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# URBAN HEALTH AND SOCIETY

Interdisciplinary  
Approaches to  
Research and Practice

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# CHAPTER



# TRANSDISCIPLINARY ACTION RESEARCH ON TEEN SMOKING PREVENTION

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## LEARNING OBJECTIVES

- Describe and compare the three types of interdisciplinary collaboration within action research teams: (a) scientific collaborations among research investigators, (b) community problem-solving coalitions in which researchers work with community members to translate scientific knowledge into community problem-solving strategies, and (c) intersectoral partnerships involving representatives of organizations who work together to reduce health problems.
- Identify organizational and individual factors that facilitate or impede interdisciplinary collaboration among different constituencies.

- 4 Describe the value of interdisciplinary action research to reduce the health problems associated with tobacco use.
- 5 Discuss the strategies the Tobacco Policy Consortium used to overcome the organizational problems it encountered.

## INTRODUCTION

This chapter presents a case study of transdisciplinary (TD) action research involving a consortium of tobacco scientists at the University of California, Irvine, and community decision makers based in Orange County, California. The participants in this university-community partnership focused their efforts on the growing problem of adolescent tobacco use in urban and suburban settings. The members of this *Tobacco Policy Consortium* (TPC) collaborated closely over a two-year period to produce and disseminate an evidence-based *Research and Policy Brief on Preventing Youth Smoking*.<sup>1</sup> In the ensuing sections of the chapter, we (a) discuss key principles of TD action research and present a selective review of recent literature on TD collaboration in scientific and community settings; (b) describe the goals, organization, and collaborative activities of the TPC; (c) summarize the observational, interview, and survey research methods that were used to study processes of TD action research over the course of the TPC project; (d) present empirical findings concerning important factors that either facilitated or constrained effective collaboration among TPC members; (e) summarize "lessons learned" from the TPC study; and (f) suggest potentially useful research directions that could serve to strengthen the science and practice of transdisciplinary action research in future years.

## REVIEW OF TRANSDISCIPLINARY ACTION RESEARCH

Transdisciplinary (TD) action research comprises at least three kinds or phases of collaboration: (a) *scientific collaborations* among research investigators, (b) *community problem-solving coalitions* in which researchers work with community members to translate scientific knowledge into community problem-solving strategies, and (c) *intersectoral partnerships* involving representatives of organizations situated at local, state, national, and international levels, who work together to improve environmental, social, and health problems.<sup>2</sup> The two-year TPC offered participant observers a unique vantage point from which to investigate and evaluate the processes and outcomes of TD action research.

In the 1940s, Lewin<sup>3</sup> called upon fellow psychologists to engage in "action research," or efforts to apply scientific research and knowledge to the resolution of societal problems. As Stokols<sup>2</sup> noted, Lewin believed that psychologists should apply their scientific expertise to the analysis and amelioration of community problems such as racial prejudice and public health problems. Lewin inspired many psychologists to embrace the tenets of action research in their own work, although the vast majority of

behavioral scientists rather than under-

During the 1960s, the major concerns about environmental degradation, and the need for focused research on environmental policy expanded rapidly. The participation of members in the research was quite daunting and conflicting experiences were quite common. The research was organized by Sommer and others, with participants in the research and engineering disciplines working together to solve a problem. It is contrary to the traditional approach of basic scientists who work in isolation. The discussion between the researchers was a key part of the best methods for solving the problem.

Scholars soon realized that a new approach was needed to be developed. Working relationships between researchers and community members (Stokols<sup>2</sup>) built upon Lewin's work, primarily on psychological and organizational levels. Stokols' work on collaboration in environmental settings is a major theme. It focuses on the interaction between different fields, community members, and sectors of society. It also gives explicit attention to the role of TD collaboration in solving environmental problems. TD collaboration among researchers and community members is a key part of the best methods for solving the problem.

## TRANSDISCIPLINARY ACTION RESEARCH

As noted earlier, transdisciplinary action research is a form of collaboration that goes beyond purely scientific collaboration. It involves the formation of novel conceptual frameworks and the development of *community problem-solving coalitions* in which researchers and community members work together to translate scientific knowledge into community problem-solving strategies. It also involves the formation of *intersectoral partnerships* involving representatives of organizations situated at local, state, national, and international levels, who work together to improve environmental, social, and health problems.

behavioral scientists continued to pursue more experimental, laboratory-based studies rather than undertake research for purposes of resolving social problems.

During the 1960s and 1970s, psychologists were confronted by growing societal concerns about overcrowding, the depletion of natural resources, environmental degradation, and racial violence in cities like Detroit, Newark, and Los Angeles. Problem-focused research in fields such as environmental, ecological, and community psychology expanded rapidly, and collaborations among behavioral scientists and community members ensued in an effort to ameliorate social and environmental problems.<sup>4-6</sup> Yet, participants in these university-community coalitions found the collaborative process to be quite daunting.<sup>7-8</sup> Among the challenges they faced were team members' divergent and conflicting expectations and goals. Psychologists seemed to be prepared only to educate community members about their findings in short-term collaborations, characterized by Sommer<sup>9</sup> as the "hit and run" model of community partnering. Researchers participating in these coalitions seemed to rely heavily on a model commonly used in science and engineering—that is, take scientific findings and then unidirectionally apply them to solve a problem (without much input from the community partners). This model is contrary to the ideals of community-based participatory research in which university-based scientists work closely and reciprocally with community members (with ongoing discussion between researchers and community partners) to understand and discover the best methods for solving a social problem.<sup>10</sup>

Scholars soon realized that more effective strategies for facilitating action research needed to be developed, especially those that promote nonhierarchical and equitable working relationships among community members and university-based scholars.<sup>11-14</sup> Stokols<sup>2</sup> built upon Lewin's original conceptualization of action research, which focused primarily on psychological science and did not give explicit attention to the logistical and organizational challenges associated with interdisciplinary and/or interprofessional collaboration. Stokols' conceptualization of the science of TD action research has two major themes. It encompasses scientists who are trained in and working in different fields, community decision makers and practitioners, and representatives from multiple sectors of society (e.g., education, public health, academia, local and state government). It also gives explicit attention to the empirical study of factors that facilitate or impede TD collaboration toward the goal of enhancing the effectiveness of ongoing and future collaboration among scientists and nonacademicians.<sup>15</sup>

## TRANSDISCIPLINARY ACTION RESEARCH CYCLE

As noted earlier, transdisciplinary action research incorporates at least three kinds of collaboration that occur sequentially over different phases—namely, those involving purely *scientific collaborations* aimed at creating new intellectual products such as novel conceptual frameworks and empirical knowledge; *community problem-solving coalitions* in which researchers from different fields work closely with community members to translate scientific evidence into interventional programs aimed at reducing societal problems; and *intersectoral partnerships* involving representatives of

community organizations situated at local, state, national, and international levels, all of whom work together to integrate their expertise drawn from multiple disciplines and professions to design and implement broad-gauged policies for improving environmental, social, and public health outcomes.<sup>2</sup>

Scientific collaborations emphasize the *discovery* of new knowledge, whereas community coalitions and intersectoral partnerships place greater emphasis on the *translation* of scientific findings into new programs and policies for improving community health. When considered together, these different forms of collaboration comprise inter-related facets and sequential phases of a *transdisciplinary action research cycle*.<sup>2</sup> During this cycle, purely scientific collaboration occurs at the outset, often followed by university-community coalitions that translate research findings into evidence-based practices and policies; these, in turn, evolve into broader intersectoral partnerships aimed at designing, implementing, and evaluating evidence-based health promotion policies spanning local, regional, national, and international levels as well as multiple sectors of society. Participants working at each level of a transdisciplinary action research project must coordinate their respective efforts to foster the development of scientific innovations that are translated into social change and health-improvement policies. The different forms and phases of TD action research have been investigated independently, but they have not been conceptually well linked as part of an integrative cycle encompassing multiple phases.

Studying and fostering the TD action research cycle is particularly timely. Societal interest and investment in conducting problem-focused TD research have grown dramatically over the past decade.<sup>16-20</sup> Public agencies and private foundations have come to the realization that many of society's most vexing environmental and social problems require large-scale interdisciplinary teams of scientists to create innovative strategies for ameliorating those problems. Large-scale research networks and centers have been established to investigate topics such as tobacco use, obesity, and environmental correlates and causes of disease. These pervasive health and social problems are seen as insoluble through unidisciplinary research. Instead, the development of effective strategies for resolving societal problems will likely require large-scale collaboration among scientists trained in multiple fields working in concert with community decision makers.

Examples of TD science and training centers established over the past ten years include initiatives such as the Transdisciplinary Tobacco Use Research Centers (TTURC) and Transdisciplinary Research on Energetics Center (TREC) as well as the Centers for Excellence in Cancer Communications and Research (CECCR), the Centers for Population Health and Health Disparities (CPHHD), and the Clinical Translational Science Centers (CTSC), which are funded by government agencies such as the National Cancer Institute, the National Institute on Drug Abuse, and the National Center for Research Resources.<sup>21-25</sup> Similarly, nonprofit organizations such as the Robert Wood Johnson and Keck Foundations have launched large-scale initiatives to promote TD collaboration in science, training, and the translation of knowledge into evidence-based practices and policies.<sup>26,27</sup>

The substantial foundations to establish that TD collaboration can yield the benefits often are as follows:

1. The higher level of evidence relative to research
2. Higher levels of evidence through a trial
3. Greater opportunity for dissemination likely to trigger policy changes that are inherent
4. The resolution of issues that require a scientific conclusion

To date, the situation of collaboration among researchers is reported in a systematic analysis, and empirical studies have identified several factors for facilitation, including the role of social capital among researchers. Empirical case studies identify antecedents to interdisciplinary scientific collaboration, but also across the disciplines and community-based practice.

## TRANSLATING TO COMMUNITY II

An opportunity to illustrate the UC Irvine Transdisciplinary Tobacco Use Research Center.<sup>1</sup> To illustrate the translation of research into practice, ensure that the Transdisciplinary Tobacco Use Research Center authors of this paper have been instrumental in the creation and tracking of the Transdisciplinary Tobacco Use Research Center. Established in 2003, the Transdisciplinary Tobacco Use Research Center partnership comprises

The substantial investments that have been made by public agencies and private foundations to establish large-scale team science initiatives is based on the assumption that TD collaboration is valuable at both scientific and societal levels. Among the benefits often ascribed to TD research, training, and translational initiatives are the following:

1. The higher levels of explanatory power afforded by cross-disciplinary theories relative to reductionist analyses rooted in singular disciplinary perspectives;<sup>28, 29</sup>
2. Higher levels of convergent and discriminant validity that can be achieved through a triangulation of methods and multiple methodologies;<sup>30</sup>
3. Greater opportunities for developing broad-gauged public policies that are less likely to trigger unintended adverse consequences due to the gaps in knowledge that are inherent in monodisciplinary perspectives;<sup>31</sup>
4. The resolution or reduction of complex community health and social problems that require a generalist orientation characterized by the integration of multiple scientific conceptual and methodological approaches.<sup>32</sup>

To date, the situational circumstances that facilitate or impede effective TD collaboration among researchers and community members have not been widely studied or reported in a systematic fashion. However, some retrospective accounts, conceptual analyses, and empirical case studies have been published.<sup>13, 14, 33-37</sup> These studies have identified several factors that influence the effectiveness of transdisciplinary collaboration, including the breadth and diversity of collaborators' fields, the cultivation of social capital among team members, and the interdependence of team members' goals. Empirical case studies, like the one described in this chapter, are especially needed to identify antecedents and processes that facilitate or hinder positive outcomes of transdisciplinary scientists' efforts to collaborate not only across disciplinary boundaries but also across the diverse professional fields and perspectives represented among their community-based partners and within multiple sectors of society.

## TRANSLATING TRANSDISCIPLINARY RESEARCH INTO COMMUNITY INTERVENTION AND POLICY

An opportunity to implement TD action research arose following the completion of the UC Irvine TTURC, a five-year NIH-funded Transdisciplinary Tobacco Use Research Center.<sup>1</sup> The Robert Wood Johnson Foundation funded an initiative to facilitate the translation of transdisciplinary tobacco research into tobacco control policy to ensure that the TTURC research would ultimately impact public policy. Some of the authors of this paper (who were TTURC researchers) decided to participate and lead the creation and tracking of the UC Irvine (UCI) Tobacco Policy Consortium (TPC). Established in 2003, the two-year TPC was a university-community collaborative partnership comprised of UCI tobacco use researchers (all faculty members of the

TTURC) and community decision makers, including schoolteachers, school administrators, representatives of government agencies, and directors of nonprofit organizations and private foundations.

Our approach to translating tobacco research into public policy initiatives included organizational strategies focusing on both intellectual and social integration. The findings from earlier studies of scientific collaboration<sup>11, 38, 39</sup> highlight the substantial influence of interpersonal processes on the effectiveness of scientists' efforts to integrate their diverse perspectives and research ideas. Stylistic, cognitive, and status-related differences between researchers and community members can derail a collaboration. Altman<sup>11</sup> discusses a variety of circumstances that can strain relationships between researchers and community members. In general, academics and community collaborators may have different, or even clashing, worldviews, values, and time orientations. Community decision makers tend to require much less data and information before committing to action, and they prefer a shorter time frame for taking action. Community decision makers want to work with information that they can use more immediately to change policies and programs.

Furthermore, a major impediment during the early and later stages of university-community collaborations is perceived status differences between researchers and community members.<sup>11</sup> To achieve more effective, sustained collaborations, status differentials and other potential barriers to effective communication need to be confronted and resolved. Without recognizing and removing these communication barriers, conflict can escalate and impede the productivity of the collaboration.

Conflict appears to be an inherent feature of collaboration, and many scholars have argued that it is a normal prerequisite for achieving collaborative success. Tuckman's storming model<sup>39</sup> describes the role of conflict in small groups as they go through the following developmental stages: forming, storming, norming, and performing. When group members join together (usually as strangers), the group begins by "forming" and orienting to one another and getting to know more about other members. The second stage is the "storming" stage when groups experience conflict and polarization around interpersonal issues (e.g., status resentment and power imbalances), and group members may respond emotionally, rather than rationally, when working on tasks. The "norming" stage occurs when cohesiveness develops, along with an in-group feeling. In this stage, new status roles and performance standards are set. "Performing" is the final stage when group members channel their energy into completing tasks. The group's main issues of structure, leadership, and norms are resolved so that participants can work together more effectively. According to Tuckman, groups may repeat these stages at any point.

Both Altman's and Tuckman's conceptual models, outlined above, informed the programmatic strategies adopted by the Tobacco Policy Consortium. Also, empirical findings from Fuqua<sup>33</sup> suggested that conflict impedes effective, smooth-running collaboration. In the study of two groups of tobacco researchers from the TTURCs, the group with minimal conflict was more effective in achieving positive research outcomes than the group with a great deal of conflict, as described elsewhere.<sup>33, 36</sup> The conflicted

group had a general nonconflicted group. essential condition f Nonetheless, it seem: help a group move to Note that Tuckman's out some initial "sto group that never real

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**TABLE 3.1.**  
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group had a general social climate that was more formal and more negative than the nonconflicted group. In general, it is unclear whether a positive social climate is an essential condition for successful intellectual integration and intellectual products. Nonetheless, it seems that positive social integration following a "storming" phase can help a group move toward the "norming" stage and, eventually, a "performing" stage.<sup>39</sup> Note that Tuckman's<sup>39</sup> model implies that simply having a positive social climate without some initial "storming" could be an indicator of a complacent, underperforming group that never realizes its full potential.

Collaborations seem to vary along at least two dimensions: social integration and intellectual integration.<sup>36,37</sup> As shown in Table 8.1, the low and high levels along these dimensions suggest four types of collaboration: high social integration and high intellectual integration; low social integration and low intellectual integration; high social integration and low intellectual integration; and low social integration and high intellectual integration. The TPC was designed to support both social and intellectual integration of ideas between university researchers and community members with the goal of achieving high levels on both dimensions.

Specifically, the TPC conferences among university researchers and community practitioners were structured to encourage several facets of social integration, including informality, friendliness, building consensus, and mutual trust. Ample time was allotted for introductions among people, unstructured (and structured) discussion, and informal communication during meetings, breaks, and meals. In summary, both the intellectual and social components of the TPC were designed to maximize the potential for intellectual integration of policy ideas and to minimize the potential for any damaging interpersonal conflict. Details of the study design follow.

The next sections provide a summary of the intellectual components of the TPC and the methods with which collaborative processes and outcomes were empirically assessed.

**TABLE 8.1. Types of Collaboration Reflecting Different Levels of Social and Intellectual Integration among Participants**

		Intellectual integration	
		Low	High
Social integration	Low	Social and intellectual nonintegration	Asocial intellectual integration
	High	Social support without intellectual integration	Socially supported intellectual integration

### Applying Transdisciplinary Action Research Principles to the Design of Collaborative Conferences

Seven half-day conferences were organized over two years at University of California, Irvine (UCI) to identify ways of translating university-based research into innovative tobacco control policies and programs. At the conferences, UCI TTURC scientists presented their research to participating community members and led discussions about how their research might be translated into effective strategies for preventing teen smoking. For example, one group of researchers presented data about critical periods during early adolescent rat brain development indicating that animals are more susceptible to developing nicotine addiction during adolescence than during early childhood or later adulthood. Other research was presented that examined the physical, social, affective, and dispositional contexts of adolescent smoking behaviors. As part of that research, teens answered questions regarding where, when, and with whom they smoke, as well as regarding their mood states before and after smoking. Anger and depression were reported to be positively related to smoking urges among adolescents. The researchers suggested that prophylactic pharmacotherapy for treating anger and depression (e.g., administering medications to nicotine-susceptible youth) could protect against future tobacco use, especially among adolescents with attention deficit hyperactivity disorder (ADHD) who may be medicating themselves with tobacco products.

During conferences 1, 2, and 3, participants introduced themselves, and overviews of university tobacco research and U.S. tobacco control policies were presented. A large portion of conference time was reserved for discussing the significance of the research as well as for brainstorming possible tobacco control strategies aimed at reducing adolescent substance use. During conferences 4 and 5, four TPC subgroups, comprised of diverse researcher and community member participants, were tasked with developing new strategies for reducing adolescent tobacco use. Drawing on earlier research and their professional expertise, members of each subgroup spent a majority of their time talking about possible tobacco control strategies, refining their ideas, and later presenting their strategies to the consortium at large. Following conference 5, the consortium staff compiled a Program Appraisal Survey designed to measure participants' reactions to and relative preferences for the four tobacco policy proposals that emerged from the subgroup discussions.

During conference 6, consortium participants evaluated the various proposals. Certain disagreements about the proposed policy initiatives surfaced with some consortium members opting out of further meetings. For example, the possibility of administering prophylactic medications to reduce adolescents' susceptibility to nicotine addiction prompted vigorous debate. One group advocated giving adolescents various kinds of psychotherapy and pharmacotherapy, whereas another group strongly disagreed with ever providing adolescents with any type of tobacco control medications. Following conference 6, some consortium members expressed their discouragement about these disagreements. The consortium staff developed a proposal for a seventh conference with the goal of regaining the consortium's collaborative momentum. Ultimately,

conference 7 was held with consortium members: (a) tobacco policy effort and refinement state, and national policy use and control.

Discussions at the conference were facilitated by and included consortium members. A diverse array of consultants and teachers from the offices of the consortium, were captured in the discussion, attitude questionnaires,

### Tracking the Impact of Collaborative Assessment of the Process

Assessments were conducted including the attitudes of the project. There were *control strategies* (workshops) and (b) members they engaged in over time, descriptive measures, descriptive evaluate collaborative

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**Perspectives on Transdisciplinary Collaborative** Transdisciplinary Collaborative individuals' values and attitudes work, I typically incorporate are different from my with items such as "I perspectives from field will exists among the

conference 7 was held and two tobacco control initiatives were endorsed by consortium members: (a) the creation of a Grants-in-Aid program, providing funds for local tobacco policy efforts that reflected consortium members' ideas and (b) the development and refinement of a research and policy brief geared toward informing local, state, and national policymakers about recent scientific findings related to teen tobacco use and control.

Discussions at many of the conferences generated comments about the important facilitators of and impediments to tobacco control. Participants' conversations focused on the relevance of the scientific research to the unique tobacco policy concerns of consortium members. As described in greater detail later, consortium members included a diverse array of community practitioners ranging from middle and high school principals and teachers to the leaders of nongovernmental organizations and staff members from the offices of local elected officials. Members' attitudes and thoughts about the links between scientific research and public policy, and about their collaboration in general, were captured using a variety of assessment methods, including participant observation, attitude questionnaires, and personal interviews.

### **Tracking the Intellectual and Social Developments: Assessment of the Collaboration**

Assessments were conducted regularly to record specific collaborative processes, including the attitudinal shifts that occurred among TPC members over the course of the project. There were two foci of assessment: (a) members' *attitudes toward tobacco control strategies* (which were suggested and refined by members during the conferences) and (b) members' *shifting attitudes and reactions to the collaborations* that they engaged in over seven half-day conferences. Several new quantitative and qualitative measures, described next, were developed and administered at repeated intervals to evaluate collaborative processes and outcomes.

**Collaborative Activities Index** The Collaborative Activities Index includes seven items to assess how often individual consortium members engage in cross-disciplinary activities such as attending conferences outside their respective disciplines, obtaining new insights into one's own work through discussion with individuals from other fields, and establishing new links with colleagues from different disciplinary orientations that may lead to future collaborative work. The response options range on a 7-point scale from "never" to "weekly."

**Perspectives on Transdisciplinary Collaboration** The seven-item Perspectives on Transdisciplinary Collaboration Scale includes 5-point Likert scales that assess individuals' values and attitudes toward transdisciplinary collaboration (e.g., "In my own work, I typically incorporate perspectives from fields and disciplinary orientations that are different from my own"). The scale also assesses attitudes toward the UCI TPC, with items such as "I believe that UCI TPC members are open-minded considering perspectives from fields other than their own" and "I believe that a high level of goodwill exists among the members of the UCI TPC."

**Perspectives on Scientific Research and Professional Practice** The Perspectives on Scientific Research and Professional Practice Scale includes semantic differential scales that ask one subgroup (community members) to indicate their impressions of the other subgroup (research scientists), and vice versa. To gauge members of the two subgroups' impressions of each other, scale items include pairs of bipolar adjectives such as idealistic-realistic, arrogant-humble, and patronizing-respectful.

**Perspectives on Tobacco Control Strategies** The Perspectives on Tobacco Control Strategies Scale assesses respondents' reactions to alternative tobacco control strategies, many of which were suggested by consortium members. The first section includes twenty-one strategies such as "pay organizations to ban/limit tobacco use," "provide medication to youth to curb their smoking," "alert parents to their child's tobacco and other substance use," and "utilize teachers to administer an adolescent tobacco use prevention intervention." Participants are asked to rate their receptivity to each strategy on a 5-point scale ranging from 1 ("not at all receptive") to 5 ("very receptive").

The second section assesses consortium members' perceptions of the barriers to and facilitators of various tobacco control strategies. Participants read descriptions of several tobacco control strategies and are instructed to rate the extent to which each strategy was feasible, effective, beneficial, favorable, and likely to have negative effects on a set of 5-point Likert scales. Participants also are prompted to write in any beneficial or detrimental consequences they think might be associated with each of the alternative tobacco control strategies.

**Program Appraisal Survey** The Program Appraisal Survey assesses consortium members' attitudes toward the four tobacco prevention initiatives that were proposed, discussed, and refined by consortium members during previous conferences. The theoretical framework for the survey is derived from affective-cognitive consistency theory.<sup>40</sup> The theory describes how the perceived benefits and costs associated with a particular concept (e.g., a tobacco control policy such as imposing a cigarette sales tax) combine to determine an individual's overall attitude toward the concept. By assessing how negatively or positively an individual feels about potential outcomes linked to a particular concept as well as how likely those outcomes are, a numerical index of the respondent's overall attitude toward a concept (e.g., cigarette tax) is derived. For example, a potential outcome of "increasing sales tax" might be "the emergence of a strong tobacco black market." An individual may feel that such an outcome is unlikely but so undesirable that he or she develops a strongly negative attitude toward the concept of increasing cigarette taxes.

On the Program Appraisal Survey, individuals are instructed to read and evaluate four 1–2 paragraph consortium-generated proposals and action plans. A sample proposal is "to develop and implement an anger management/hostility reduction/bullying reduction program based on an existing nationally recognized exemplar program and determine its effectiveness for reducing alcohol, tobacco, and other substance use." After reviewing each proposal, respondents assess the likelihood and desirability of potential short-term outcomes (e.g., easy for program administrators to implement),

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**Data Collection Sch**  
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TABLE 3.2.

Measure

Collaborative activities  
index

Perspectives on  
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intermediate-term outcomes (e.g., increased program funding), and long-term outcomes (e.g., reduction in risky behaviors). Respondents rate the likelihood of each outcome on a scale ranging from 1 to 7 with 1 being "very unlikely" and 7 being "very likely." They also rate the relative desirability of each outcome on a scale ranging from -7 being "very undesirable" to +7 being "very desirable."

**Interim Interview Questions** Individualized interviews were conducted with consortium members by phone or in person at participants' respective offices during the interim periods separating the seven half-day conferences. The qualitative interview questions are designed to assess participants' attitudes toward several topics, including the quality of TPC members' collaboration, personal attributes of their fellow collaborators, particular tobacco control strategies, and potential barriers to and facilitators of tobacco control strategies. Some questions are highly open-ended, such as, "Thinking back on the first conference, what stands out in your memory?" Other questions are more specific to factors influencing tobacco control strategies, such as, "What are the most important barriers to implementing tobacco prevention programs and policies at your local schools/community?" Other questions assess participants' goals and motivations, such as, "At this point in the project, what are you hoping to get out of your involvement? What's going to keep you interested and involved?" Questions about the collaboration include "Has your attitude about this project changed since you first heard about it (neutral, more negative, or more positive)?" and "Has your comfort level interacting with UCI researchers increased, decreased, or stayed the same?" For the latter question, community members are asked about "UCI researchers," and UCI researchers are asked about "community members."

**Data Collection Schedule** Measures were administered at various times during the seven conferences and in the interim periods between conferences (Table 8.2).

**TABLE 8.2. Data Collection Schedule**

Measure	Purpose	Dates administered
Collaborative activities index	Investigation of individuals' cross-disciplinary and collaborative activities	3 time points: Conference 1, 4, 6
Perspectives on transdisciplinary collaboration	Assessment of thoughts about the consortium and about transdisciplinary collaboration in general	4 time points: Conference 1, 6, and 2 interim time points

(Continued)

TABLE 3.2. (Continued)

Measure	Purpose	Dates administered
Perspectives on scientific research and professional practice	Rating of impressions of consortium members (i.e., "researchers" and "community members") using semantic differential scales	5 time points: Conference 2, 4, 6, and Professional Practice and 1 interim time point
Perspectives on tobacco control strategies	Investigation of receptiveness to 21 tobacco control strategies to understand barriers and facilitators of tobacco control	4 time points: Conference 1, 6, and 2 interim time points
Program appraisal survey	Evaluation of attitudes toward four consortium-generated tobacco prevention initiatives, including assessment of the desirability and likelihood of potential outcomes of each initiative	Conference 5
Open-ended interim interviews	Assessment of attitudes toward the consortium, transdisciplinary collaboration, tobacco control strategies, barriers, and facilitators	Between all conferences

### FACTORS FACILITATING OR IMPEDING COLLABORATION AMONG TPC MEMBERS

An analysis of the antecedent factors that facilitated or constrained collaboration, as well as the processes and tangible outcomes that occurred over the course of the collaboration, is presented next. This analysis, informed by our empirical case study of the TPC, may help shed light on ways to enhance collaboration effectiveness in future university-community partnerships. Our study of the TPC revealed a number of *antecedent* factors (situational circumstances that were in place at the outset of the collaboration) as well as ongoing collaborative *processes* (which occurred

over the course of the collaborative *outcomes* or pro

#### Antecedent Factors

**Initial Outlook** Over an *enthusiastic outlook*, members of the group consistently positive attitudes (ward directions) and occasional expressions were selected for membership social climate. The community members who were invited to join them in prior years (e various nonprofit health selection and invitation and participate in the was expected of them

At the same time five initial outlook. In a more negative and pessimistic that they had not achieved near the end of the project sixth conference, were majority members of the community members the sixth conference were members following the selection arisen because, during Research and Policy Implementation circulate the brief to local national levels. They remaining project funding prevention programs ;

**Disciplinary and Professional** membership composition UCI TTURC center, various disciplines ranging from disciplinary perspectives diverse researchers trying

over the course of the two-year TPC project) that may have influenced the collaborative *outcomes* or products of the consortium.

### Antecedent Factors

**Initial Outlook** Overall, TPC members demonstrated a rather *friendly, optimistic, and enthusiastic outlook toward the collaboration and fellow team members*. Participants were impressed with the expertise, energy, and wealth of knowledge possessed by the members of the group. Survey data indicated that members generally maintained a consistently positive attitude (with some fluctuations over time in both upward and downward directions) and a shared commitment to the TPC collaboration punctuated by occasional expressions of conflict and tension. Perhaps the ways in which individuals were selected for membership in the TPC contributed to the group's generally positive social climate. The consortium coordinator handpicked several community members who were invited to join the TPC based on her positive collaborative experiences with them in prior years (e.g., as fellow employees of the Irvine Unified School District and various nonprofit health promotion organizations in Orange County, California). This selection and invitation process may have strengthened the group's willingness to attend and participate in the seven half-day conferences of the TPC and to accomplish what was expected of them during those meetings.

At the same time, all members throughout the TPC project did not sustain a positive initial outlook. In fact, at the sixth conference, many community members expressed a more negative and pessimistic view (particularly when they left the conference feeling that they had not achieved implementable action plans or other major accomplishments near the end of the project period). These negative feelings, expressed at the end of the sixth conference, were corroborated in follow-up interviews conducted with community members of the TPC between the sixth and seventh conferences. Interestingly, community members' negative appraisal of the TPC's accomplishments following the sixth conference was replaced by a more optimistic evaluation of the team's achievements following the seventh and final conference. The more optimistic view may have arisen because, during their final meeting, TPC members reviewed and approved a Research and Policy Brief on Preventing Teen Smoking and agreed on plans to widely circulate the brief to legislators and health promotion organizations at local, state, and national levels. They also agreed to establish a TPC Grants-in-Aid Program with the remaining project funds to help support local community efforts to implement smoking prevention programs aimed at reducing tobacco use among adolescents.

**Disciplinary and Professional Scope** The TPC collaboration was established with a membership composition representing a diversity of disciplines and professions. The UCI TTURC center, which spawned the TPC, encompassed a broad array of scientific disciplines ranging from neuroscience to health policy research. This breadth of disciplinary perspectives within the UCI TTURC created difficulties and challenges for diverse researchers trying to work together across multiple disciplinary boundaries.<sup>35, 37</sup>

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When the multidisciplinary members of the TTURC joined forces with even more diverse professionals from the community to establish the TPC, collaborative challenges became even more pronounced. School principals, politicians' staff, funding agents, police officers, medical doctors, and others found themselves trying to understand each other's jargon, values, working styles, and goals. TPC members did not share the same language. For example, statistical methods for analyzing survey data and terms such as *psychopharmacogenetic* approaches to studying nicotine addiction were unfamiliar to many community-based members of the TPC. As another example, when a UCI tobacco scientist presented his research on computer modeling of tobacco use, some community members felt frustrated that they were left without understanding any practical implications of the reported findings.

**Researchers Versus Community Members** Experiences of frustration arising from TPC members' attempts to communicate across disciplinary and professional boundaries led some nonuniversity participants to conclude early on that the consortium discussions might be beneficial to researchers but not to community members. At times, there was a feeling that researchers were part of one camp who shared a common perspective (e.g., the importance of basic and theoretical science) and that community members were part of another camp who shared a dissimilar perspective (e.g., the importance of bidirectional discussions leading directly to the application of scientific knowledge to the development of programs aimed at preventing or reducing teen tobacco use in the local community). These contrasting perspectives may have arisen from preexisting attitudes in which community members and researchers did not view each other as "equals" (i.e., as having equivalent status) in the TPC partnership.

Often, members revealed during conference discussions (and in their interview and survey comments) that they did not share agreement on what the TPC's priorities were for tobacco prevention and control, and they also recognized that their views on the group's priorities were dauntingly diverse. Researchers believed that more basic and theoretical research was an important goal and that the dissemination and translation of their findings into smoking prevention programs might take years to develop. In contrast, community members wanted to establish short-term, practically oriented programs based on tobacco use research that would quickly benefit the constituents in their own organizations and geographic region. As an example of these diverse perspectives, a researcher prioritized understanding brain sensitivity to nicotine in rats, whereas a police officer emphasized the need to round up more truant teens and get them back in school because truants are often seen smoking. Over the course of the TPC conferences, researchers' and community members' perspectives on tobacco control priorities became more similar as a result of repeated brainstorming sessions and collective discussions of the TPC's priorities. They began to share views on which directions were the most promising for tobacco control in their local communities and organizations.

**Professional Goals** Group members' diverse educational and occupational backgrounds meant that their individual *professional goals* and the criteria for promotion in

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frustration arising from and professional boundaries that the consortium disintegrated members. At times, they shared a common perspective and that community members' perspective (e.g., the application of scientific findings or reducing teen activities may have arisen if researchers did not view the TPC partnership. They said in their interview and the TPC's priorities were that their views on the need that more basic and translation and translation of research to develop. In contrast, locally oriented programs for constituents in their own diverse perspectives, nicotine in rats, whereas animals and get them back in the case of the TPC conferences on tobacco control priorities and collective decisions which directions were needed and organizations.

and occupational backgrounds and criteria for promotion in

their own jobs were not interdependent, which made it difficult to develop a shared conceptual and programmatic framework for achieving consortium goals. For example, a neuroscientist, a school principal, and a police officer are rewarded in their workplaces for very different reasons. A university-based scientist is promoted for publishing high-quality research in prestigious academic journals and not for making a difference in the number of teens who smoke. A principal of an elementary or middle school is rewarded for developing innovative educational programs that can be touted to school board members and parents. A tobacco use prevention focus per se is less important than demonstrating gains in students' achievement exam scores. School principals' priorities for tobacco control tended to have an educational slant whereby students would learn about math and biology while working on homework or classroom assignments pertaining to tobacco-related problems. Alternatively, police officers are promoted by their departments for being able to demonstrate how they keep the peace and ensure the safety of community members; for example, focusing on truants and getting them back in school may be their highest priority.

Some consortium members' *professions* do not require or foster *collaborative skills* as a basis for achieving their professional goals. Community members may be more accustomed to collaborative roles as part of their work, whereas academicians are more accustomed to pursuing independence and leadership in their jobs as they administer their own labs and write their own papers.

**Lack of Shared Intermediate Goals** A barrier that prevented the TPC from achieving an implied goal of self-sustained collaboration and demonstrable reduction in tobacco use was the *lack of shared "intermediate goals"* (or short-term goals) *in the structure of the consortium*. Members knew that their participation required that they come to conferences (for which they received a small stipend), listen attentively at the conferences (or give a talk if they were researchers), and participate in activities (e.g., brainstorming sessions and discussions of tobacco control strategies). The structure of the collaboration did not require that certain milestones or goals had to be met along the way. There was no accountability for a product, except among the TPC organizers and researchers, who developed activities to ensure achievement of most of the consortium's stated goals. Community-based members of the TPC were not required by their organizations to demonstrate products or report on successes. Although members were expected to work toward the goal of translating tobacco research into evidence-based smoking prevention programs and policies during each of the seven conferences, they were not directly accountable individually for doing so. Only the university-based organizers were responsible and accountable to the funding organization, the Robert Wood Johnson Foundation, for demonstrating positive outcomes (which they did in their yearly reports).

### Collaborative Processes

Some members felt that a disconnect existed between the university researchers and the community members, noting disparities in their communication styles, life experiences, and "worldviews." The process by which researchers presented themselves at

the TPC conferences may have exacerbated community members' preexisting attitudes about the shortcomings of university-based researchers. Community members commented after the first and sixth conferences that some researchers' style of lecturing and "pontificating" without listening during information sharing was not helpful to the group dynamics. Community members had slightly more negative views of university researchers than the researchers had of community members. Many community members did not feel the collaboration was equitable or bidirectional. Over time, however, they came to view the researchers as more receptive and more progressive, as reflected in the gradual shifts toward more positive attitudes that were observed in the repeated-measures analyses of survey and interview data.

To facilitate the development of strategies for translating tobacco research into policy innovations, a series of structured activities were included in the agenda and format of each half-day conference. As noted previously, there were structured times scheduled for members to listen to reports of UCI studies on nicotine addiction and tobacco use and to engage in extended discussions of the research findings and their possible implications for developing improved tobacco control strategies. Structured time was allocated for members to participate in guided, interactive discussions and activities that fostered a synthesis of the university research findings and the development of tobacco control strategies. Specifically, members were organized into small groups that regularly met in conferences to share their ideas about translating tobacco research into improved smoking prevention policies. Furthermore, unstructured time was provided for informal conversations among team members and the development of social capital. Usually, a meal was provided, and people had time to socialize and get to know one another informally.

These activities and the structure of the consortium involved relatively little conflict compared to some other collaborations involving primarily university scientists.<sup>33,37</sup> The substantive focus and organizational structure of TPC meetings may have fostered the generally positive social climate observed at most of the TPC conferences and as evidenced in participants' survey and interview data. The fact that the discussions never required members to determine how to share resources or give up some of their own resources may have been a facilitator of the cooperative atmosphere of TPC meetings as well.

Yet, as noted earlier, there were times when *frustrations and misunderstandings* occurred. Most noticeably, after the sixth TPC conference, members felt frustrated, and a tone of pessimism was evident in survey responses and interview comments. At this conference, community members were surprised to be asked who would volunteer to continue the collaboration beyond the formal funding period of the TPC project and about who would write grants or otherwise commit to working toward the continuation of TPC activities. They did not expect to commit to additional responsibilities by the end of the sixth conference. Furthermore, members assumed that this conference would be the last one, and they were hoping to feel a collective sense of achievement. Instead, community members seemed to feel confirmation of their original concerns about the "hit and run" style of university researchers—that, after two years, the TPC had

not provided them with immediately use in the benefiting the univers

Several months prior to that final meeting, a positive and optimistic draft of the TPC Research and Action Plan was developed by TPC members between the TPC and the In-Aid Program was a result of the TPC were invited to meet and implement the organizations. Thus, I envision a tangible product: a Brief to legislators and efforts over the two-year control strategy.

**Collaborative Outcomes**  
**Accomplishment of the Consortium (TPC)** was successful in outlining in the proposal established and sustained community decision making over seven TPC conferences, professional, and multisectoral, including educational and public health findings emerging from discussions and active collaboration. Novel ideas were generated to guide the programs that would be collaborative ideas were the fourth goal of the

In addition, the consortium to implementing innovation reduction among adolescents: (a) "What are tobacco prevention programs?" "In what ways do you prefer collaborative anti-tobacco programs?" "overwhelmingly agree competing educational time, and staff; and (c

not provided them with any "take-home" products and information that they could immediately use in their professional roles and that their time and energy were only benefiting the university scientists.

Several months passed before a seventh TPC conference was convened. The tone at that final meeting, in contrast to the sixth conference, was once again decidedly positive and optimistic as members were invited to work together toward refining a draft of the TPC Research and Policy Brief, which had been drafted by a subgroup of TPC members between the sixth and seventh conferences.<sup>1</sup> Also, a new TPC Grants-in-Aid Program was announced at the seventh conference, and community members of the TPC were invited to apply for consulting funds to be used toward the development and implementation of tobacco control programs initiated by their respective organizations. Thus, by the end of the seventh TPC conference, members began to envision a tangible pathway: the widespread distribution of the Research and Policy Brief to legislators and health policy organizations, through which their collaborative efforts over the two-year project period would be translated into a specific tobacco control strategy.

### Collaborative Outcomes

**Accomplishment of Stated Goals** Overall, the UCI TTURC Tobacco Policy Consortium (TPC) was successful in accomplishing the major goals of the consortium as outlined in the proposal to the Robert Wood Johnson Foundation. First, the TPC was established and sustained over the two-year project period. Approximately twenty-five community decision makers and five TTURC scientists participated in each of the seven TPC conferences. The consortium was unique in its interdisciplinary, interprofessional, and multisectoral composition with various sectors of the community including educational and public health organizations represented. Second, new research findings emerging from the UCI TTURC were collectively synthesized through TPC discussions and activities designed to facilitate university-community dialogue and collaboration. Novel ideas—some readier for implementation than others—were generated to guide the translation of UCI TTURC research findings into community programs that would benefit adolescents residing in the Orange County region. These collaborative ideas were formulated into specific "targets of translation," which was the fourth goal of the consortium.

In addition, the consortium identified institutional/cultural facilitators and barriers to implementing innovative TD approaches aimed at tobacco use prevention and reduction among adolescents. Specifically, participants were asked the following questions: (a) "What are the most important barriers and facilitators to implementing tobacco prevention programs and policies in your local schools and communities?" (b) "In what ways do you think parents, teachers, students, and others can facilitate or hinder collaborative anti-tobacco efforts?" Despite a wide range of responses, participants overwhelmingly agreed that the most important barriers to implementation were (a) competing educational priorities for schools; (b) limited resources, including money, time, and staff; and (c) limited program evaluation research demonstrating the most

effective community strategies for preventing and reducing smoking. Key facilitators of effective collaboration and implementation of innovative policies and programs included (a) highly committed volunteers and leaders; (b) scientific research providing clear and empirically validated insights into the sources of teen smoking; (c) creative partnerships among schools, public agencies, and community organizations for streamlining collaborative efforts; (d) peer-to-peer education about and involvement in tobacco control strategies; and (e) the development of evidence-based and demonstrably effective policies for preventing or reducing teen smoking.

Participants also pointed out several ways in which parents and schools can influence the development and implementation of innovative tobacco control strategies. For instance, parents may hinder implementation because of their beliefs that tobacco is no longer a pressing issue due to the gains made in California statewide tobacco control and that, therefore, their children are not at risk for tobacco use. School districts may hinder implementation of tobacco control programs in the classroom due to the "No Child Left Behind" law, which has raised standards for each child to test well on educational achievement tests and, thereby, has relegated health-related curricula to a much lower priority than instruction in areas such as math, science, and English. Health education is often superficial and inadequate in K-12 schools. At the same time, parents may foster implementation of smoking prevention programs owing to their desire to raise healthy children and their support of schools' efforts to achieve broader educational goals beyond the required standards for enhancing children's academic development. Schools, too, may foster implementation if they support the idea of teaching children to be healthy and if administrators and school districts believe in tobacco control.

Over the course of their collaboration, TPC members identified potential targets of translation for community-based tobacco control strategies, especially those building on and incorporating the scientific findings from UCI FTURC studies of nicotine addiction and tobacco use. The four major targets of translation identified by TPC members for possible implementation in the community are outlined here.

1. Via *DVD or Web site*, provide diagnostic assessment of vulnerabilities to nicotine addiction and tobacco use based on an individual's assets and resources. Based on a decisional algorithm, assign appropriate treatment modules that match individual students' and their family's needs. Create versions for both parents and children.
2. Develop a *consensus statement* such as a research and policy brief to inform various groups (ad/marketing campaigns, schools, legislative bodies) about evidence-based tobacco control strategies. Provide an avenue for youth involvement. Publish the consensus statement in multiple print and electronic venues.
3. Develop an *anger management*, hostility, and bullying reduction program based on an existing exemplary program and evaluate its effectiveness for reducing tobacco use. Offer schools monetary incentives for participation.

4. Develop a *emotion regulation* program for children and adolescents. Focus on health, coping skills, and effectiveness.

As an elaboration of the first target, we chose to develop *Smoking, UCI FTURC* for tobacco control briefs were distributed to inform the impact on future studies.

Finally, the *consensus statement* and decisional algorithms for prevention programs for parents and organizational leaders. The TPC Grants-in-Aid were distributed to their constituents, which counselors and parents used as alternatives to risk reduction. Where Are My L... younger students' findings from UC... control message... and family members... study and related research were fun...

**Falling Short of A...**  
ing its full potential demonstrated reduction in smoking rates not met yet again a longer term goal: Why did this not meet the long-term goal in time, and support...

Moreover, the *consensus statement* that their individual findings maintaining collaboration understandably, and the two-year funding to translate research into practice should have been...

4. Develop a *three-pronged approach* to (a) teach children the *best practices* of emotion regulation, impulse control, and decision making; (b) monitor high-risk children and adolescents; and (c) collaborate with community centers that offer health, cooking, life skills, and physical activity programs to develop integrative and effective school health programs.

As an elaboration of the second target of translation just noted, TPC members chose to develop and disseminate a Research and Policy Brief on Preventing Teen Smoking. UCI TTURC research was presented and synthesized, and specific directions for tobacco control policy innovations were presented in the brief.<sup>1</sup> Three thousand briefs were distributed to local, state, and national policy and decision makers. The impact on future smoking prevention policies and programs has not yet been assessed.

Finally, the consortium allocated grants-in-aid funding to support local professionals and decision makers in their efforts to launch and sustain evidence-based programs for preventing and reducing teen smoking. Community decision makers and organizational leaders proposed and implemented a variety of programs supported by the TPC Grants-in-Aid program that they felt would be most useful and effective for their constituents. One program was an education and discussion session series in which counselors and at-risk adolescents discussed positive emotional outlets and alternatives to risk-taking behaviors such as smoking. Another initiative, the "Dude, Where Are My Lungs?" program, devised a plan for high school students to mentor younger students and work together to create an educational play incorporating the findings from UCI TTURC research. Audience members, who would be the tobacco control message recipients, included not only adolescents but also younger students and family members. In addition, a new adolescent smoking prevention research pilot study and related affect management training program based on earlier UCI TTURC research were funded and implemented.

**Falling Short of Achieving Full Potential** Still, the consortium fell short of achieving its full potential. Specifically, it did not become a self-sustained collaboration that demonstrated reduced tobacco use among teens. To date, consortium members have not met yet again as a group. The consortium did not demonstrate or achieve its implicit longer term goal: to reduce tobacco use among adolescents in a sustained manner. Why did this not occur? The original goals of the consortium did not explicitly include the long-term goal of sustaining the collaboration, and there were negligible funds, time, and support to do so once the foundation-funded project period ended.

Moreover, the multidisciplinary and professional diversity of team members meant that their individualized and dissimilar professional goals were not conducive to sustaining collaboration once the TPC project formally ended. Community members, understandably, did not commit to doing more to sustain the collaboration beyond the two-year funding period. Without a longer time frame, there was little opportunity to translate research ideas into local community interventions. Perhaps initial expectations should have been set so that members would sustain the collaboration on their own,

and more time and funding should have been granted to allow members to continue their multisectoral collaboration.

To promote sustained collaboration, institutional incentives could have been sought for the consortium members. Researchers could have sought administrative buy-in through course releases and greater institutional recognition of the value of interdisciplinary collaboration in faculty promotion processes. For community members, monetary incentives for attending, the potential to be associated with other well-respected people at a major university, and the possibility of gaining firsthand knowledge about the latest research that might help them in their jobs may have prompted community members to attend TPC conferences, but additional incentives were needed to sustain longer term collaboration. Community agencies could have found ways to release their representatives to spend more time on the collaboration. If these had been part of the goals of the consortium, then perhaps it would have been more likely to survive after the Robert Wood Johnson Foundation funding was expended.

Finally, the relatively short time frame of the collaboration (two years) made it difficult for members to make a demonstrable impact on public health. Years, not months, may be required to realize the public health benefits of scientific research that has been effectively disseminated and translated into improved community interventions and outcomes, such as reductions in population levels of adolescent smoking. Perhaps ten, twenty, or more years are needed to recognize the long-term impact on public health.<sup>41,42</sup> The consortium enabled members to begin the process of generating novel ideas that could lead to long-term public health benefits over time, but tracking such ideas and outcomes would require a significantly longer period than two years.

In some ways, the TPC project might be better characterized as a "precollaboration" rather than a fully functioning collaboration. That is, it might be more accurate to characterize the consortium as a group just getting started during the initial phase of collaboration when planning begins but difficult decisions and conflict have not arisen. The TPC was, after all, an informal group whose members did not have to sacrifice much time, funds, or other resources to participate. Members did not spend much time making difficult decisions about whom the leaders would be, how funds would be spent, and whose ideas were worthy of being implemented in the future. TPC participants did not face major concerns about whether individual members were being treated respectfully and fairly, whether individuals were meeting the expectations and norms of the group, or whether they would be willing to devote more of their resources toward continuing the collaboration. Their regular work outside the collaboration was not affected particularly negatively or positively by their participation in the consortium. Members were not required to be accountable, by their employers or the consortium organizers, to achieve positive outcomes. Some time was spent at meetings focusing on creating tobacco control *ideas* collaboratively in subgroups, but most of the collaborative ideas were not translated into new *policies and programs* by the end of the collaboration. There was no requirement to actually implement the TPC members' ideas. In fact, when given an incentive and a quick deadline to submit a grant proposal for funds, members chose to drop the more ambitious ideas they had originally generated in consortium

subgroups. Instead, and directly benefiting the idea of spending with a school principal on her curriculum goals for the semester.

## IMPLICATIONS LEARNED FROM

This case study of a consortium that facilitated or hindered members working to reduce tobacco use focuses on improving the effectiveness of team science

## Cycles of Emotion and Group Motivation

One lesson learned from this study is that group motivation is a dynamic process. For example, group motivation can be positive, meaning that members are engaged and committed. Observations corroborated this, showing that group motivation was more negative, following a similar pattern to the collaborative process. The collaborative process included initial rejection, followed by frustration, and finally, cycling back to positive group motivation. At the end of the seventh cycle, group motivation was positive—especially, during the implementation of the TPC grants-implementation phase. Observations of the collaborative process and the implementation of the grants are essential for improving the collaborative research cycle.

## Understanding the Collaborative Process

A second lesson pertains to the importance of understanding the collaborative process (terminology) of collaborative research across professional fields. The wide range of experience and expertise of members from a broad range of exper-

subgroups. Instead, they opted to propose programmatic ideas that would more quickly and directly benefit their unique constituents. For example, instead of pursuing the idea of spending weeks reviewing best practices for tobacco control in school settings, a school principal in the TPC proposed a tobacco control plan that tied in with his/her curriculum goals and that could be implemented immediately during the next semester.

## IMPLICATIONS AND ADDITIONAL LESSONS LEARNED FROM THE TPC STUDY

This case study of the UC Irvine Tobacco Policy Consortium (TPC) identifies factors that facilitated or hindered the collaborative efforts of university and community partners working to reduce teen smoking. Presented here are several "lessons learned" that focus on improving future university-community collaborations and enhancing the "science of team science" field in general. Suggestions for further study also are presented.

### Cycles of Emotional Storm and Calm Influence Group Motivation and Performance

One lesson learned relates to identifying cyclical affective processes during collaboration. For example, the initial observations of the TPC collaboration were positive, meaning that members rated their attitudes toward the TPC favorably, and informal observations corroborated their positivity. Some later observations, however, were more negative, followed by attitudinal improvements later on, suggesting a cyclical nature to the collaborative process. Times of moving forward or backward for the TPC included initial reports of optimism and enthusiasm at the beginning of the collaboration, followed by frustration and skepticism at the conclusion of the sixth conference, and finally, cycling back to a positive social climate and sense of achievement at the end of the seventh conference emanating from certain tangible collaborative achievements—especially, the completion of the TPC's Tobacco Policy Brief and distribution of the TPC grants-in-aid for selected tobacco control projects. As is evident from our observations of the TPC, there are affective ups and downs that shape or color collaborative processes. Understanding personal as well as group motivations and acknowledging the importance of personal as well as group feelings about specific shared goals are essential for improving team collaborations during the transdisciplinary action research cycle.

### Understanding Professional or Academic Jargon Requires Time

A second lesson pertains to the difficulties of learning the *lingua franca* (professional terminology) of co-collaborators who represent diverse disciplines and professional fields. The wide scope of the academic and professional backgrounds covering a broad range of experience levels represented in the consortium made for a rich mix of

diverse knowledge and perspectives. With such diversity, it was sometimes difficult to find a common language for understanding tobacco control research. For example, during a nicotine pharmacology research presentation, one TPC community member observed that big "agglutinated" terms like *psychopharmacogenetic* were intimidating and off-putting from a layperson's perspective. Over time, professional terminology and academic disciplinary jargon may be gradually demystified and defined. The extra time it takes to explain new terms may be warranted, however, to reduce the risk of alienating fellow collaborators who feel lost in a sea of jargon. Whereas the TPC members each had time to inquire about terms they did not understand, team collaborations must also consider the type and prevalence of jargon that is used throughout collaborative discussions.

### **Developing Realistic Expectations Helps Achieve Intended Group Processes and Outcomes**

A third lesson learned relates to choosing carefully the goals as well as the administrative tasks requested of the collaborators. Individuals entered the consortium with certain assumptions about key collaborative goals and administrative tasks. For community members, the assumed goals included developing new tobacco control strategies, and the assumed tasks included meeting over a two-year period to contribute their views about research priorities. For the university members, the assumed goals included developing an understanding of community partners' research priorities, and the tasks included assessing community members' views about those priorities. On the surface, the consortium goals and administrative tasks were obvious and useful. Upon deeper analysis, some community members complained about feeling like a number in a large research study when they were interviewed about their views or asked to complete a variety of surveys during or after each conference. Even though the surveys were framed as being necessary for understanding collaboration between community representatives and university researchers, completing surveys was considered an activity that had less benefit when compared to spending time on generating new tobacco control programs or policies.

Thus, it is important to establish realistic expectations early on about time commitment and how long various components of the collaboration will take to complete in light of members' shared goals. Addressing member expectations about the timeline needed for achieving project outcomes is vital for success in any team science collaboration. TPC members could have been warned, for instance, that part of their time would be spent completing surveys and doing small group brainstorming. Furthermore, they could have been told that it might be difficult to create simple, low-cost tobacco control programs, given the limited duration of the conference. Such forewarning may have resulted in fewer complaints about how much time was devoted to administrative activities and less disillusionment about reaching consensus on tobacco control programs or policies.

### **Small-Group A Build Essential**

Another lesson learned for sharing various tobacco control research with the TPC for interacting tobacco control strategies, provided of most valued activities establishing a community due to the difficulty and the researcher practical questions cessation programs solutions such as, "How Furthermore, community researchers feeling community needs. Despite appreciating the time consortium membership from this case study dialogue and allow am

In conclusion, the study is highlighting program structure diverse background toward deepening the phases of the transd

### **FUTURE DIRECT**

#### **Antecedent Coni**

Understanding antecedent collaboration begins with team members but at outset. For example, they are otherwise working on their own knowing their feelings. This case study did not rather examined feelings explore the degree of suggestion is to surv



### Small-Group Activities Foster Shared Views and Build Essential Social Capital

Another lesson learned relates to establishing a structured set of group activities designed for sharing viewpoints, both personal and professional, regarding the value of various tobacco control programs, policy, and research. For example, time was allocated in the TPC for interactive, small group discussions when members talked about ideas for tobacco control strategies. The discussions, coupled with the unstructured time during meals, provided opportunities for sharing and explaining perspectives. Uniformly, the most valued activities were the ones that allowed for developing social capital and establishing a common ground for discourse.<sup>43</sup> Time to foster shared views was necessary due to the differences between the professional goals of the community members and the researchers. During small group sessions, community members focused on practical questions such as, "How do we enroll more students in after school smoking cessation programs?" In contrast, university members often focused on research questions such as, "How do we recruit more students to participate in our research study?" Furthermore, community members did not always appreciate the style of university researchers feeling that they tended to "pontificate" while neglecting practical community needs. Despite their differences, all TPC members reported highly valuing and appreciating the time and activities devoted to getting to know the viewpoints of fellow consortium members. One strong recommendation for fostering collaboration emerging from this case study is to emphasize small group interactions that encourage dialogue and allow ample time for all participants to express their views.

In conclusion, the lessons learned from this case study of the TPC speak to identifying program structures for motivating collaboration when team members have very diverse backgrounds and experience levels. The science of team science should look toward deepening the understanding of transdisciplinary scientific collaboration at all phases of the transdisciplinary research cycle.<sup>2,41</sup>

## FUTURE DIRECTIONS

### Antecedent Conditions That Warrant Further Study

Understanding antecedent conditions that exist before a transdisciplinary scientific collaboration begins must include not only identifying the disciplinary backgrounds of team members but also acknowledging their beliefs and feelings about the project at the outset. For example, if team members participate by virtue of their technical skill, yet they are otherwise uninterested in the project as a whole (e.g., they would rather be working on their own project and resent the extra work posed by team activities), acknowledging their feelings about the project becomes an important antecedent condition. This case study did not examine affective attitudes about the project before it began but rather examined feelings about the project after it commenced. Future studies should explore the degree of motivational buy-in before large, expensive projects begin. One suggestion is to survey members of large teams after they drop out to determine the

reasons for their departure. Whereas cyclical processes in team member motivation (e.g., affective ups and downs) are expected in any transdisciplinary scientific collaboration, identifying antecedent motivational factors is worthy of future study.

### **Collaborative Processes That Should Be Further Investigated**

In addition to antecedent conditions, several processes should be studied to enhance the success of future TD scientific collaborations. One process that should be studied focuses on the transfer of knowledge from one discipline or professional background to another. For example, how does the basic vocabulary and theoretical perspectives from the discipline of psychopharmacology get transferred to a youth guidance counselor, and vice versa? What activities are most effective in promoting effective exchanges of disciplinary information? Would completing a series of "basic primers" or seminars serve as a test for prospective members' motivation to participate in a large TD collaboration? And after completing some kind of "continuing professional education" seminar or training module on TD collaboration, would prospective team members still want to participate? Any type of collaboration readiness "audit" should assess factors that facilitate or impede collaboration across disciplinary and professional lines. Such an audit should ensure that the collaboration has (a) clearly defined goals, (b) goals that are perceived to be attainable, and (c) participants who are relatively united across various community interests and agendas.<sup>45-47</sup> Incentives for collaboration also should be assessed because groups with individuals who have clear incentives to collaborate (e.g., grants funding, administrative support) may be more likely to do so.<sup>48</sup>

Another collaborative process worth exploring is the amount of time members perceive as necessary for completing the team project compared to the actual time necessary. For example, Buehler, Griffin, and Ross<sup>49</sup> describe the "planning fallacy" in which people routinely underestimate the time required for task completion. Future studies should explore the degree of underestimation in task completion that occurs during transdisciplinary scientific collaborations.

### **Collaborative Outcomes That Warrant Further Study**

Of equivalent importance to the study of collaborative antecedents and processes is the study of how transdisciplinary scientific outcomes are translated into health-promotive community intervention and widely disseminated.<sup>50</sup> For example, how were the scientific outcomes of a large team project made available to lay audiences that included community practitioners and local decision makers? What are the most effective formats of translational presentations (e.g. book chapter, journal article, lecture, executive policy brief)? What is the longer term impact of the information after it has been translated and distributed widely to community groups? Which group (e.g., lay public to expert) reports benefiting most from the information?

Clearly, future studies of team science and transdisciplinary scientific collaboration must consider a wider range of collaborative antecedents, processes, and outcomes than have been studied in earlier investigations. Evaluation of the long-term impact of collaboration on science, public health, and society also should be evaluated.<sup>44</sup> Two years

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(the duration of the UCI TPC) is not sufficient time for planning, implementing, and tracking public health outcomes, such as a reduction in adolescent tobacco use in the community. Most collaborative teams funded by government agencies and private foundations tend to last five years or fewer, which typically is not enough time to see science translated into positive outcomes in the community. Through these future, longer term research efforts, we will be better able to strengthen the science and practice of transdisciplinary action research.

### Expanding the Field of Transdisciplinary Action Research

In general, transdisciplinary action research is underexplored and should be studied in its own right<sup>3</sup> so that innovative scientific research is translated into policies and programs that benefit society. To promote transdisciplinary scientific collaboration, university-community collaboration, and intersectoral partnerships, a number of broadly conceptualized future directions would be helpful.

**Continue Initiatives to Support Transdisciplinary Collaboration** Greater attention and funding will enable future research teams to conduct and study transdisciplinary action research. Already, an increasing number of researchers and agencies are recognizing the need for more information in this rapidly expanding field. Although many funding agents and university administrators acknowledge and verbally support transdisciplinary collaboration, some have taken concrete steps to establish initiatives that financially support transdisciplinary endeavors. For example, at a national level, NIH representatives should continue to support transdisciplinary scientific initiatives through intra-agency collaboration, and efforts to translate research should be strengthened by organizations such as Robert Wood Johnson and Keck Foundations, which have launched large-scale initiatives to promote TD collaboration in science, training, and the translation of knowledge into evidence-based practices and policies.<sup>26, 27</sup>

As transdisciplinary action research (or the science of team science) grows, additional efforts to evaluate the transdisciplinary collaborations are even more essential. Determining how to evaluate transdisciplinary scientific collaboration is difficult. Reliable and valid evaluative metrics need to be developed. A greater understanding of how to best track and evaluate ongoing collaboration is needed. Only minimal empirical work has tracked collaborative processes, generated hypotheses, and tested hypotheses, which would then contribute knowledge that can be used to refine future collaborations and health-promotive public policies.

**Increase the Knowledge Base** The current knowledge base of information on transdisciplinary scientific collaborations, university-community collaborations, and intersectoral partnerships needs to be augmented in several respects. The relevant literature can be described, for the most part, as nonexperimental and diffuse (i.e., scattered across different fields and disciplines). Scholars working in multiple fields have published papers on one aspect of the problem. For example, librarians have discussed definitions of disciplines, and physicists have provided retrospective memoirs of their experiences

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in a collaboration using terms from their discipline, such as centripetal forces. Although fields such as organizational psychology and public health have discussed teamwork and community-based participatory research, they haven't been used widely to improve TD science, training, and translation.<sup>15</sup>

**Provide Effective Incentives to Increase Scientists' and Community Partners' Participation** Greater incentives for researchers, community policymakers, and other policymakers to participate in TD collaboration are needed. Grant funding is helpful to attract more people interested in TD collaboration, but additional incentives are needed for community members and researchers. Community members might need more time off from their usual job responsibilities. They need to problem solve how to achieve mutually beneficial goals of their organization while meeting the goals of the collaboration. For example, a principal figured out how to merge tobacco science research results into her new program on physical health by creating a program in which the heart is studied, and the tobacco research is discussed along with the heart. University researchers can determine how to share resources to help community members achieve their goals—for example, arranging university student assistants to help them with their needs or enabling them to speak in classes to bolster their résumés and ties with the university.

Researchers could provide incentives such as course release time, reduced administrative committee responsibilities, and perhaps a sabbatical from departmental responsibilities while they participate in labor-intensive collaborative projects. They might also be encouraged to join university-sponsored organized research units (ORUs) rather than remaining spread across different departments. Also, because researchers must publish to be promoted, greater support for collaborative cross-disciplinary publications is needed. Too often, journal editors are the “gatekeepers” who determine the boundaries of their fields, and they are not sufficiently receptive to cross-disciplinary work. In addition, collaborative, multiauthored publications are sometimes viewed by university promotion committees as less important than single-authored publications. To foster transdisciplinarity, public funding agencies and private foundations should follow the lead of the National Institutes of Health in recognizing multiple principal investigators on the same collaborative project as a basis for distributing research credit more equitably among team members.

**Provide Educational Training** Graduate students and staff should be trained in principles of conducting TD action research. They need to be exposed to multiple disciplinary mentors and sensitized to the barriers and facilitators associated with interdisciplinary collaboration. Additional funding sources and institutional mechanisms are needed to support such training. Conferences and networks can also be beneficial for fostering knowledge about TD collaboration. National conferences such as those organized by funding agencies are also valuable in this regard. For example, in 2006, the National Cancer Institute organized a Science of Team Science conference focused on transdisciplinarity.<sup>51</sup>

**Allow a Longer Time** A large amount of time to understand the research, conduct it, and demonstrate an impact. Some agencies may need more time, as they normally take years to complete a project. Evaluation may take even longer. Thus, it may take ten years to complete a project.

This case study illustrates the lessons learned from the experience of team science and the phases of team collaboration. It provides a model of TD science, training,

## SUMMARY

In this chapter, we describe the Tobacco Use Policy Consortium (TUPC), a transdisciplinary action research consortium of tobacco researchers and community decision makers. From 2003 through 2006, TUPC created a grant program to support adolescent smoking prevention research, developing and disseminating a policy brief for local and national policymakers. Over time, despite initial differences in backgrounds, work styles, and priorities, TUPC researchers and c

## DISCUSSION QUESTIONS

1. Why did the UC researchers use an interdisciplinary approach?
2. What obstacles did they face?
3. What steps could other researchers take in their work? What lessons can be learned for youth engagement?

**Allow a Longer Time Frame for Collaboration Assessment** Two years are not a large amount of time for a collaboration. More time is needed for members to understand the research, contemplate how it could be implemented, implement a program, and demonstrate an impact on public health. Collaboration members and funding agencies may need to realize that ahead of time. Although traditional science may normally take years to be translated into policy, transdisciplinary scientific collaboration may take even longer because of the additional time needed to conduct the work. Thus, it may take ten, fifteen, or even twenty years to see effective translation occur.

This case study highlights some of the facets of transdisciplinary action research that occurred among team members in a tobacco policy consortium. It is likely that the lessons learned from this case study will inform future funding of research into the science of team science. Guiding future scientists and professionals through the multiple phases of team collaborations will improve as we understand more about the workings of TD science, training, and translational initiatives.

## SUMMARY

In this chapter, we analyzed the Tobacco Policy Consortium (TPC), a grant-funded transdisciplinary action research consortium of tobacco researchers and community decision makers. The TPC collaborated from 2003 through 2005, with the goals of creating a grant program to support local adolescent smoking prevention efforts and developing and disseminating a research and policy brief for local, state, and national policymakers. Our assessments show that despite initial differences in backgrounds, work styles, and perspectives, TPC researchers and community members

gradually came to share views on tobacco control priorities as a result of repeated brainstorming sessions and collective discussions. Although the TPC was successful in accomplishing its major goals, it fell short of achieving its full potential—namely, to become self-sustaining and reduce adolescent tobacco use. Lessons learned include improving future university-community collaborations, enhancing the “science of team science,” and incorporating measures for sustaining grant-funded community-research partnerships from the outset.

## DISCUSSION QUESTIONS

1. Why did the UC Irvine Tobacco Policy Consortium choose to use an interdisciplinary approach to understand youth tobacco use?
2. What obstacles did the consortium encounter and how did they address them?
3. What steps could the consortium have taken to engage young people themselves in their work? What might have been the advantages and disadvantages of youth engagement?

4. Based on their experiences, what suggestions do the authors make for improving the process and effectiveness of interdisciplinary action research? Do you agree with their recommendations?

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