Limiting Results and Analysis (*n* = 11)
	Logistical Barriers (*n* = 11)
	Increased Financial Cost (*n* = 9)
	Disciplinary Jargon (*n* = 5)
	Hinders Career Advancement (*n* = 5)
	Publishing Difficulties (*n* = 3)

Benefits

New perspectives. Thirty-two participants indicated that incorporating different ideas, theories, and frameworks allows a research team to "study a research question from different angles." This was seen as beneficial to kinesiology research because "each discipline provides only one perspective about human movement and multiple perspectives are likely to provide a better understanding of what

is being observed." In addition, as kinesiologists try to understand complex phenomena, "it is critical to integrate the knowledge of other fields into kinesiology." Thus, IDR provides "increased insight and knowledge generation."

Better results. Twenty-seven participants thought that IDR produced better results than disciplinary-focused research, especially when studying complex phenomena, such as human movement. One participant captured this subdiscipline nicely: "Interdisciplinary research offers both broader and more in-depth outcomes in addressing questions related to human experience." In addition, IDR was seen to create "more insightful answers to research hypotheses" and was thought of as being "less reductionist."

Collaboration potential. Sixteen participants felt that collaborating with other disciplines outside of kinesiology enhanced their research. Seen as an extension of new perspectives, collaborations provided "opportunities to network," allowing them to "work with people who are experts in related fields." These collaborative teams can create new ideas and deepen understanding to complex problems by providing different theoretical viewpoints. Furthermore, several participants indicated that partnering with practitioners and clinicians was beneficial because they have different viewpoints than do academics.

Funding potential. Fourteen participants reported the ability to secure funding as a benefit of IDR. One participant exemplified this:

> I do feel that interdisciplinary involvement makes it easier to get funding from different sources than would be possible with just our own discipline. Some research grants are only available for people who are working with teams of three or more researchers, for example.

Another participant noted, ". . . I find that one of the benefits of IDR is the access to funding sources that I would not have had [had I been] working solely with kinesiologists in a university setting."

Better methodology. Eleven participants mentioned that IDR improved research design by allowing the use of different techniques, measures, and technology. For example, one participant stated, "Having suggestions from many disciplines before I start a

research project can make my research design a lot stronger and also prepare me for the kinds of criticisms that I may receive from people outside my discipline . . ."

Increased publication and application. Ten participants felt that IDR was an effective strategy for publication. IDR not only helps with funding opportunities, but it also increases "the number of publication and presentation" opportunities, especially for "journals that target a broad audience." In addition, there was a mutual feeling that there was a "preference for interdisciplinary research in high standard journals." Finally, research should have application, or a "need to apply results to wider interests." One participant expanded, saying, "Applying the new findings usually needs interdisciplinary-focused research."

Movement is multidimensional. Five participants agreed that human movement was "a function of many inter-related elements including physiological, social, cultural, psychological and other processes." Such a complex phenomenon is best understood through IDR because it "opens avenues to adopt technologies, strategies and knowledge from various fields to sustain positive behaviour change."

Benefits the field. Five participants also thought IDR was beneficial to the field, both externally and internally. Within the broader realm of academia, IDR was described as a way to bring "positive attention to kinesiology." One participant provided a representative explanation: "I think it [IDR] is a way to promote the type of research we lead . . . being able to conduct interdisciplinary research would help the field of kinesiology build a stronger identity."

Limitations

Collaboration problems. Rarely is IDR done independently; it is usually conducted by a team with members from different disciplines. Fifteen participants expressed the sentiments captured by the following comment from one participant: "Such people may not exist within a department or university or these people may not be interested in collaboration. One would most likely have to seek out comrades from other universities." In addition, one participant mentioned "territorialism or turf wars" between supposed collaborators, with certain kinesiologists worried that other disciplines would receive the credit for *their* research. Perhaps more seriously, some participants did not feel respected by potential collaborators:

"The natural science subdisciplines (e.g., physiology, biomechanics) sometimes view the behavioural science subdisciplines (e.g., psychology, sociology) as 'softer' and therefore less scientific. That assumption can make it difficult for the behavioural science groups to participate on equal footing."

Challenging methodology. Thirteen participants mentioned that IDR had an adverse effect on methodology, especially when partnering with other disciplines. IDR "can make quantifying metrics quite challenging, and there will likely be dispute (between disciplines) of varying severity in how best to measure or analyse a given task in the context of a problem of interest."

Limiting results and analysis. Eleven participants expressed concern that IDR was too broad, hindering the depth required for adequate insight. For example, one participant said,

> I think a limitation may be due to the breadth of research involved and exposing the research to potentially a lot more confusing variables in order to address the research problem. I think it may be difficult to analyse a problem with the proper amount of detail in order to address this breadth.

In addition, different disciplines may have "conflicting primary aims" and "different research directions" that dilute results and weaken analyses.

Logistical barriers. According to 11 participants, conducting IDR is logistically demanding, requiring a greater time investment than disciplinary research. It takes longer to collect data, analyze results, and set up meetings. These hurdles are made more difficult by institutions not supporting interdisciplinary collaboration, according to participants. One researcher nicely summarized the general sentiment: "The added time and complexity of these types of studies is too great relative to the time and resources available." Thus, the extra investment deters researchers who are already overcommitted. Finally, two participants specifically mentioned the lack of formal interdisciplinary training, which turns IDR into a process of trial and error.

Increased financial cost. Because of the complex nature of some interdisciplinary studies, nine participants said financial costs were a barrier. For example, one participant said,

> Because human development moderates or mediates relationships in all kinesiology research questions, longitudinal studies accounting for growth and maturation are required for establishing cause and effect relationships. This is costly, time consuming and subject to attrition.

In addition, ambiguity may exist regarding the distribution of grant monies among team members. One participant even posed the questions, "Who gets the indirect funding from grants? How are those roles managed?"

Disciplinary jargon. Five participants thought a particular IDR "challenge is to build a common language and a common object so that it becomes possible and useful to work with colleagues of other disciplines." Each discipline has its own vocabulary, making collaborations challenging. Trying to speak "the same language is difficult at times between interdisciplinary researchers" because many researchers are reluctant to learn the jargon of another discipline.

Hinders career advancement. Five participants worried that pursuing IDR would negatively affect their career advancement (i.e., tenure and promotion). It was seen as more difficult to get promoted "from research that doesn't fit obvious disciplinary categories." One participant expressed, "Interdisciplinary research has hurt me in job-hunting."

Publishing difficulties. Only three participants considered IDR a publishing liability that made it more difficult to publish a manuscript. A "non-interdisciplinary journal may be less interested in a paper that is comprised of an interdisciplinary team of researchers." Worries extended beyond the scope of the journal, and participants expressed that it was "often difficult to publish [IDR] as most reviewers are not interdisciplinary."

Discussion

The primary purpose of this study was to explore kinesiologists' views of IDR. The results revealed an interesting relationship between the perceived benefits and limitations. Prior to exploring that relationship, however, one needs to understand the subtle bias in the results. The participants unanimously agreed that IDR was beneficial to kinesiology, a surprising outcome since 23% self-identified as disciplinary-focused researchers. The unanimous result may be due

to the embrace of interdisciplinarity in academia (Basken, 2012b; Jacobs, 2009; Ruse, 2010), with participants feeling obliged to agree because it is the "right" answer. Regardless of the reason, the results should be interpreted with an understanding of this positive bias.

The results exposed a complex relationship between the participants and IDR. As previously mentioned, each participant thought IDR had positive and negative attributes, organized within two dichotomous themes: Benefits and Limitations. These themes simultaneously push and pull researchers in both directions. For example, collaboration was generally seen as beneficial, yet participants still had reservations that dampened their enthusiasm. The subthemes further illustrate this tension. Both themes had five similar subthemes: results, collaboration, funding, methodology, and publishing. Future research exploring these subthemes could help shed light on this paradoxical situation. Yet it should be noted that all the subthemes are interrelated, with any one subtheme being influenced by the others.

It was not surprising that Results was a controversial topic because significant and meaningful results are necessary for publication. Over twice as many participants thought IDR produced better, more robust results. Participants thought that IDR more fully captured the complexities of human movement because human movement does not occur in a vacuum, but rather it is simultaneously influenced by (and is influencing) physiological, psychological, social, and environmental factors. Yet trying to study too many factors may produce results that lack the depth of knowledge needed to adequately understand anything. Ultimately, the relationship should not be as binary as it appears in this study. The participants shared the extreme views that permeate throughout academia. Instead of viewing results from IDR as either too limited or too broad, researchers should view them on a continuum and try to seek a balance. The underlying assumption being that the knowledge is known and understood within the broader scientific discipline and professions affected by it, akin to Zeigler's (2011) long-standing call for organizational principles for the field.

Finding the proper balance is more of an art than a science because it considers many factors, such as type of research, research goals, variable(s) of interest, and desired degree of sensitivity and specificity. In addition, the results are dependent on available re-

sources (e.g., equipment, facilities, funding). Thus, because of the countless number of considerations and resources, universal recommendations are beyond the scope of this study.

Collaboration is almost always necessary when conducting IDR, and similar to results, collaboration is controversial. Collaborating with people in different disciplines may widen perspective and deepen understanding on a particular topic because it is impossible to know everything about a topic. This expansion of knowledge may mitigate previously held biases and assumptions, helping to improve the quality of a study. In addition, working with nonacademics (e.g., community leaders, industry partners, practitioners) may make the research more applicable and/or contextually relevant.

The biggest challenge to reaping the benefits of collaboration is collaboration itself. From the participants' descriptions, egos and elitism often hinder productive communication. Not respecting the ability of all disciplines to add value to a project undermines IDR, reinforcing biases and assumptions about other disciplines.

Even if everyone's opinions are equally valued, it still takes time to build collaborations. Stemming from the subtheme of Logistical Barriers, the increased complexities of IDR require more time and effort, which is supported in the literature (Campbell, 2006; Rhoten & Parker, 2004). As discussed in greater detail later, young faculty members under the pressure for production to obtain tenure (i.e., the "publish or perish" paradigm) do not always have such luxuries. Additionally, finding a common scientific language amid the jungle of disciplinary jargon is another hurdle often too high to overcome. To collaborate successfully, researchers and the universities that support them must first believe that the potential benefits outweigh the barriers. But belief is not enough; researchers and the universities must also invest in resources (e.g., equipment, facilities, funding, time) to overcome the barriers. Belief without proper investment may result in confusion, frustration, and/or inaction.

Similar to results and collaboration, more participants felt IDR expanded funding opportunities. Participants overwhelmingly noted that obtaining grants alleviated many of the challenges by supplying resources. Grants, however, do not solve all problems. Instead, problems shift to the fair appropriation of the monies. With pressure to bring in external funding to departments, large sums of money

may cause rifts in research teams because dispersion is often complex and political. In addition, funding may not be sufficient to the needs of the team or the department expectations, which may also cause tension among research members. Thus, the emphasis on funding may hinder rather than facilitate IDR. In future research, researchers should examine the role of funding in greater detail.

Because of the importance of methodology in research, it was not surprising to see conflicting opinions about the role of methodology in IDR. Of the five subthemes with reciprocal relationships, methodology was the only subtheme that had more negative than positive comments. The primary challenge was agreeing on the best way to measure and analyze the variables of interest. Other participants, however, felt that working with different disciplines strengthened the methodology because researchers in other disciplines were able to see limitations in any one technique and offer suggestions. Initially, these two viewpoints appear to be opposite, but they are related. Researchers often disagree about the best methodology because they see the strengths of their design and the limitations of the others, as described in the negative connotation. The research teams that can productively collaborate (without egos or elitist attitudes) can find the best methodology (or combination thereof) based on their collective expertise, as described in the positive connotation. The interrelated relationship of these subthemes becomes increasingly important because finding the best methodology through productive collaboration produces the best results.

Publishing is a primary currency that academics collect and for which they are evaluated for career advancement, especially among young academics seeking tenure and promotion. Although more participants felt IDR increased opportunities to publish, the type of publication outlet may be the key to understanding this contradiction. The content of an academic journal is determined by its editor in chief, editorial board, and reviewers, all who are guided by the mission statement and/or purpose of the journal. The content of academic conferences is often premised in a similar manner. However, journals and conferences are different in their level of interdisciplinary focus. In addition, certain subdisciplines and regions (e.g., Asia, Europe, North America) encourage IDR more than others. Thus, the participant's subdiscipline and location may determine the publish-

ing opportunities. In future research, researchers should examine this complex relationship.

Not all of the Benefits subthemes are reciprocal in nature, specifically New Perspectives, Movement Is Multidimensional, and Benefits the Field. These subthemes are focused on the more universal aspects and/or benefits of IDR in kinesiology, illustrating that IDR is beneficial for the field in general. Additionally, having no counterpart to the Limitations subtheme supports the positive bias of the responses. Because there were no negative subthemes, such as Movement Is Disciplinary or Harms the Field, participants felt that at least the idea of IDR was more beneficial than limiting.

Perhaps most enlightening is the comparison of the Benefits subtheme of Benefits the Field with the Limitations subtheme of Hinders Career Advancement. As previously described, Benefits the Field is more universal and idealistic, whereas Hinders Career Advancement is more individualized and realistic. This enigmatic pairing shows the inconsistent expectations of higher education. At the same time universities and departments tout their support of IDR, they often reward disciplinary research. Until these mixed messages stop, researchers will continue to feel the tension between helping the field versus advancing their careers.

Conclusion

Despite the rhetoric, IDR in kinesiology is a controversial topic. The tension between perceived benefits and limitations is obvious. The general consensus is that IDR is beneficial, but many have legitimate hesitations. These stem from an apparent double standard whereby academics and administrators praise the potential of IDR, but reward those following a more disciplinary-oriented research paradigm. Until there is a shift in academic thinking that elevates IDR to the same level of importance and support as disciplinary research, researchers will have to continue to overcome unnecessary barriers. Kinesiologists seem to perceive that IDR holds great promise, but kinesiologists must work together to lower the hurdles to make it a reality.

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