Transdisciplinary Translational Science for Youth Health and Wellness: Introduction to a Special Issue

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Abstract

Background Transdisciplinary translational science applies interdisciplinary approaches to the generation of novel concepts, theories and methods involving collaborations among academic and non-academic partners, in order to advance the translation of science into broader community practice.

Objective This paper introduces a special issue on transdisciplinary translational science for youth health and wellness. We provide an overview of relevant research paradigms, share the related goals of the Iowa State University Translational Research Network (U-TuRN), and introduce the specific papers in the issue.

Method Authors were asked to submit empirical reports, programmatic reviews or policy-related papers that examined youth health issues from a transdisciplinary translational perspective.

Results The papers included in this special issue each involve direct and fully-integrated community-university partnerships and collaborations between academic and non-academic partners in scholarship and research. Reports emphasize the value of the applied nature of the work with a research agenda driven primarily by real-world health and social needs.

Conclusions There is growing acceptance of the need for transdisciplinary, community-university collaborative research approaches as a means to meet both the requirements posed by real-world problems as well as goals of advancing scientific knowledge and innovation. In this issue, readers will find papers that show the promise of rethinking existing conceptual frameworks to incorporate transdisciplinary approaches as a catalyst to addressing translational science questions related to the field of children and youth care.

Keywords Transdisciplinary · Translation science · Community-university research partnerships · Collaborative research · Youth health and wellness

This paper introduces a special issue on the application of transdisciplinary translational science to the enhancement of youth health and wellness. Authors were asked to

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submit manuscripts focused on translation science aimed at articulating conceptual frameworks, research methods, or strategies involving community-university partnerships that have promise for ‘enabling youth health and wellness,’ as well as programmatic research reviews, or research generated policy papers. Emphasis was placed on research partnerships that were transdisciplinary. While *interdisciplinary* research emphasizes the integration of perspectives, concepts, theories, and methods from different disciplines, *transdisciplinary* work specifically seeks to generate new frameworks, models, and methods that transcend disciplinary bounds, typically involving non-academic partners to ensure that the concepts and methods have utility in real-world settings. These salient characteristics of transdisciplinary research partnerships and collaborations readily lend themselves to the conduct of science focused on the translation of information gained through scientific research into knowledge that positively affects health-related practices and, ultimately, improves public health. For purposes of this special issue, this transdisciplinary approach to translational science will be labeled ‘transdisciplinary translational science.’

The papers in this special issue illustrate a rich diversity of community-university partnerships or collaborations serving to address key translation research functions highlighted in the literature, including advances through innovative partnership models, conceptual frameworks, research methods and intervention implementation strategies. Collectively, they reveal the promise of partnerships among academics and community-based collaborators that are innovative in both their collaborative approach and their practice-oriented methodologies. The papers each involve direct and integrated collaborations with non-academic partners in planning, implementation and/or evaluation. They demonstrate how the concepts and methods have utility in real-world settings and that the research agenda is driven by needs of relevant stakeholders or practitioners (Pohl 2011). As described below, they thereby address both of the two core challenges in translational research, infrastructure development (e.g., community-university partnerships and research networks) and scientific advances in translation research functions (see Spoth et al. 2013).

The Iowa State University Transdisciplinary Research Network (U-TuRN) was established to facilitate and support this type of community-engaged, transdisciplinary translational science and therefore provides an example of the transdisciplinary translational process and outcomes in which collaborative teams engage. In the next sections we will provide an overview of transdisciplinary translational science, describe U-TuRN’s guiding framework as a transdisciplinary translational science hub, and introduce the specific papers in the issue.

Defining Transdisciplinary Translational Science

Translational research generally describes research moving from basic to applied research settings and questions in order to address the implications of research relevance on daily life (Fort et al. 2017). All of the papers in this special issue focus on translational research and practice efforts in education, public health, and human services. As noted in a comprehensive literature review by Spoth et al. (2013), translational research in these contexts and settings often is labeled as Type 1 and Type 2 translation (also see Sung et al. 2003). Type 2 research has been defined as investigating “...the complex processes and mechanisms through which tested and proven interventions are integrated into practice and policy on a large scale and in a sustainable way, across targeted populations and settings.” (Spoth et al. 2013, p. 321). This type of translation research focuses on a range of translational

functions. That is, following translation-oriented intervention development and testing, research questions concerning the adoption, implementation and sustainability of interventions are addressed.

A *transdisciplinary* approach to translational science entails an integrative process whereby scholars or scientists and practitioners work collaboratively to develop and use novel conceptual and methodological approaches that *synthesize and extend* discipline-specific theories, methods, and translational strategies to yield innovative solutions to scientific and societal problems (see Stokols et al. 2013). Although translational research has long been part of the field of children and youth care, recognition of the added influence of transdisciplinary translational research innovation is more recent (e.g., Abrams 2006; Hall et al. 2012b). Our transdisciplinary translation science framework fosters the development of efforts to pursue the research agenda noted above on Type 2 translation functions, several aspects of which are illustrated by the papers in this special issue.

Overview of Transdisciplinary Research

There is growing acceptance of transdisciplinary, community-university collaborative research approaches as means to meet both the requirements posed by real-world problems as well as the goals of transforming scientific knowledge and innovation (Lang et al. 2012). Transdisciplinary research entails addressing questions related to systems (problem origin and interpretations as well as further development of a problem in the world), targets (identifying and explaining needs for change, desired goals and improved practices) and transformation (possible means of acting that aim to transform and optimize existing practices) (Pohl and Hirsch Hadorn 2007). As transdisciplinary research sets a foundation for research to be more societally relevant, it has specific utility for translational science realms of research such as those in the field of *child and youth care*.

Prominent publications in the field of transdisciplinary translational science have outlined key principles, considerations, research methods, and tools (e.g., Hirsch Hadorn et al. 2008; Lang et al. 2012; Pohl and Hirsch Hadorn 2007; Vogel et al. 2014). Further, specific steps to initiate transdisciplinary research are outlined as well as guidelines for research focused on sustainable development of evidence-based community practices (e.g., Pohl and Hirsch Hadorn 2007). In turn, transdisciplinary team-based science has been shown to increase translational research productivity (Hall et al. 2012a, b), yield more rapid and broader dissemination of research findings across multiple disciplines and fields (Stipelman et al. 2014), and produce practical applications as well as high impact scientific outcomes (Jordan 2006).

Yet transdisciplinary translational research also introduces unique challenges, including the added time and effort necessary to communicate with more diverse collaborators (Trochim et al. 2008; Cummings et al. 2013); varied perspectives, goals and assumptions when conducting research across multiple disciplines (Trochim et al. 2008; Eigenbrode et al. 2007); competing demands from researchers' organizational departments (Gehlert et al. 2014); natural tensions between scientists and practitioners (Spoth and Greenberg 2005); and potential delays in productivity or increased start-up time needed for teams to plan and work through existing challenges (Hall et al. 2012a, b; NASNAE 2005; Salazar et al. 2012; Stokols et al. 2013). However, these barriers can be effectively overcome through broad campus- or organization-based transdisciplinary translational research hubs that facilitate ongoing coordination and collaboration. Transdisciplinary translational research hubs are

able to engage, connect, and organize multiple stakeholders to target larger-scale problems and solutions than single research teams are capable of tackling independently. An example of the broad transdisciplinary translational science hub approach at Iowa State University is presented below. The U-TuRN network is a particularly relevant example as each of the eight papers in the current issue are authored by U-TuRN members or collaborators.

The Iowa State University Translational Research Network (U-TuRN) and Transdisciplinary Work Teams

The ISU Translational Research Network (U-TuRN) is a transdisciplinary translational research network committed to addressing the fundamental challenges that limit the translation of health and social sciences to practice. Based on membership surveys, U-TuRN membership currently consists of collaborators participating in some form of community-university partnership addressing one or more of the translation research functions noted above. Community-based efforts are conducted in wide-ranging settings (communities generally 37%, schools 21%, clinical settings 21%, worksites 5% as well as other settings 16%), and network project participants cut across the lifespan (adults 31%, older adults 19%, college students 15%, children 12%, adolescents 12%, preschoolers 8%, and infants 4%). The vision of U-TuRN is to *'enable healthy lives by empowering communities to take action informed by science.'* As a transdisciplinary translational research hub, U-TuRN works to (1) build and support the infrastructure needed to facilitate community-university partnerships, and (2) rigorously evaluate the adoption, implementation, and sustainability of partnerships and partnership-based practices to support lasting changes, thereby addressing the two core challenges in Type 2 translation research (Spath et al. 2013). A primary focus of the work is on approaches that build capacity in community settings to promote the adoption, implementation, and sustained application of evidence-based programs, practices and policies. In other words, the U-TuRN approach emphasizes transdisciplinary community-university partnerships involving researchers from multiple disciplines and community stakeholders to enable shared learning and to foster innovative outcomes. As shown in Fig. 1, the interactive contributions of transdisciplinary research teams and science-driven practice are central to sustainable community health impact.

U-TuRN includes representation from a diverse group of community-engaged faculty, staff, and students from an array of colleges, departments and disciplines on campus. Figure 1 illustrates the four teams that bring unique and complementary skills, expertise, and resources to the ISU Translational Research network. Each collaborative team, led by identified U-TuRN Team Science Leaders, has established activities and impact goals that support the team's collaborative work with community stakeholders. In a number of ways, the work of transdisciplinary research teams specified in the figure, along with translation-science driven practices (e.g., workforce trainings) and the dissemination of formative stage results through primary and secondary dissemination methods, lead to enhanced community and systems capacity (e.g., infrastructures to support EBIs, productive community-university partnerships) which, in turn, has contributed to the intended community health and well-being impacts. In this way, U-TuRN fosters collaboration on larger, more coordinated and more impactful agenda of translational research.

Team 1 (Community Health Systems and Workforce Development) works to extend and refine previously developed translation science and community-university partnership models (e.g., PROSPER), workforce training methods, and evaluation strategies to support

Fig. 1 University Translational Research Network (U-TuRN) for Transdisciplinary Translational Science and Sustainable Health Impacts. *Note* This figure is an updated version of the framework in the original University Translational Research Network proposal to Iowa State University’s Vice-Provost for Research, “‘Translational Research Network’: Building Bridges between Science and Practice.” (PIs: Welk, Weems and Spoth). *Based on a translation research framework and functions in the University Translational Research Network proposal, from a comprehensive Type 2 translation science literature review (Spoth et al. 2013). **EBI = evidence-based intervention

community health research in different settings and populations and for multiple behaviors. The team provides expertise on implementation science and support effective planning and evaluation of translational research by other collaborators. Team 1 approaches to transdisciplinary translational research allow for a variety of engagement avenues such as proposal writing and involvement in funding for cross-discipline initiatives, a dissemination and implementation science journal club, as well as a think tank for Team 1 member ideas, and an available platform for consultation or support to other U-TuRN members working to develop products in the areas of implementation science and translational research.

Team 2 (Intervention Development, Testing and Training) facilitates the development and utilization of effective behavior change interventions and techniques in translational research applications. This group provides expertise on behavioral change theories, appropriate

measures of theoretical constructs, and methods to develop and evaluate strategies to impact behavior change across a variety of settings. In addition, Team 2 works to leverage existing collaborations to connect healthcare systems and research programs in order to expedite and cultivate transdisciplinary research addressing questions related to health and behavioral health issues.

Team 3 (Health Information Systems, Monitoring and Evaluation) applies user-centered design approaches to build tools for merging, manipulating, and visualization of disparate sources of data in order to support a wide array of stakeholders (academic researchers, community residents, policy makers, health organizations) in making data-informed decisions that ultimately improve community health. The work of this team aligns with the general premise that data-supported decision making can improve decision-making outcomes. When provided with tools, non-scientists also are better able to explore and visualize information, which assists citizen stakeholders to engage and influence their communities. Team 3 is able to offer varying levels of support to other U-TuRN members and collaborators with the aim of enhancing the innovation of data infrastructure in real-world, user-friendly applications.

Team 4 (Community Outreach and Engagement) works to build capacity and awareness about community-engaged research. The team provides expertise on methods that university researchers and community partners can use to build transdisciplinary research relationships to foster the enhancement of campus-community engagement and to integrate science with practice. Team 4 supports engagement opportunities including hosting an Engaged Scholars Speaker Series, advising a university-wide, student-led Community Engagement Club, as well as offering and supporting the use of a broad-scale engagement and social networking platform for campus and community partners. This engagement platform allows U-TuRN members and collaborators to more independently and organically engage in collaborative partnerships with other U-TuRN partners, as well as to develop and extend to new collaborations with others in the broader community.

While each U-TuRN work team has a distinct realm of expertise, U-TuRN members collectively focus on four complementary objectives (Engaging Communities, Impacting Health, Advancing Science and Changing Systems). The translational hub allows members to flexibly dial up or down on their participation over time. In turn, a range of research projects contribute to these goals but the hub's transdisciplinary translational initiatives are centered around contributing to three fundamental research questions: (1) What factors influence health-related decision making at each level of the social ecological framework? (2) What factors influence the adoption, implementation and sustainability of evidence-based programming in practice? and (3) What strategies can be developed, refined and disseminated to impact health-related programs, policies and practices in different settings and populations? Translation science often is complex. U-TuRN's work and focus on translation infrastructure and evaluation, however, highlights how transdisciplinary translational science hubs allow for thoughtful and inventive solutions to complex issues. Subsequently, the work and success of U-TuRN as a translational research network hub deserves much credit for the collaborative discussions and thinking that led to this current special issue.

This Special Issue

The papers included in this special issue illustrate the impacts that community-university translation science teams can have as they move toward a transdisciplinary translation science agenda. Across papers, several common threads run through the narratives as each

addresses a range of issues central to translational science centered on health and well-being in youth. The included papers also illustrate the scope of methods (participatory methods, mixed methods) and study designs (e.g., iterative and staged design processes) necessary to answer Type 2 translation research questions in real-world community systems. This scope reflects a robust field of transdisciplinary translational research as the authors collectively answer translation science research questions utilizing the skills, experiences, and expertise of individuals from various sectors (e.g., university, community, schools, and government) and multiple disciplines (e.g., human development, food science, kinesiology, education, psychiatry, psychology, prevention science), involving participants from the full range of ages, from birth to emerging adulthood.

The authors highlight experiences consistent with previously identified core challenges of translational research such as barriers and successes in the development of translation infrastructures to support community-university partnerships and transdisciplinary teams, as well as how to feasibly and efficiently advance scientific understanding across the translation research functions. Regardless of unique nuances, many connections are evident in the lessons learned across projects. That is, the experiences of working teams represented by the special issue authors independently and collectively highlight several key considerations and research areas common to practice-oriented translation research. We will discuss collective lessons which the authors identify specific to the four translational functions: The *pre-adoption function* consists of factors and characteristics that impact the ultimate adoption of interventions (e.g., branding and promotion of the intervention, consumer preferences). The *adoption function* entails the decision making process and relevant factors (e.g., competing needs). The *implementation function* involves factors impacting the ultimate embedding of the intervention (e.g., training, technical assistance, and implementation quality). Finally, the *sustainability function* involves factors related to maintaining the implemented intervention over time (e.g., infrastructure, funding, institutionalization of the intervention). By way of introducing this issue's papers, in the section to follow we will anchor on (1) the types of research questions of focus as well as (2) the four key functions in Type 2 Translation research (i.e., *pre-adoption*, *adoption*, *implementation* and *sustainability*; see the TSci Impact Framework; Spoth et al. 2013).

Two articles address broad translational science questions as they examine program effectiveness through implementation of evidence-based interventions. Beecher and Van Pay (2021, this issue) report a project from a team including partners from a public library and non-profit agency as well as university researchers, examine the effectiveness of a universal prevention program delivered through public libraries. Program data are collected automatically, using innovative wearable technology, to provide data on the home language environments of families of young children (i.e., growth in parent talk and conversational turns). Vazou et al. (2021, this issue) examine the effectiveness of a web-based, teacher-led learning program that incorporates physical activity. The authors describe two studies in a series intended to gauge program effectiveness in increasing young children's cognitive and behavioral control in academic settings, in order to optimize learning and academic achievement. Each of these studies not only explore child-specific changes in outcomes, but also a range of implementation science questions (e.g., feasibility of program delivery in a new setting, implementation fidelity).

In addition, several of the included studies focus on specific aspects of implementation science across translational functions. Two studies explore factors influencing *implementation quality*. Espil et al. (2021, this issue) and Hughes-Belding et al. (2021, this issue) each examine aspects of program *fidelity* and the specific feasibility of fidelity measurement procedures *during implementation*. Espil et al. (2021, this issue) examine fidelity in

the context of implementing a school-based yoga and mindfulness intervention, with the objectives of adapting and refining measurement tools that could improve feasibility for community replications of the program. Hughes-Belding et al. (2021, this issue) examine *fidelity* and monitoring while implementing empirically-supported assessment strategies into the practices of home-visiting agencies providing direct services to young children with special needs. Lastly, as part of a broader study of implementation effectiveness (School Wellness Integration Targeting Child Health; SWITCH[®]; USDA-funded project; 2015-68, 001-23, 242), McLoughlin et al. (2021, this issue) use a mixed- methods approach to study specific *organizational/stakeholder characteristics* (i.e., the engagement and motivation of 4-H leaders to implement the intervention), contributing to understanding of key stakeholder values (i.e., intervention implementation is consistent with the leader's existing roles, provides connection to schools) which are related to increased engagement and motivation in implementation of a school-based intervention.

Finally, several papers address specific translational science questions or develop evidence-informed conceptual frameworks, planning, and policy recommendations with the intention of providing guidance to key stakeholders in the transdisciplinary translational research enterprise. Each of these articles have both broad policy implications as well as specifically recommend strategies to advance current practice within the community system of focus. Spoth et al. (2021, this issue) synthesizes an extensive, multidisciplinary literature (e.g., medicine, public health, education, psychology, and that specific to Extension professionals) to provide a conceptual framework for building the capacity of Extension across four domains (organizational development, professional development, strengthened culture of behavioral health, financial/resource development), for enhanced contributions to the resolution of behavioral health issues. The authors outline the unique position of the Cooperative Extension System to facilitate the translation process as well as illustrate approaches to broader dissemination of effective behavioral health practices through the Cooperative Extension System in collaboration with state and national partners, including proven community-university partnerships and a National Behavioral Health Extension Network. Tyler et al. (2021, this issue) describe the use of an evidence-informed framework intended to increase non-researcher familiarity with research activities, in order to promote increased involvement of non-researcher system partners in elements of translational research program processes and functions (e.g., program design, testing, implementation and sustainability). These authors examine the utility of this framework through the testing of an aftercare intervention for youth-departing residential programs. Rouse et al. (2021, this issue) collaborate with a non-profit organization established to champion positive youth development policies and practices supporting system-involved youth. These authors work to better understand the perspectives of system-involved youth through the findings of their mixed-methods study, in order to provide clear evidence-informed policy and practice recommendations to child welfare policy leaders and decision makers related to programming and needed supports for addressing the disproportionately high rate of unintended pregnancies and early parenting among youth transitioning from foster care.

Collective Lessons Specific to Translational Function

Pre-adoption/Adoption Several articles highlight *pre-adoption lessons* in their work. Beecher and Van Pay (2021, this issue) and McLoughlin et al. (2021, this issue) discuss ways that they *repackaged* their respective programs after initial piloting to improve *product positioning* (i.e.,

branding and promotion). Two papers also discuss the potential influence of *competing needs* on program *adoption and uptake*. Vazou et al. (2021, this issue) discuss how competing priorities to maximize academic instruction time in early education settings ultimately may impact the uptake of physical activity curriculums in early education classrooms; while Hughes-Belding et al. (2021, this issue) highlight the impact of limited time on the *adoption* of more effective, yet more time-intensive home visiting monitoring practices. Tyler et al. (2021, this issue) further illustrate the importance of understanding what key stakeholders *value or view as “evidence”* for EBIs over other interventions, highlighting that understanding the specific factors that predict the decision to adopt or not adopt an EBI may accelerate the ability for translational researchers to scale up effective treatments. Both McLoughlin et al. (2021, this issue) and Spoth et al. (2021, this issue) describe examples of *information dissemination networks for EBIs*, acknowledging the impact that stakeholder networks may have on EBI-related decision making, as well as how disseminated information about the EBI is ultimately used by stakeholders to make decisions regarding EBI adoption, implementation and sustainability.

Implementation Most papers focused on primary research questions related to factors influencing implementation. More specifically, primary questions centered on the impact of specific characteristics or factors influencing implementation quality, such as provider and organizational characteristics (e.g., McLoughlin et al. 2021, this issue) and specific elements of implementation of EBIs that may impact implementation quality, such as intervention fidelity (Beecher and Van Pay 2021, this issue; Espil et al. 2021, this issue; Hughes-Belding et al. 2021, this issue; Vazou et al. 2021, this issue). These studies suggested additional ways to adapt or incorporate these elements into intervention design, as they examine the optimal doses and modality of training, as well as technical assistance necessary for successful implementation.

Sustainability Though not the primary research focus of the included articles, sustainability planning was an ongoing consideration in the packaging of programs across community systems as well as the development of study methods and designs. Several articles explicitly discussed considerations and strategies used with the intention to build capacity and further integrate programs into existing systems. In doing so, they collectively suggest several of the commonly considered sustainability outcomes such as examining *continued participant benefits, program activities, community-level partnerships, organizational practices, ongoing attention to the problem, and diffusion of the intervention* following the end of their initial training and implementation initiative. Some authors examined considerations of long-term feasibility of specific intervention components and procedures (e.g., Espil et al. 2021, this issue; Hughes-Belding et al. 2021, this issue; Vazou et al. 2021, this issue). Other authors discussed rather detailed plans for sustainability and scalability of EBIs more generally, such as McLoughlin et al. (2021, this issue) and Spoth et al. (2021, this issue) who both build rationales for broad dissemination of effective behavioral health practices through the Cooperative Extension System, suggesting the importance of coordinated prevention translation efforts. To that point, they propose working collaboratively with the extension system to investigate the structures, strategies, policies and resources necessary to create sustainable change. Moving towards a transdisciplinary translation science agenda, these authors ultimately are able to delineate ways that current programming be enhanced and suggest key areas that supporters should understand in order to better serve youth.

Conclusion

Transdisciplinary teams have potential to serve as catalysts in moving forward translation research and practice in the field of child and youth care. This work is extremely timely since there continues to be an increasing trend towards the integration of evidence-based practice requirements into social, welfare, and health policy systems across the U.S. Overall, a broad research agenda is needed to address the various intervention development, adoption, implementation and sustainability complexities natural to intervening in dynamic, multi-level community practice systems. The eight articles included in this issue illustrate broad uses of translational science teams in practice, each demonstrating transdisciplinary ways to propel the real-world impact of their work. The authors describe key enablers and barriers or challenges in their work highlighting the need for transdisciplinary translational research hubs such as U-TuRN to create new possibilities, innovative theories or models, and novel methods while speeding up the research to practice cycle.

There is great potential in applying transdisciplinary translational science approaches to increasingly greater numbers of sectors and practices of *child and youth care*. In many ways, transdisciplinary teams should be well suited to take on ‘research with practice’ questions which are complex and ultimately require innovative approaches that move past previously applied strategies. Similarly, translational science is a field with many questions ideally resolved through community-university partnerships across scientific domains and collaborators. As the translation science agenda continues to be advanced, new research work teams and questions will challenge the child and youth care field to expand our horizons for the benefit of children, youth, and their families.

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Compliance with Ethical Standards

Conflict of interest The authors declare no conflicts of interest.

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