

# A Scientific Framework for Social Work Doctoral Education in the 21st Century

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Erick G. Guerrero<sup>1</sup>, Hadass Moore<sup>1</sup>, and Marcie Pitt-Catsouphes<sup>2</sup>

## Abstract

The emerging discourse about the science of social work has urged doctoral social work programs to reexamine assumptions about conducting research and responding to new expectations for scholarship. This article examines three promising models to guide scientific research in social work (evidence-based practice, team science, and multi- and transdisciplinary models). We first conducted a systematic review of social work publications (1985–2016) and found a notable increase in publications that discussed either research-informed or evidence-based practice or multidisciplinary approaches, but not team science or transdisciplinary approaches. Next, we engaged in a comparative analysis of each model's purpose, number of researchers, and breadth of disciplinary focus. Finally, we completed an exploratory assessment of PhD program websites to identify the presence of these models. Information provided on these websites followed a similar pattern as noted in the publications. Implications of these models for doctoral education in the 21st century are discussed.

## Keywords

scientific framework, doctoral education, evidence-based practices, multidisciplinary approach, team science, transdisciplinary approach

Dating back to the Charity Organization Society movement in the late 1800s, the field of social work (SW) has recognized the importance of developing a strong research foundation (Fortune, McCallion, & Briar-Lawson, 2010). During the past four decades, significant discussions have occurred about how to understand different aspects of SW research, with the emergence of the discourse about the science of SW being the most recent phenomenon (Brekke, 2012). Various perspectives about SW research have been articulated, each with its own priorities, foci, and approaches. Deliberations about different models of SW research have in turn had an impact on the goals, structure, and content of doctoral education. In the current academic labor market, early career scholars are expected to be trained in rigorous and contemporary scientific methods (Anastas, 2006). Consequently, SW doctoral educational programs have designed their curricula and training opportunities to ensure that their graduates have the knowledge, skills, competencies, experience, and values needed to meet the market demands. But knowledge about the direction SW doctoral education should take to best prepare graduates is limited.

The number of SW doctoral programs has grown considerably during the past four decades (Anastas, 2006; Anastas & Kuerbis, 2009), and they are poised to have an increased impact on SW scholarship. As a consequence, it is critical to understand the foci of different models of SW research that may shape key components of doctoral education. Most of the research conducted to date about SW doctoral education has focused on the characteristics of PhD students, the relative

emphases on teaching versus research, or the tension between research and practice (Anastas, 2014; Anastas & Kuerbis, 2009; Bentley, 2013). Little is known about the influence of an SW school's overall orientation toward research on the research instruction offered to its doctoral students. Understanding the prevalence of models and their contributions to preparing future scholars is significant. A careful consideration of the different approaches will foster comparisons and assessments (both horizontally across programs and vertically within programs) of the outcomes associated with training SW doctoral students.

The first step in this process is to determine the prevalence and trends of the most common models. We examine three models of research with a specific orientation rather than mutually exclusive of each other. These three models are research related to evidence-based practice (EBP), team or collaborative research, and multi- and transdisciplinary approaches to knowledge building. We consider the implications for doctoral education. As a second step, we developed a

<sup>1</sup> Suzanne Dworak-Peck School of Social Work and Marshall School of Business, University of Southern California, Los Angeles, CA, USA

<sup>2</sup> School of Social Work, Boston College, Boston, MA, USA

## Corresponding Author:

Erick G. Guerrero, Suzanne Dworak-Peck School of Social Work, University of Southern California, 655 West 34th Street, Los Angeles, CA 90089, USA.  
Email: erickgue@usc.edu

conceptualization of research approaches, similar to Weberian ideal types, which can guide the development of a typology relevant to the science of SW. Analysis of this conceptualization could also shape the contours of doctoral education. Therefore, in this article, we show the prevalence of the proposed models in publications and doctoral education in SW and review some of the important markers of the development of SW doctoral education. We use these empirical findings to identify three salient characteristics of different approaches to SW research: the aims or purpose of the research, the disciplinary breadth of the research, and studies conducted by independent scholars versus collaborative research. We provide concluding remarks on the promise of each model to prepare SW researchers to compete in the 21st century.

### *Research Development in SW Doctoral Education*

For more than 100 years, SW doctoral education has evolved and changed (Acquavita & Tice, 2015). Initially, SW doctoral programs placed a prominent focus on the mastery of advanced knowledge that had direct, practical applications. The increase in undergraduate and graduate SW programs then exerted pressure on doctoral programs to train the next generation of faculty members; therefore, many programs offered course content and opportunities for SW doctoral students to become familiar with research content in preparation for a faculty position (Acquavita & Tice, 2015).

Three factors underpin the current increased focus of SW doctoral programs on students' development of rigorous research and analytic skills. First, there is widespread recognition that advanced research techniques are needed to understand today's complex social problems and evaluate the short- and long-term effectiveness of programs and services designed to address those problems (Videka, Blackburn, & Moran, 2008). Second, SW leaders recognize doctoral students as the stewards of the discipline (Anastas & Kuerbis, 2009; Golde & Walker, 2006). Therefore, it is important that students are well prepared for the challenges of the future. The guidelines for doctoral educations proposed by the national Group for the Advancement of Doctoral Education in Social Work (2013) underscore the importance of this preparation and state that the mission of doctoral education is to "improve the art and science of social work by generating, disseminating, and conserving the knowledge that informs and transforms professional practice" (pp. 1–2). Stressing the critical role of doctoral education in strengthening the science of SW, the guidelines specifically indicate that SW doctoral graduates should have the ability to conduct high-quality research that focuses on questions related to SW using research skills that enable systematic collection and analysis of data. Finally, universities exhibit increased expectations that early career scholars will have already engaged in cutting-edge research and be prepared to compete successfully for external funds (Acquavita & Tice, 2015). This has altered some aspects of the academic landscape, with many leading SW academics observing that it is critical for students to gain sophisticated

research competencies as part of their SW doctoral education. In response, SW doctoral programs are directing increased attention to ensuring that their students develop a broad range of rigorous research and analytic skills (Anastas, 2015; Jenson, 2008). This challenges the field of SW to grapple with the meaning of SW science and reflect on the role of doctoral education in the expansion of the knowledge base.

### *Role of Science in SW Doctoral Education*

The definition of the science of SW (Brekke, 2012, 2014) has generated much discussion and deliberation in the academic community. According to Brekke (2012), the need to define the science of SW is a priority for several reasons, including (a) SW as a discipline is practice based, (b) the number of SW doctoral programs is growing, (c) the research conducted by SW scholars is increasingly sophisticated, and (d) the number of other professions that are defining themselves as scientific is rising (also see Brekke, 2014; Guerrero, 2014). Brekke (2012) argued that there are three critical elements for shaping the science of SW: domains of inquiry, core constructs, and defining characteristics of approaches to knowledge building. The latest development in the definition of the science of SW can be seen in Brekke's discussion of the three elements at the Island-Wood roundtables. Brekke (2012) defined the domains of inquiry as issues of most concern to SW, including marginalization, disenfranchisement, individual and social factors in dysfunction, and well-being and health. He also suggested that the science of SW focuses on three core constructs: biopsychosocial dimensions of the human experience, person-in-environment, and service systems for change. Finally, he posited that the defining characteristics of SW science stem from the field's eclectic, multifaceted, and ecological approach, which requires philosophical, theoretical, and practical tools for synthesis and pluralism.

Since Brekke (2012) first suggested the science of SW framework, the SW academic community has reflected on important questions such as: "What is the role of practice while developing such a framework?" (Anastas, 2014), "Should SW strive to become a scientific discipline?" (Shaw, 2014), and "Should the science of SW framework be incorporated in doctoral education?" (Mor Barak & Brekke, 2014). In essence, these inquiries ask for basic justification for incorporating science into SW, well known as a practice discipline. Moving this discourse forward requires a careful examination of existing models of doctoral education that can build the science of SW in different ways. SW is at a crossroads and needs a framework to prepare SW researchers to systematically build the knowledge base. In this article, we provide empirical evidence of models in SW presented in publications and doctoral-level training and develop a comparative analysis of these models' purpose, number of researchers, and breadth of disciplinary focus. We aim to inform a conceptual framework of doctoral education based on key features of existing models.

## Method

We relied on different sources of data gathered from the ProQuest database (literature review) and SW PhD program websites to investigate the extent to which PhD programs in SW follow any of the selected models. We also evaluated the models' benefits and limitations regarding SW education.

### Search Strategy

To examine trends in the prevalence of the three models in scholarly SW publications between 1985 and 2016, two graduate-level researchers conducted preliminary systematic searches separately in the ProQuest database. This database was chosen because it updates published material daily and includes scholarly journals, trade journals, magazines, dissertations and theses, newspapers, working papers, and other sources, thus allowing us to capture historical trends. The search was restricted to peer-reviewed SW-related publications in English based on four periods (prior to 1985, 1985–1994, 1995–2004, and 2005–2016). These time periods were chosen with the goal of comparing differences between and within each approach. In total, 16 searches were conducted by each of the two researchers—four for each approach based on the time periods. Conjugations and plural forms of the search words were also included. The following search terms were used: (a) “evidence base” AND “social work” AND “research”, (b) “team science” AND “social work” AND “research”, (c) “multidisciplinary” AND “social work” AND “research”, and (d) “transdisciplinary” AND “social work” AND “research.” Selection of eligible studies was approved by a third reviewer, and duplications were excluded.

In addition, to understand the prevalence of these three models in current doctoral education at schools of SW in the United States, two graduate-level researchers analyzed website data for all PhD programs in SW listed by the Group for the Advancement of Doctoral Education in Social Work. Of the 78 programs listed, researchers agreed to exclude four that had a research practice orientation (doctorate in SW). The analytic sample focused on 74 PhD programs that shared the same overall academic structure. To examine how programs communicate their model for doctoral education via their website, we identified the extent to which key words representing any of our models, that is, EBP, team science, multidisciplinary, and transdisciplinary, appeared on each program website. The two researchers reached overall consensus regarding the selected programs and their categories. A third member of the research team resolved any differences of opinion about the categorization expressed by the two graduate researchers.

### Developing a Conceptual Model

Informed by Brekke's (2012) perspective on the critical elements of shaping a science of SW, we developed a conceptual model using the three dimensions of the science of SW to distinguish different approaches to SW research and doctoral education. These include the disciplinary breadth of the social

science that underpins the research, the perceived goals and purpose of the research, and the organization and structures used to conduct research tasks and activities. We applied this model to the 74 SW doctoral programs in the United States in 2016 (Lightfoot & Beltran, 2016).

We relied on an analytic tool (i.e., diagram) to observe three key dimensions informed by Brekke's perspective, allowing us to distinguish among doctoral models (see Figure 1). The *x*-axis is associated with Brekke's (2014) core constructs and represents the breadth of the social science knowledge (both theoretical perspectives and empirical research) used to inform the research; that is, whether that knowledge is specific to the field of SW or informed by multiple disciplines. The *y*-axis is related to Brekke's (2014) domains of inquiry and refers to the envisioned goals and purpose of SW research. This axis addresses the extent to which the aims of the research are directly relevant to SW policy, practice, or education, or if the focus is placed on building SW knowledge more generally. Finally, the *z*-axis designates the idealized structure for implementing research tasks and activities, as measured by the number of researchers involved in specific research endeavors, ranging from an independent researcher to teams or collaborations of teams from different disciplinary backgrounds. This dimension is informed by Brekke's (2014) notion of the defining characteristics of SW, such as perspectives of researchers from different disciplines that contribute to ecological analyses used to understand specific social problems.

Using this analytic tool, it is possible to identify current characteristics of different approaches to doctoral education as models or Weberian ideal types. The three identified models are (a) doctoral programs that focus on developing expertise about EBP, (b) doctoral programs that stress the importance of team science, and (c) doctoral programs that train doctoral students to engage in multidisciplinary or transdisciplinary research and theory building to address complex social problems. We recognize, of course, that different doctoral programs developed by schools of SW may contain elements of more than one model. This article seeks to highlight their individual and joint contributions to a comprehensive framework.

## Results

Table 1 shows the findings from the literature search of peer-reviewed research publications. The greatest increases in all three models occurred during the previous 20 years (1995–2016). EBP is the most prevalent model in published material. But it seemed to emerge in the field as a model only in the early 1990s. Prior to that time period, publications focused on “evidence that informed practice/research” a slightly different term, and perhaps the precursor of EBP in the literature. In contrast, the prevalence of team science in SW publications is limited and only present during the latest time period (2005–2016). Multidisciplinary approaches have increased considerably, doubling during the previous 20 years, whereas transdisciplinary approaches have increased more than 3 times yet the number of related publications has remained limited.

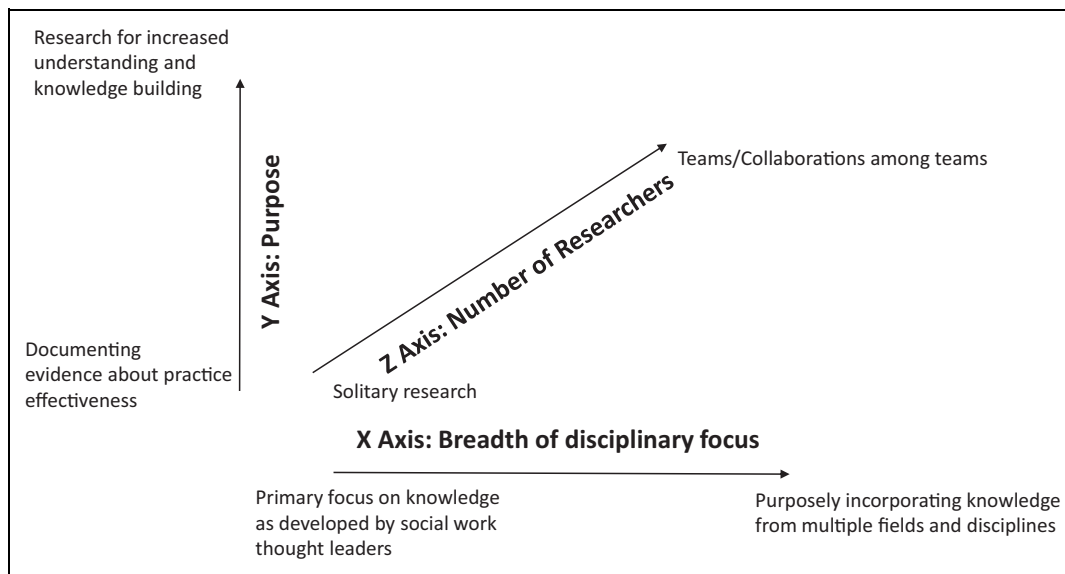


Figure 1. Analytic framework.

Table 1. Number of Publications by Approach and Time Period.

Time Period	Evidence-Based Practice	Team Science	Multidisciplinary	Transdisciplinary
Prior to 1985	8 <sup>a</sup>	0	315	8
1985–1994	12 <sup>a</sup>	0	556	19
1995–2004	1,677	0	2,441	140
2005–2016	12,763	33	5,112	522

Note. <sup>a</sup>Note that during this period of time before the 1990s, publications focused on evidence that informed practice or research rather than evidence-based practice per se.

Table 2. Approach Presented on Social Work PhD Program Websites.

Approach	N	Percentage
Evidence-based practice	19	26
Team science	24	32
Multidisciplinary	4	5
Transdisciplinary	2	3

Note. The sample included 74 programs. As many as 25 (34 percent) programs did not include any of the four approaches presented.

The review of key words for each model on SW PhD program websites (Table 2) revealed that team science (32%) is the most prevalent. This category included any mention of the team approach to SW research. EBP (26%) followed as the second most prevalent model, whereas multidisciplinary was only present in four programs (5%). Only two PhD programs (3%) in the nation reported activities that were transdisciplinary in nature.

These statistics provide a preliminary notion of the prevalence of three ideal models of research in SW. The findings demonstrate that all approaches are present in PhD programs but in various degrees. Tables 1 and 2 also suggest different

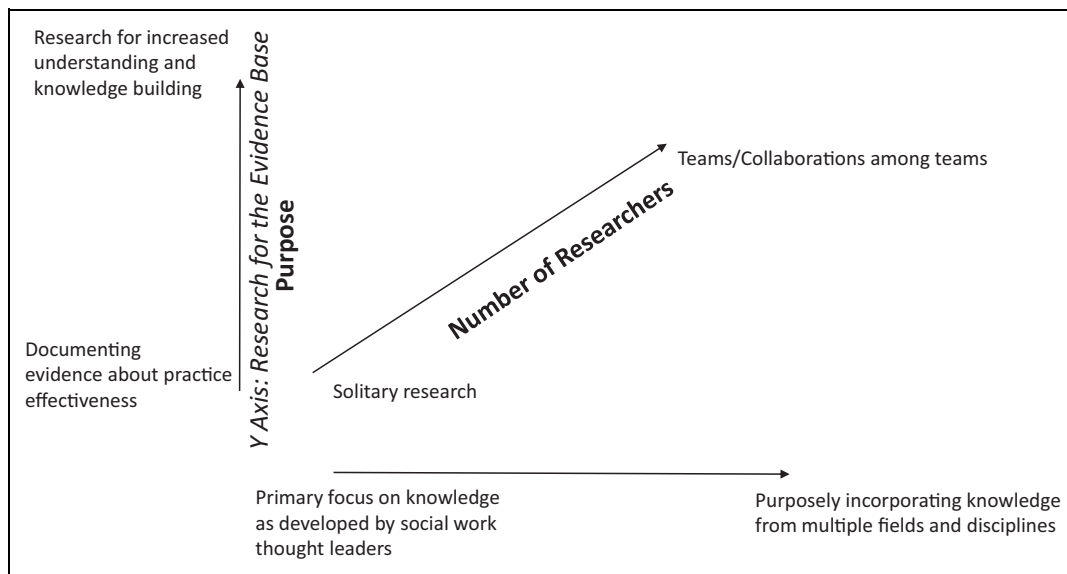
patterns in the prevalence of approaches based on data source, that is, published scholarly work versus PhD programs’ online descriptions. These differences may indicate important gaps between content marketed by SW doctoral programs and the direction of scholarly work and research.

The comparative analysis of the three main models highlighted critical characteristics regarding the contributions of these models to SW education in the 21st century. These models emphasize different features, as depicted by the x-, y-, and z-axes of Figure 1.

### Model 1: Evidence Base for Social Policies and SW Practice

Historical accounts confirm that from the earliest days of the field’s emergence, SW leaders have stressed the importance of conducting research to establish practice excellence (Austin, 1997). However, the explicit focus on EBP and corollary demands for intervention research became particularly evident at the beginning of the 21st century.

Research conducted to build the evidence base seeks to gather rigorous data that are relevant to information needed by policy makers, practitioners, and other decision makers who



**Figure 2.** Evidence-based practice model.

want to provide the highest quality services possible to members of vulnerable populations (Fraser, 2003; Gambrill, 2003). The priority is placed on applied research, and researchers conduct intervention research, assessments, and rigorous program evaluations that are focused on application (Fraser & Galinsky, 2010). Given this model's emphasis on using research for EBP, researchers recognize policy makers, practitioners, community residents, and organizational decision makers as an important consumer of findings regarding the efficacy of different interventions, programs, policies, and social change initiatives. Thus, research conducted to build the evidence base stresses translational research, which encompasses scientific discovery and basic research, trials of promising interventions, clinical- and patient-oriented research, development of evidence-based recommendations, population-based research, and dissemination and implementation research.

The heuristic framework presented in Figure 2 centers this model of SW research on practice and policy efficacy (see placement of the X in the figure), thus positioning the EBP approach as having a strong connection to practice (y-axis). Considering studies undertaken to build the knowledge base, great variability can exist in the extent to which the research: (a) may draw primarily from the SW knowledge base or from many disciplines (x-axis) and (b) may engage a single SW researcher or a team of collaborators, some of whom could be practitioners or social scientists from disciplines other than SW (z-axis), as indicated by the dotted arrows connected to the X position in Figure 2.

### *Model 1: Implications for SW Doctoral Education*

Focusing research on expanding the evidence base can generate several benefits and opportunities for SW research and doctoral education. Structuring doctoral programs to focus on the evidence base can provide integrative structures such that the compilation of research findings offers guidelines for the

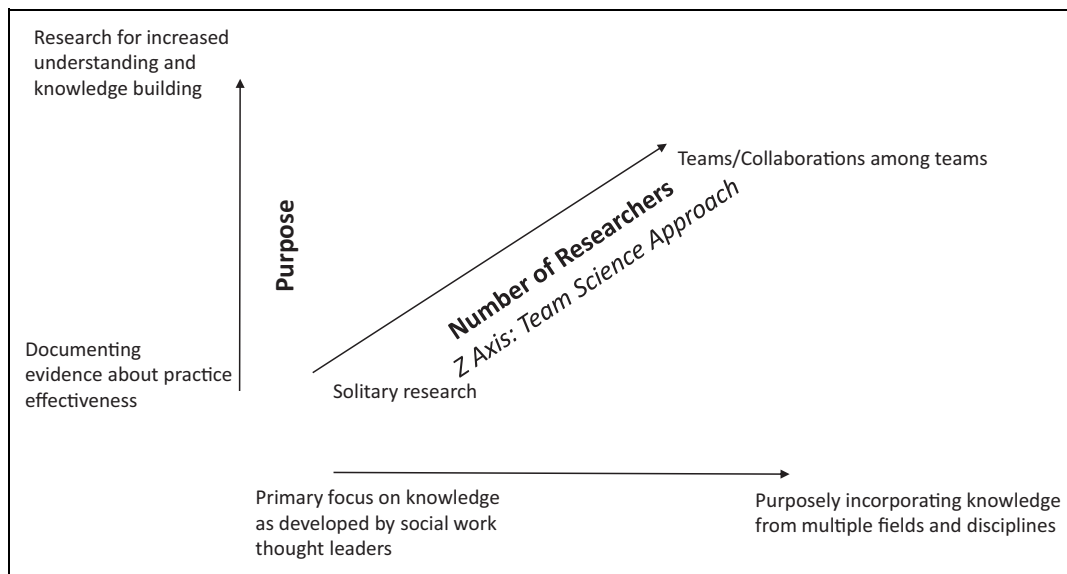
continuous improvement of both macro and clinical practice (Fraser & Galinsky, 2010). One consequence of designing doctoral programs with a focus on EBP is reduced perceptions of schisms between SW research and practice, especially if specific research skills are taught.

Efforts to firmly establish SW as an academic discipline with a unique and rigorous knowledge base have provided a strong argument for directing SW research toward studies that document the efficacy of policies, programs, and practices intended to address complex social issues (Fortune et al., 2010). Despite compelling reasons for training doctoral students to conduct studies that expand and deepen the evidence base, this path has been challenging, in part because it is difficult, expensive, and sometimes impractical to design randomized controlled trials, yet doctoral students need to be trained in intervention and quantitative research to understand and potentially conduct research that leads to evidence (Fortune et al., 2010).

The promise of the EBP model has encountered challenges, including the divergent perspectives typically adopted by academic researchers and practitioners who make decisions about the application of research findings (Feldman, 2010). Of particular worry are indications that the vast majority of service providers may not use existing research findings (Palinkas & Soydan, 2012); therefore, it is unclear whether it is reasonable to assume that doctoral students would be able to achieve the goals and aims of this approach to SW science, even if they were trained to conduct research designed to contribute to the evidence base.

### *Model 2: Team Science to Address Complex Social Problems as a Group*

Team science has become a promising approach to addressing complex social problems. The science of team research is



**Figure 3.** Team science model.

concerned with understanding multilevel factors that facilitate or hinder a wide range of collaborative, team-based research efforts (Börner et al., 2010; Stokols, Hall, Taylor, & Moser, 2008) and seek to understand conditions, processes, and outcomes associated with successes and failures of interdisciplinary team science initiatives (Stokols et al., 2008). The fields of team science and SW research are complementary; both focus on intrapersonal, interpersonal, organizational and institutional, physical and environmental, societal and political, and technological contextual factors that contribute to understanding the impact of interventions on individual outcomes. Using the science of team science to understand how to build effective team performance may lead to effectively building the SW knowledge base (Emmons, Viswanath, & Colditz, 2008; Stokols et al., 2008). Hence, team science provides a strong conceptual framework to structure SW doctoral education.

Team science in particular may have significant benefit to building the science of SW. Disciplines, defined as institutions with well-validated methods and knowledge, gain authority and recognition based on their unique and in-depth expertise and knowledge in their respective areas (Abbott, 1988). Single-discipline approaches contribute to academic silos, reflected in university structures such as single-discipline departments, centers, and so on, and communication of knowledge via single-specialty scientific journals, conferences, and other entities or venues. Although discipline specificity and specialization can have significant advantages when addressing a finite and well-defined issue, the multilevel nature of SW issues requires a comprehensive approach across units of analysis. Although SW should be able to develop and communicate its own validated methods, knowledge, and other contributions, an approach based on team science that encompasses the principles of SW is best able to adequately address grand social challenges. Although team science research draws from different disciplines to respond to social issues, it does not

necessarily integrate knowledge to create new theories, methods, or solutions that go beyond the knowledge base of the disciplines, even when the science from those disciplines is considered in tandem.

A team science research approach places this model at the z-axis (see Figure 3), with its emphasis at the end of the axis. Examples of team science can be seen in research centers established at the university, college, and school of SW levels. These centers are generally structured to facilitate collaboration among researchers from different disciplinary backgrounds. Centers are generally organized around a social problem (e.g., healthcare disparities, cancer, healthy aging, etc.), and the main activities involve team approaches to advancing knowledge.

Organizational factors that support collaboration mainly involve the physical environment, incentives and disincentives, and structure of the workplace, including individual and team recognition in the workplace and structures and processes that facilitate communication and interaction among scholars (Stokols, 2006). Colleges, schools, or departments of SW are located in universities and thus have opportunities to be accessible. Many of these schools also employ numerous scientists trained in other disciplines, helping connect the profession with other fields (Videka et al., 2008). However, few schools have formal mechanisms to house scientists from different disciplines in one physical location.

For some types of research, the team science approach can have great advantages to the solo practice (or silo) approach. However, significant resources are often needed to develop and maintain research teams from different disciplines. Furthermore, findings from empirical studies in diversity literature suggest that misunderstandings, and in some cases, conflict can arise in diverse teams even though creativity and productivity are generally higher among diverse work groups (Mor Barak, 2013). Given these challenges, most doctoral students find that

limited opportunities exist to become involved in studies conducted by teams.

### ***Model 2: Implications for SW Doctoral Education***

The focus on team science creates new demand for the training of doctoral students, who would need to take courses taught by faculty members affiliated with different disciplines. Beyond the classroom experience, doctoral students-seeking proficiency in working with colleagues from different disciplines need structured opportunities to engage in studies that involve researchers who themselves have been trained in different social and behavioral sciences. This means researchers from multiple disciplines including SW would need to devote time and effort to be trained in the science of team science; that is, remove boundaries to team science on the institutional level, identify manners to create and execute collaborative teams, and support effective collaborations (Stokols et al., 2008). This approach has the benefit of not only addressing problems in a comprehensive manner but also bridging the gap between SW practice and research in a unique manner. Because SW practitioners often work in teams composed of members from different professions, the focus on team science could provide an opportunity for researchers in SW to both learn from and inform practitioners about the complexities and opportunities of this task. This exchange allows for the possibility that the gap between the two will close and that power structures will dissolve. This could potentially be a major contribution to the field in general and research in particular, but requires careful planning and training, which could be provided by doctoral programs.

Some of the limitations of the team science approach are related to the various team members, their agendas, and location. Even though technology for collaboration has the great potential of bringing experts from different fields to work together more than ever before, it is often designed without addressing the needs and limitation of each member, and this could harm such collaboration (Cooke & Hilton, 2015).

### ***Model 3: Multidisciplinary and Transdisciplinary Approaches to Developing Theories and Methods to Respond to Complex Social Problems***

It is important to first distinguish multidisciplinary from transdisciplinary approaches before discussing this model. Multidisciplinary approaches rely on researchers working independently but sequentially to eventually address a common problem (Rosenfield, 1992) and has come to be regarded as an improvement over single-discipline approaches. As a more complex and elaborate approach, transdisciplinary research is defined as studies that engage representatives from various areas of research who collaborate to develop new theories and methodologies with the mission of producing all-encompassing and advanced approaches to addressing research questions (Klein, 2008; Stokols et al., 2008). Whereas some references to transdisciplinary research

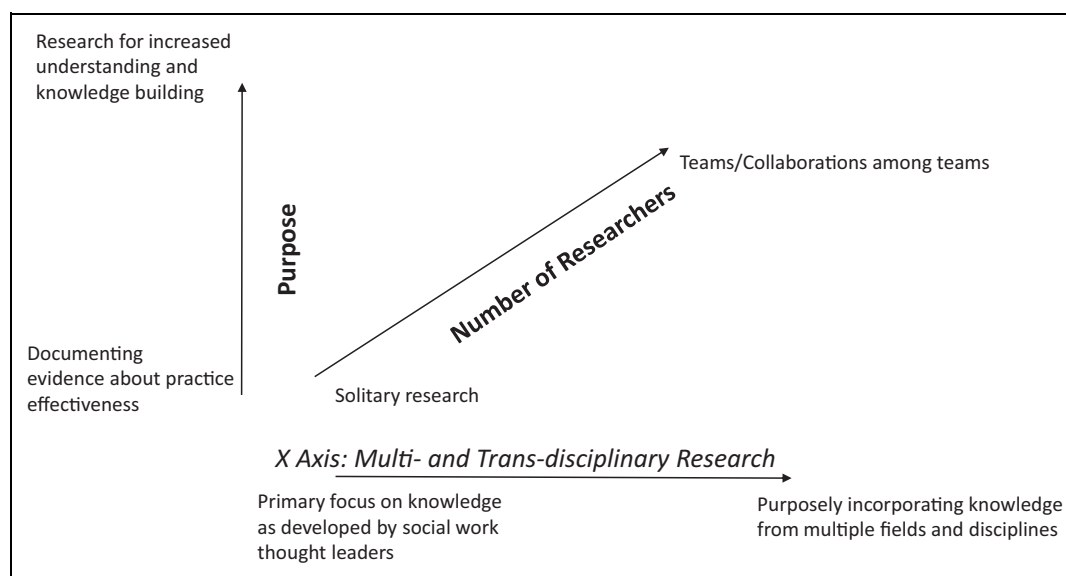
suggest that the teams include academics trained in different disciplines, others suggest that the disciplines could include practitioners and scholars. The transdisciplinary movement, particularly in Europe, also emphasizes the involvement of many stakeholders in society (Klein, 2008). In these situations, transdisciplinary research is sometimes viewed as action research (Hirsch Hadorn et al., 2008; Stokols et al., 2008) and emphasizes the translation of research findings into practical solutions to social problems (Haire-Joshu & McBride, 2013), similar to research conducted to strengthen the knowledge base (see previous discussion of Model 1).

The fact that the multidisciplinary approach has been a part of SW research since a very early stage might be related to SW practice and the roles that social workers in the field take in multidisciplinary teams (such as hospitals). Still, we can find illustrations to this approach specifically in SW research. Learning how to master knowledge and manage scholars from different disciplines are important learning objectives for doctoral students who are members of multidisciplinary teams. For example, it can take sophisticated negotiation skills for researchers from different disciplines to design a coherent study that includes the types of measures that each member needs to publish in peer-reviewed journals relevant to individual disciplines. Potential conflicts need to be anticipated and addressed to leverage the diverse knowledge in diverse teams (Kessel & Rosenfield, 2008; Videka et al., 2008). Despite these challenges, multidisciplinary research projects offer SW doctoral students opportunities to learn about other disciplines' language, theories, conceptual frameworks, and methods while they build their knowledge and skills in SW approaches to research.

Finally, it is important to recognize that the multidisciplinary model has the potential to challenge much of the characteristic structure of doctoral education. For example, doctoral programs that embrace this approach might encourage dissertations informed by several experts from different disciplines wherein the individual SW student assumes the leadership role from study design through the defense.

The transdisciplinary approach to research can be viewed as a natural evolution of the multidisciplinary and interdisciplinary approaches. Scholars have often considered these three approaches as distinct but connected models that represent various forms of cross-disciplinary collaborative research and practice (Haire-Joshu & McBride, 2013). Some academics have differentiated the three subtypes by placing them on a spectrum ranging from higher to lower levels of integration and innovation when addressing an issue or a problem (Aboelela et al., 2007; Abrams, 2006; Haire-Joshu & McBride, 2013; Vyas, Alperovich, Grayson, McCarthy, & Rodriguez, 2015). In that sense, multidisciplinary approaches are focused on a combination of concepts and methods from different disciplines to solve a problem, whereas interdisciplinary approaches emphasize the integration of concepts and methods from different disciplines to address a problem (Haire-Joshu & McBride, 2013). The uniqueness of transdisciplinary work is not only its integration or combination of different disciplines to address a





**Figure 4.** Multi- and transdisciplinary model.

problem but also its focus on creating new theoretical concepts and methods that synthesize different disciplines and expand them beyond their boundaries.

Like team science, multidisciplinary and transdisciplinary research recognizes that the effective study of complex contemporary social problems demands the expertise of more than a single discipline. However, transdisciplinary research goes beyond the number of researchers involved to emphasize the purposeful creation of new theories, measures, and insights that reflect a mixture of perspectives from more than one discipline.

Like the multidisciplinary model, transdisciplinary research could be relevant to both basic and applied science (allowing it to be placed at any point on the *y*-axis; see Figure 4). By definition, it needs to be at the end of the *x*-axis to draw from multiple disciplines. However, at least in theory, it could be possible for a single researcher trained in two or more disciplines to engage in transdisciplinary research, as suggested by the dotted line along the *y*-axis.

Some of the challenges of the transdisciplinary approach are associated with the resources, time, and investment necessary to develop transdisciplinary research teams. This research model assumes an evolving relationship that requires ongoing funding, a high level of investment and skills among members, and development of effective ways of working together.

Because multidisciplinary and transdisciplinary frameworks are fairly new to the SW research paradigm, their low prevalence and growth in the published literature and on PhD program websites are expected. Even though the transdisciplinary approach has the potential, both conceptually and practically, of becoming an optimal choice to deal with complex issues, its manifestation might be complicated to describe and hence there are not enough clearly documented examples. However, work that approximates this approach can be seen in several areas, including health services. For instance, the Center for Interdisciplinary Health Disparities Research, which is funded

by the National Institutes of Health, specifically addresses health disparities through transdisciplinary research (Gehlert et al., 2010). An article describing the transdisciplinary work of the team outlines how this approach generates a unique ability to comprehend and resolve health disparities (Gehlert et al., 2010). Fundamentally, the research creates new knowledge by way of a collaborative investigation of biological, social, behavioral, and other sciences, allowing for a holistic perspective that addresses the multiple levels at which health disparities occur. However, it is emphasized that bringing knowledge together may not be a sufficient response and that “it is the mechanics or functioning of transdisciplinary teams that confers their advantage over other approaches” (Gehlert et al., 2010, p. 419). The article presents the example of breast cancer research, noting that screening and treatment recommendations have failed to address biological and social considerations and emphasizing the importance of including multiple levels while defining the problem, creating interventions, and conceptualizing the issue to provide adequate health services (Gehlert et al., 2010).

Perceptions of threats to their professional identity may push SW scholars away from a transdisciplinary model. In contrast, the major pull toward the model is the potential to leverage SW’s extensive research about and experience with vulnerable populations and social justice issues, which can help SW researchers navigate several disciplines to identify explanatory or analytic frameworks that explain social phenomena. Optimally, SW researchers should feel that SW has a well-defined identity and knowledge base and can complement such knowledge with knowledge from other disciplines.

### *Model 3: Implications for Doctoral Education*

Multi- and transdisciplinary research provides an opportunity for SW doctoral students to assume leadership as conveners of



diverse teams. To help them do so, doctoral education programs will need to ensure that SW doctoral students have the requisite communication and research skills to lead transdisciplinary teams. Doctoral programs will need to teach SW doctoral students effective strategies for articulating the value proposition of SW to other members of transdisciplinary teams. As contributing members of transdisciplinary teams, doctoral students in SW will need to have a strong understanding of SW-specific knowledge, methods, and applications. In addition, SW doctoral students will need to acquire knowledge from different fields and disciplines and become facile in using that knowledge to generate new perspectives and insights that are no longer discipline specific.

The transdisciplinary approach offers SW research and education an optimal approach to addressing the types of complex social problems common in the profession. However, it is realistic to assume that most SW researchers and students would have limited access to transdisciplinary research given its complexity and high resource and development requirements. This approach involves not only developing a multidisciplinary team but also evolving its work to learn from various disciplinary frameworks and jointly creating knowledge, methods, and applications that may better respond to complex issues. Also, the transdisciplinary approach possibly extends beyond a team science approach featuring diverse teams. Whereas multidisciplinary research requires the presence of more than a single discipline to conduct the research, it is entirely possible for multidisciplinary teams to collaborate and ask questions that reflect each member's disciplines in a particular study (e.g., psychologists ask questions about emotions and cognition; sociologists ask questions about positions in social structures; economists ask questions about capital; social workers ask questions about social marginalization and isolation, etc.) and then have the findings reported back to the different disciplines. In contrast, moving toward paradigm shifts seems to be an explicit goal for transdisciplinary research. Stokols' model indicates several areas of attention to develop transdisciplinary research—intrapersonal, interpersonal, organizational, physical environment, technological, and societal and political—while considering that the purpose of the work is to develop new theories and methodologies that do not fall under the dominance of one discipline, both practically and theoretically (Klein, 2008; Stokols et al., 2008).

## Conclusion

Doctoral programs in SW are challenged to develop scientifically viable models, secure funding resources to support rigorous studies, and develop and maintain relationships with academics from other disciplines and SW practitioners. Opportunities exist for doctoral education programs to advance discussions about different models of SW research that could further develop and refine SW as a discipline. In this article, we critically analyzed three current models of research in SW (research to build the evidence base for practice; team research; and multidisciplinary and transdisciplinary approaches to

research) to inform doctoral education in the 21st century. Findings show that EBP is the most prevalent and increasingly growing model in SW published literature, whereas team approaches to science and EBP are common models used in doctoral programs. Multi- and transdisciplinary models are the least prevalent, but are growing exponentially in the scientific literature in SW.

These findings should be interpreted considering study limitations. The systematic search did not include nonindexed literature produced by SW schools. The three models are relatively new in the SW literature and earlier or emerging terms (e.g., evidence that informed practice/research) were not considered in this article. But we noted their presence in early years (before 1990s). Our reported prevalence of the three models in doctoral programs is limited to material presented in websites. Our interrater agreement relied on three verifying searches and three graduate-level researchers. All in all, the prevalence information and conceptual framework presented here is a preliminary examination of how three promising models emerge and can be used to inform a scientific model of SW education.

Our critical analysis relied on each model's purpose, number of researchers, and breadth of disciplinary focus to highlight the importance of key active features of each model. The EBP model may provide research skills to identify EBPs and conduct research to establish such EBPs. The team science model provides a compelling approach to structure SW doctoral education based on the number and type of researchers needed to conduct rigorous research. Finally, the multi- and transdisciplinary model offers a promising approach to collaborate across disciplines at all stages of research.

By conducting this critical analysis, we identified opportunities to inform a new conceptual framework that promotes the key features of each model. Stokols' transdisciplinary team science framework has brought together team science and transdisciplinary approaches. Because these models are generally complementary, devising ways to enact the most promising areas of these models together may benefit science in SW. The research literature has stressed that intrapersonal factors play an important role in developing individual readiness for collaboration. Among these key factors, anticipation and preparedness to collaborate with a team (Stokols, 2006), openness to other disciplinary and world perspectives (Israel, Schulz, Parker, & Becker, 1998), and values and shared responsibility (Wray, 2002) are critical to engaging effectively and contributing to the collaboration. Interpersonal factors mainly involve the type, amount, quality, and content of communication among members that lead to developing trust and supporting performance (Stokols et al., 2003; Stokols, Harvey, Gress, Fuqua, & Phillips, 2005). Overall, the framework for transdisciplinary team science offered by Stokols, Hall, Taylor, and Moser (2008) provides an excellent platform to build on EBP research and tailor it for the realities of SW programs.

The discussion of these models helped clarify some of the important features that may be used concurrently to inform promising approaches to science in SW. The robust presence of EBP and the emergence of the transdisciplinary approach in

SW research offer a path to develop the science of SW. Because doctoral education is perceived as having the role of stewardship of the SW discipline (Goodman, 2015), understanding the science of SW is a crucial component of the current discussions on the development and incorporation of the science of SW into doctoral education programs (see Island-Wood roundtable discussions in Thyer, 2014). The stewardship role encourages SW leaders to pursue and actively grapple with questions about the future of doctoral education on the intra-disciplinary, interdisciplinary, and transdisciplinary levels.

Finally, it is critical to engage doctoral programs in an ongoing conversation about factors that comprise the unique identity of the SW discipline (Gitterman, 2014) and how these elements could be integrated with a consolidated, EBP-based, transdisciplinary team science framework. The approaches discussed in this article could be extremely beneficial for doctoral education and generate valuable science while meeting the goal of stewardship. However, because each of these approaches relies on some form of “exiting the boundaries” of the SW discipline, there is a risk that the core elements of the discipline and its unique contribution to any form of collaboration would be weakened, especially considering SW’s ongoing search for an identity. Hence, prior to applying each of these approaches, it is important to agree and define the doctoral education platform, tools, and skills to develop a thorough understanding of the SW discipline.

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