Preliminary Evaluation Report

Evaluation

of the

Transdisciplinary Tobacco Use Research Centers (TTURCs) Initiative

Evaluation Group

William Trochim, Cornell University
Stephen Marcus, NCI
Louise Mâsse, NCI
Richard Moser, NCI
Patrick Weld, NCI

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The analysis of data associated with this evaluation is ongoing. This report summarizes the initial descriptive results of the evaluation. Revisions of and additions to this report will be issued as more extensive analyses are completed.

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Acknowledgements

This evaluation is a pilot project that evolved over the past two years from something much smaller and less ambitious. It was not originally intended to be so comprehensive, but it was in the spirit of trying out something new and ground-breaking that this evolution occurred. As in all such cases, one needs a nurturing environment for something interesting to emerge. This environment was initiated by two key people -- Barbara Rimer, the former director of the Division of Cancer Control and Population Sciences (DCCPS) and Robert Croyle, the current acting director -- who, while preserving a probably accurate skepticism about this endeavor, to their credit, lent their unwavering moral support, leadership and enthusiasm.

There are many within NCI who played key roles throughout this evaluation. Glen Morgan walked the very delicate role between program management and evaluation, often giving generously of his time and energy to help us move this project along. We were fortunate to be able to involve more bright young people on this evaluation team than we had any right to expect. I especially want to thank Eva Matthews for both her knowledge and expertise with the TTURCs and for her steadiness when things occassionally got bumpy, Scott Marchand for his good humor and outstanding efforts on financial analysis; Patty Fiero and Rachel Grana for their invaluable advice and assitance at key stages of the project; and Ginny Hsieh for the efforts she made to manage.

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Bill Trochim
Ithaca, NY

The TTURC Initiative

The Transdisciplinary Tobacco Use Research Centers (TTURC) initiative is a five-year $70 million project funded by the National Cancer Institute (NCI) and the National Institute on Drug Abuse (NIDA). The initiative provides support to seven research centers to study new ways of combating tobacco use and nicotine addiction, and to help translate the results and implications of this work for policy makers, practitioners, and the public. Each center's research portfolio covers basic and applied research as well as research on policy-relevant issues in studies being conducted at the center. The overall goal of this initiative is to stimulate integrated research that will significantly advance our understanding of tobacco use and nicotine addiction that will help to combat the toll from tobacco use.

The TTURC Initiative is supported by the $14 million "Partners with Tobacco Use Research Centers" (Partners) funded by the Robert Wood Johnson Foundation (RWJF). This "Partners" program supports tobacco-related policy research and communications activities at the funded TTURCs.

Seven major university-based centers are currently funded through the TTURC/Partners program. These seven participating universities are: Brown University, University of California at Irvine, University of Minnesota, University of Pennsylvania/Georgetown University, University of Southern California, University of Wisconsin, and Yale University. The University of Illinois at Chicago provides technical direction and assistance to the Partners program.

This TTURC initiative is unique in several ways. One of the primary goals of the initiative is to encourage and support transdisciplinary research (i.e., research that crosses and integrates theories and methods from different disciplines). It is hoped that the research supported and generated by the initiative represents a new direction in how tobacco-related research should be conducted. Training is a major component of the initiative and includes both new and established investigators with the hope of broadening their scope of expertise both within tobacco and across disciplines. Specific funds are provided to the centers to help facilitate the translation of basic and applied research into policy and practice. Finally, the initiative represents a partnership between governmental funding agencies and private foundations.

Because of the relatively new and unique aspects of this initiative, the funders are interested in evaluating the outcomes of the initiative, both in the intermediate term (e.g., 2-5 years) and in the long term (> 5 years). As of this writing, the Centers have completed 3 of 5 years of initial funding.

The TTURC Evaluation

The purpose of the TTURC evaluation is to provide an ongoing comprehensive assessment of TTURC Initiative functioning and short-term and intermediate-term markers. The evaluation system is designed to address the information needs of multiple stakeholder groups including the Congress, the National Cancer Institute, the National Institute on Drug Abuse, the Robert Wood Johnson Foundation, the universities that host the TTURCs, public health researchers and practitioners, and the TTURCs themselves. While it is essential to gather data from each of the TTURCs, and that information will provide useful feedback to a variety of stakeholders, the system emphasizes assessment of the TTURC Initiative as a whole, rather than as separate evaluations within each center.

This evaluation report summarizes the initial descriptive analyses of the evaluation data. It is primarily designed to provide empirical input for the initial discussions on re-authorization of the initiative that will commence in Summer 2003. These initial findings are subject to revision based on more extensive analysis that will be undertaken.

Conceptual Framework

The conceptual framework for this evaluation system was developed collaboratively, with active participation by TTURC investigators, funders, and other stakeholders. Concept mapping was utilized to construct a comprehensive map of the outcome domains that needed to be addressed in the evaluation. This outcome map then was construed into an outcome logic model that depicts the sequential causal relationships among outcome constructs. The map and outcome logic model were used to guide development of the measurement approaches. The methods for and results of this conceptual framework development project are presented in detail in Appendix A.

The outcome logic model that was developed is shown in Figure 1[1]. Each shape or object on the model represents an outcome area that encompasses multiple relevant specific markers. The model generally flows from more short-term markers on the left to long-term markers on the right. Beginning on the left are the basic activities of the centers — *training*, *collaboration*, and *transdisciplinary integration* — that represent simultaneously the core activities of the TTURC Initiative and the earliest, most short-term markers or effects that might be expected. Moving from left to right, these basic activities lead to the development of new and improved *methods*, *science and models*. The consequent new or improved *interventions* are tested and lead to *publications*.

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[1] Throughout this summary of the report, we use the term "markers" to suggest that there is a continuum along the path from the most immediate process variables (e.g., training, collaboration) to the most long-term outcomes (e.g., health outcomes). There is no clear dividing point between what is a "process" measure and an "outcome". There are different evaluation traditions that use the term "outcome" very differently. For some, outcomes are the end of a causal chain where for others the term can refer to anything that represents a measurable result of a program or intervention – including process results. In this latter tradition, it makes sense to talk about "collaboration" outcomes of the TTURC initiative. In the former traditions, the term "outcome" would only make sense for the area labeled health outcomes on the logic model. We intend the term "marker" as a tradition-neutral term that suggests a consequence of the initiative, however short or long term, but also use "outcomes" in reference to a broader collection of markers.

Publications in turn lead to both *internal and external recognition*, which feed back upon the overall infrastructure and capacity of the centers resulting in increased support for their basic activities (training, collaboration, and transdisciplinary integration). Publications also provide the content base for *communication* of scientific results to the broader community. (Recognition, through the public relations it engenders, provides a secondary impetus for communication). *Policy implications* primarily result from communications and publications while *translation to practice* is primarily influenced by improved interventions (that is, what is being translated). However, there is an intricate dynamic relationship between translation to practice and policy implications suggested by the bi-directional arrow between them. *Health outcomes* are influenced both by the treatments and health practices that have been developed and by the policy changes enacted. In turn, positive or negative health outcomes feed back into new policies and practice. Taken together, the outcome logic model provides an empirically and collaboratively derived conceptual framework that guided the development and implementation of the evaluation.
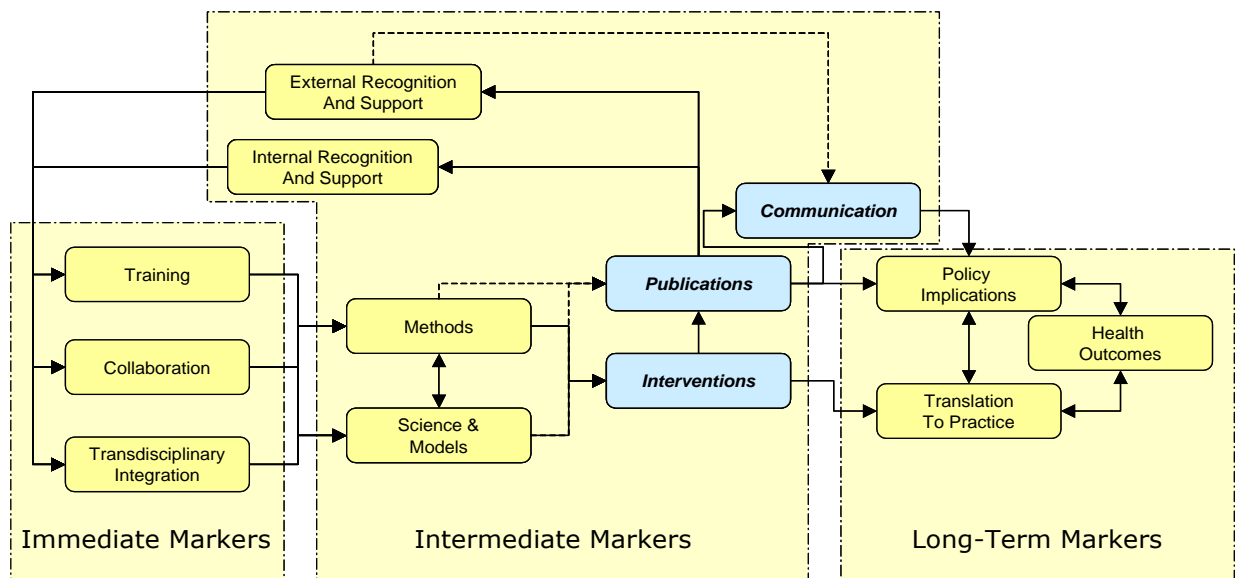
Figure 1. Outcome logic model for the TTURC evaluation.

The logic model can be used to frame the overall purpose of the TTURC evaluation within a single statement:

> The purpose of the TTURC evaluation is to assess the extent to which the collaborative transdisciplinary work of the centers affects the development of methods and models that lead to improved science as evidenced in scientific publications, and to the recognition, communication and translation of scientific findings into improved interventions, health practices and policies that improve key health outcomes.

Evaluation Questions

This logic model is also the basis of the key questions that guide the evaluation. Each question, in turn, has sub-questions of greater specificity. The questions and subquestions can be categorized in terms of short-term, intermediate and long-term markers.

Short-Term Markers

How well is the *collaborative transdisciplinary* work of the centers (including *training*) accomplished?
- What are TTURC researcher attitudes about collaboration and transdisciplinary research?
- How do researchers assess performance of their centers on collaboration, transdisciplinary research, training, institutional support and center management?
- What are examples of collaboration, transdisciplinary and training activities of the centers?
- What is the quality and impact of the collaboration, transdisciplinary and training activities of the centers?
- Do TTURC research publications provide evidence of collaboration and transdisciplinary research, and how do they compare with "traditional" research?
- How effective and efficient is the management of the TTURCs?

Intermediate Markers

Does the collaborative transdisciplinary research of the centers lead to the development of *new or improved research methods, scientific models and theories*?
- What is the TTURC researchers' assessment of progress in development of methods, science and models?
- What progress has been made in methods, science and models?
- What are examples of progress in methods, science and models?
- How productive are TTURC researchers at obtaining new grants?

Does TTURC research result in scientific *publications* that are recognized as high quality?
- How productive have TTURCs been in publishing? How does this change over time?
- What is the quality of research published?

Is TTURC research *internally and externally recognized* as high-quality research that is likely to address its objectives successfully?
- Do home institutions provide the TTURCs with adequate space, resources and support for their work?

- Do home institutions reward TTURC work through standard academic reward mechanisms like promotion and tenure?
- Do external individuals and organizations (e.g., funders, professional associations) recognize and reward TTURC work?

Does TTURC research get *communicated* effectively?
- How effectively do the TTURCs communicate among researchers and externally?
- What are the major barriers to effective communication in the TTURCs and do they change over time?

Long-Term Markers

Are models and methods translated into *improved interventions*?
- What progress has been made in developing new or improved interventions (for different types of interventions)?

Does TTURC research influence health *practice*?
- What policies have been influenced by TTURC research?

Does TTURC research influence health *policy*?
- How effectively has TTURC research been translated into practice, (including development of written, video, or software materials; training of practitioners; developing guidelines; affecting benefit packages)?

Does TTURC research influence health *outcomes*?
- What is the researcher's and Peer evaluator's assessment of the impact of TTURC research on health outcomes?

Not all of these questions can be addressed at this time and through this evaluation. Some of them require longer timeframes four effects to be expected to be detectable. Others require multiple waves of measurement to be able to detect change. However, empirical evidence will be presented here to address most of these questions, especially for the short-term and intermediate-term markers.

Methods

Sampling Framework

Each of the seven TTURC centers is considered a project that is made up of multiple subprojects that can be categorized into three types (as described in the original RFA for the TTURC project):

- Core Subproject
- Research Subproject
- Pilot Subproject

The total number of subprojects at each center each year is shown in Table 1. For evaluation purposes, this is especially important because each subproject is required to submit a separate Grant Progress Report (PHS2590) Form each year. Thus, subprojects constitute a logical unit of analysis within centers.

Table 1. Number of Subprojects at each center during each project year.

Center	Year 1	Year 2	Year 3
Brown	12	12	12
Minnesota	11	11	16
Penn	13	13	13
UCI	13	13	20
USC	14	14	14
Wisconsin	7	9	10
Yale	15	15	15
Total	**85**	**87**	**100**

Hundreds of individuals participate in the TTURCs. More than 200 TTURC staff are identified as having research roles. Nearly half of these are Principal Investigators, Co-Principal Investigators, Co-Investigator; Principal, Associate, Core or Project Director, Researcher, Scientist, or Research Scientist. Nearly one-fourth are identified as professional staff such as (Bio) statistician, Research Associate, or Research, Laboratory, Data or Web Technician. About 15% are students.[2]

Measures

The major evaluation data sources and measures, and their corresponding analyses, are depicted in Figure 2. In this evaluation, a *measure* refers to original data collection. An *analysis* refers either to how such data is processed or, in several instances, the collection of data about a measure from secondary sources such as judges or coders. For instance, a key measure is the annual PHS2590 Progress Report that includes the Progress Report Summary, a short narrative compiled by the PI of each subproject. This Summary is analyzed through coded content analysis and by systematic peer evaluation. Both involve the collection of data about the existing reports but are considered analyses of the original data of the Summary. The White boxes in the figure represent elements that were created for this evaluation. Grey boxes indicate pre-existing data sources that were incorporated into the evaluation.

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[2] Some subprojects were not funded for the entire life of the center resulting in the different sample sizes across the three years studied. Analyses were adjusted appropriately to account for these instances. Three subproject reports were not received until later in the evaluation and were able to be included only in the Peer Evaluation of Progress Reports analysis. This accounts for the slight difference of the number of subprojects reported (either 269 or 272) in different subsections of the evaluation.
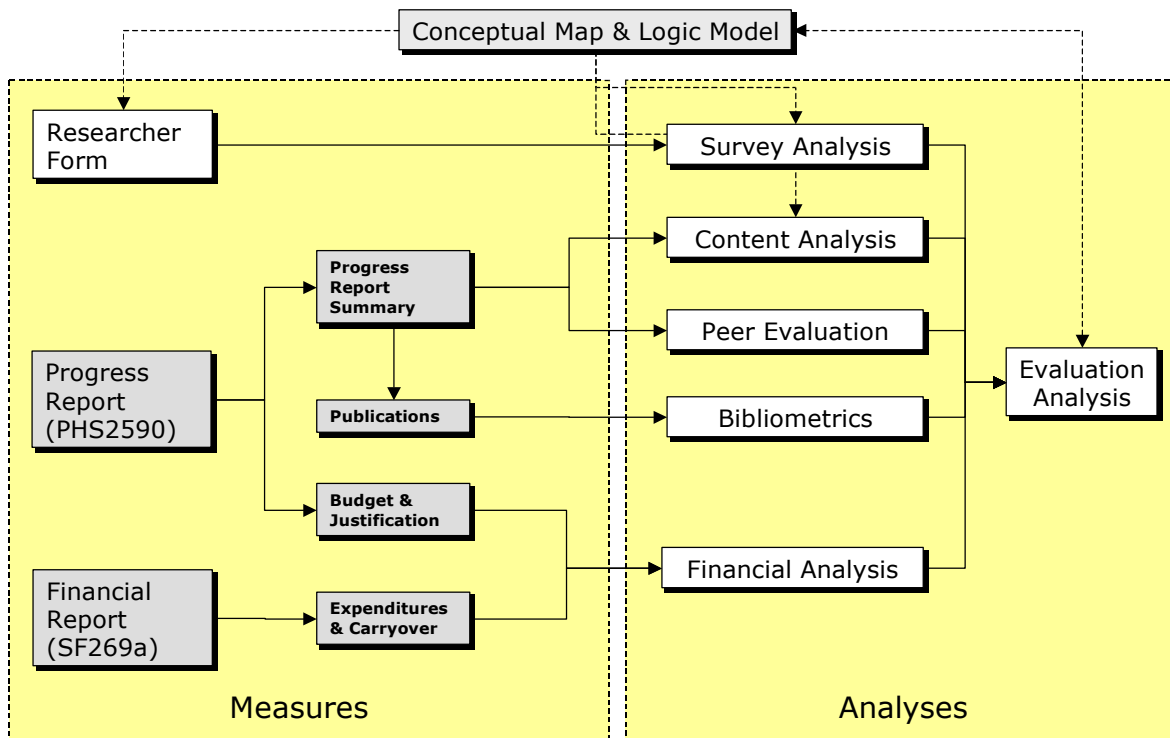
Figure 2. Primary Measurement Data Sources and Analyses

The only new measure in this evaluation is the Researcher Form, a detailed annual survey of over 200 TTURC investigators and research staff. While the Progress Report (PHS2590) and the Financial Report (SF269a) are pre-existing required annual federal reporting forms, all analyses of data from these forms are original to this evaluation and rely on several new forms and protocols including:

- A protocol for coding annual progress reports by outcome (content analysis)
- A form for systematic peer evaluation of annual progress reports
- A protocol for conducting bibliometric analysis of research publications and citations, including the construction of several new bibliometric indicators
- A form for coding budget justification statements as part of the financial analysis

Researcher Form

The Researcher Form (Appendix D) is a draft survey instrument designed to elicit the opinions and evaluative assessments of the TTURC researchers regarding the entire range of outcome markers. It consists of twenty-five closed-ended questions (each with multiple sub-items) and three open-ended questions. The instrument was designed collaboratively as part of the evaluation conceptual framework development (described in Appendix A). TTURC funders, consultants and researchers generated several hundred potential items for this form. These were classified into the outcome categories in the TTURC logic model (Appendix A) and grouped into multi-item questions in the

Researcher Form. The form measures researcher's judgments about progress on all of the outcome categories in the logic model, including: collaboration; transdisciplinary integration; science, models and methods; internal and external support and recognition; communications; and the effects of TTURC research on policy, practice and health outcomes.

The instrument went through multiple cycles of review and revision with a variety of groups including the TTURC evaluation methodology team, the funders, the TTURC consulting committee and the TTURC PIs.

This instrument is a draft instrument. Data from initial use of the Researcher Form will be used to develop scales and index variables and determine whether questions need to be revised, eliminated or augmented for subsequent uses. Since this is the first annual evaluation, the results of this form will be most useful as a basis for comparing change in subsequent years.

Progress Report (PHS2590)

The annual Public Health Service PHS 2590 Grant Progress Report[3] is required of all non-competing research grants funded through the Public Health Service, including all such research funded by the National Institutes of Health. It is a 7-page form[4] that is intended to describe both the progress made to date and plans for the following year. For this evaluation, two of the seven pages – the Budget Justification (Page 3) and the Progress Report Summary (Page 5) – provide data that is then subjected to additional coding and assessment. These sections are described briefly below.

Budget Justification

The Budget Justification form is one part (commonly referred to as "Page 3") of the annual Public Health Service PHS 2590 Grant Progress Report. The form is provided in Appendix H along with detailed results.

The instructions for completing the Budget Justification Form are:

Justification. Provide a detailed budget justification for those line items and amounts that represent a significant change from that previously recommended.

Current Budget Period. In the space provided, or on additional pages, explain any estimated unobligated balance of total costs (including prior year funds carried over) that is greater than 25 percent of the current year's total

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[3] For more detailed information and the complete form and instructions, see http://grants1.nih.gov/grants/funding/2590/2590.htm.
[4] While the form itself has seven pages, a completed form is likely to be considerably longer than that. For instance, for the TTURC initiative, grantees are expected to generate a Progress Report Summary (PHS 2590, Page 5) that is 2 - 4 pages long for each subproject. Since each of the seven centers has as many as 10-12 such reports, this section of the annual report alone can be considerable.

authorization. Explain why there is a significant balance and how it will be spent if carried forward into the next budget period.

The form consists of two open-ended response fields, one for each of the categories described above. Because responses are open-ended, it is necessary to code these responses in order to summarize them adequately. Where budget justification information was supplied, responses were categorized by type of budgetary change and, for personnel changes, the type of and reasons for such a change. If there were budget carryovers greater than 25%, the reasons for the carryover were also categorized.

Progress Report Summary

According to the instructions, the PHS 2590 Progress Report Summary section "should be a brief presentation of the accomplishments on the research project during the reporting period, in language understandable to a biomedical scientist who may not be a specialist in the project's research field" (U.S. Public Health Service, 2001). The Progress Report Summary has six sections:

a. Specific Aims

The aims, as actually funded, may differ in scope from those stated in the original, competing application, because of Scientific Review Group (SRG) and Council recommendations and/or budgetary modifications made by the awarding component. If the aims have not been modified, state this. If they have been modified, give the revised aims and the reason for the modification.

b. Studies and Results

Describe the studies directed toward specific aims during the current budget year and the results obtained. Include negative results. If technical problems were encountered in carrying out this project, describe how your approach was modified.

c. Significance

Emphasize the significance of the findings to the scientific field and their potential impact on health.

d. Plans

Summarize plans to address the Specific Aims during the next year of support. Include any important modifications to the original plans.

Address any changes involving research using human subjects and/or vertebrate animals.

e. Publications

Provide one copy of each publication not previously submitted to the awarding component. List the complete citation (author(s), title, journal or book, volume, page number, year) of all publications not previously reported. This includes manuscripts submitted or accepted for publication. Report only those publications resulting directly from this grant. State if there have been no publications.

f. Project-Generated Resources

If the research supported by this grant resulted in data, research materials (such as cell lines, DNA probes, animal models), protocols, software, or other information available to be shared with other investigators, describe the resource and how it may be accessed.

For this evaluation, the Progress Report Summary was coded for the content analysis, reviewed and assessed using peer evaluation, and a bibliometric analysis was conducted on the reported publications.

Financial Report (SF269a)

The SF269A[5] is a standard document required to be submitted annually by all federal research fund grantees within 90 calendar days of the last day of the final budget period of the projects funded through grant monies. The form and instructions are provided in Appendix H. These financial progress reports indicate the exact balance of unobligated funds. They also report expenditures according to the official records of the grantee organization. The grantee is asked to report financial information for the prior budget year, as well as the cumulative information for the life of the project covered by the grant funds. This framework assumes and allows for some need to carry over funds from one year to the next to best fit the fiscal needs of the research efforts of the grantees. At the time this analysis was undertaken, Financial Status Report information was available only for the first two years of the TTURCs.

The key data provided through this form are the total dollar amount authorized for spending (Federal Funds Authorized) and the amount actually spent during the year. The unobligated balance, or *carryover*, is the total amount authorized minus the amount spent. The SF296A only reports total dollars. Amounts spent and carried over by budget category are not provided. One SF269A form is collected from each TTURC center each year; there is no breakdown by subprojects within centers.

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[5] The form and instructions for the SF 269a can be found at http://www.whitehouse.gov/omb/grants/grants_forms.html.

Analyses

<u>Survey Analysis</u>

Three collaboration scales (Satisfaction with Collaboration, Impact of Collaboration, Trust and Respect) and a Transdisciplinary Scale were constructed by combining sets of items from the related sections of the Researcher Form survey. Confirmatory factor analysis was used to determine the factorial structure of these scales. Reliability for the scales was estimated using coefficient alpha. In addition, 26 separate index variables were constructed from different combinations of question items. Each scale and index score can be linked to an outcome area on the TTURC logic model. Basic descriptive statistics were computed for each survey question and item and for each of the scales and index scores. Finally, one-way ANOVAs were computed for each scale and index score to test for significant differences by respondent role and by center. The procedures used to compute and test scales and index scores, and all results obtained from the survey analyses, are described in Appendix D.

<u>Content Analysis</u>

Although the entire Progress Report Summary was reviewed for each subproject, sections b (Studies and Results) and c (Significance) were the primary sections with relevant information for this content analysis. Across the seven TTURC centers there were 85, 86, and 98 subprojects in years 1 − 3 respectively for a total of 269 separate reports that were coded for whether they reported each of the fourteen markers or not. In this coding scheme, it does not matter how much a progress report emphasizes or reports any specific marker, only whether it does. While not as specific as a coding of the degree to which a report addresses each marker, this dichotomous coding is highly reliable, can be accomplished quickly and at low cost, and is capable of demonstrating the general pattern of markers across the subprojects. It also enables rapid identification of those subprojects that address each marker, facilitating subsequent retrieval anecdotal reporting.

The content analysis procedures were developed and refined in a series of three reliability studies. In each study, four coders were provided with the coding instructions and a recording sheet for a sample of six subproject reports. After each reliability test, coders discussed discrepancies, clarified or revised definitions as needed, and then recoded another six subproject reports. After the third round of testing, the final reliability estimate was .94 (kappa = .938, t-value = 8.601, $p < .001$) and the content analysis coding procedure was deemed sufficiently reliable. For the content analysis, the subproject reports were randomly ordered before coding to minimize any potential sequencing effects. See Appendix E for more details on the Content Analysis.

Peer Evaluation

Peer evaluations were conducted of every Progress Report Summary for every subproject from each of the seven TTURCs for the first three years of the initiative. Peer evaluators were recruited from the same pool of people that composed the original TTURC proposal review team and make up the current TTURC consulting committee. While the peer evaluators are knowledgeable about tobacco control research in general, and familiar with the TTURCs in particular, they are "external" to the funded TTURC centers. Consequently, they are in a position both to understand the nuances of the science involved and at the same time are not initiative insiders with a vested interest in the assessments.

Twenty-one potential reviewers were identified from a larger list of approximately seventy. Of these, fourteen volunteered to be peer evaluators. Every center had two randomly selected peer evaluators. A package of review materials was sent to each peer evaluator that consisted of the complete materials for the TTURC center for the first three years of the initiative. The peer evaluations in this initial evaluation year were retrospective and included peer evaluator review of progress reports for each of the first three years for each subproject in the center. The peer evaluators were also sent the original TTURC proposal to consult if they had questions about what was originally intended by the grantee. The Peer Evaluation Form was constructed to provide four major peer evaluator assessments: Progress, Impact, Outcomes, and Comments. The form was designed to be brief so as to not impose undue burden on the peer evaluators. It was designed to enable an overall assessment of progress relative to project goals, and an assessment of impact of the research to date on four important audiences or constituencies: scientists and the research community; practitioners and clinical practice; policy makers and policies; and, clients and consumers of health services. Peer evaluators were also asked to assess progress in each of the outcome areas on the TTURC Logic Model. There is evidence to support the consistency and reliability of the peer evaluations across the pairs of randomly assigned peer evaluators. For every item assessed, over 80% of the time both judges either agreed or differed by no more than 1 rating scale unit (e.g., one judge rated and 2 while the other rated a 3). And, for every item, two inter-rater nonparametric correlation coefficients were positive and statistically significant. Please refer to Appendix F for more details regarding the Peer Evaluation analyses.

Bibliometric

Bibliometric analysis involves the quantitative assessment of scientific publications, the works they cite, and the citations of them. Only TTURC publications in peer-reviewed journals are included in this analysis. Citations are made in published scientific work to acknowledge the prior relevant work of other scientists and, consequently, the numbers and sources of citations can provide important data about the recognition of published work by other scientists. Bibliometric analysis is a critically important source of objective

information about the quality and productivity of scientific work. It can be used to estimate the influence and impact of a single publication, or the quality and recognition of the entire published opus of a researcher, a research journal, or even a field of research.

In this bibliometric analysis a number of index variables were constructed from publication and citation data. Several of these indexes are based on data that enables TTURC results to be compared to external research productivity standards. For instance, indexes are constructed based upon citation rates of all other articles in the same journal as each publication, or based on citation rates of all articles in the same field or discipline. The indexes used in the analysis include: number of citations (total, self, adjusted), number of expected citations, journal impact factor, journal and field performance indicators, 5-year journal and field impact factors, statistics on both cited and citing journals, and a journal disciplinarity index designed to reflect the multidisciplinarity of cited or citing journals. A more detailed description of the indexes, methodology and results for the bibliometric analysis is provided in Appendix G.

The TTURC bibliometric analysis is necessarily preliminary because at the time of this evaluation only three complete years of publication and two-and-a-half years of citation data were available. Nevertheless, the analysis provides: an important pilot test of bibliometric methods and indexes; critical baseline data for subsequent analysis of research productivity; and, a valuable and intriguing initial look at productivity trends.

Financial Analysis

The financial analysis integrates the data from two separate sources:

- The annual project expenditures as reflected in the Financial Status Report (FSR 269A)
- The annual budget justification which is completed as part of the annual Grant Progress Report (PHS 2590)

The FSR data describes actual spending and is collected for each of the seven TTURC centers on an annual basis, within three months of the completion of each project year. The budget justification data provide a summary of the reasons provided by Principal Investigators (PIs) for any budget carryover from one year to the next. These data are collected approximately two months before the completion of a project year and are part of the description of the plans for the subsequent year. Further information relating to the Financial Analysis can be found in Appendix H.

Evaluation Analysis

The term "Evaluation Analysis" in Figure 2 refers to the *integration* of results across the mixed methods of data and analysis used in this evaluation. This integration is

accomplished in several ways. First, the TTURC Logic Model is an essential organizing device that helps guide the development and structure of the researcher survey form, content analysis and peer evaluation. Because of this, we are able to look at the results of several methods in terms of that logic model framework. Second, the specific process and outcome categories can be divided into broad, sequential marker stages: short-term markers, intermediate markers, and long-term markers. Within each stage, we examine the results across multiple data sources. For example, a key intermediate marker is scientific productivity. Productivity results are available from the bibliometric analysis of publication quantity, quality and citations, from the assessments productivity in the researcher survey, and based on the judgments of peer evaluators.

Results

The results of the evaluation are presented in separate sections grouped into short-term markers, intermediate markers and long-term markers, as described in Figure 1 above. The term "marker" is used for the first two categories to suggest that the measure involved is a process variable that is construed as necessary in order to achieve long-term markers. Within each section, the basic findings are described across all data sources. Detailed analyses and background information for each finding reported here can be found in the relevant appendices for each data source.

Short-term Markers

The short-term markers involve measures of TTURC activities and assessments of those activities. In addition to the three areas on the logic model of *training*, *collaboration* and *transdisciplinary integration*, the short-term markers also include management-related measures including the results of financial analysis of expenditures and carryover. The evaluation suggests the following general conclusions in these areas:

Collaboration

- Researchers are collaborating across disciplines, and value both collaboration and transdiscipinarity. Collaboration received the second highest progress rating of the 13 areas rated by peer evaluators. In the third year, nearly 50% of all subprojects were coded as reporting progress in collaboration.
- There are some significant process barriers to collaboration including the difficulties of resolving conflicts, conducting productive meetings, and dealing with the increased time burden required.
- There are significant differences in collaboration results by role. Professionals appear to have relatively more difficulty than researchers with communication and collaboration.
- Communication within centers is hampered by insufficient time and by information overload.

- With respect to within-center collaboration, evaluations were highest for acceptance of new ideas and the ability to capitalize on the strengths of different researchers. However, the lowest evaluations were given for resolution of conflicts among collaborators and productivity of collaboration meetings. In terms of attitudes about collaboration, respondents express strong respect for their collaborators, but indicate that collaboration poses significant time burdens in their research.

Taken together, these results suggest that while respondents are positive about their collaboration experiences, there are significant barriers to how effectively collaboration is accomplished in practice.

Transdisciplinary Integration

- The ability to conduct transdisciplinary research was the highest rated performance marker across the centers after publication quality. It was in the top four variables (of 13) in terms of progress ratings by peer evaluators.
- Researcher attitudes about transdisciplinary research were uniformly high and positive.

Training

- The *training of students, new researchers and staff* was one of the highest rated outcome areas according to TTURC researchers. On average, they rated training good-to-excellent.
- Nearly 1/3 of all subprojects reported progress in training.

Financial Management

- There was significant variability across centers in their ability to spend allocated funds as originally proposed. All centers had significant carryover in the first year. By the end of the second year some had caught up while some remained significantly behind plans.
- Inability to spend as planned raises questions about whether the centers can achieve their proposed aims in the five-year framework of the initiative and suggests that progress is likely to be delayed.
- The results suggest that the centers had difficulty starting up in a timely fashion. Either the initial proposed expenditures were unrealistic (something that might have been caught in the review process) or the centers ran into difficulty in implementation. In all fairness on this issue, the funding agency can also be responsible for this by: not telling the institute ahead of time that funding was coming, by taking so long to process the application, and by being unclear about when funding will begin.

- A center that has significant carryover in the first few years of a large project may expose itself to the need for significantly increased levels of spending in later years just to catch up.
- There was a consistent drop in both budget changes and carryover across the first three years of the initiative. However, the third year of the TTURC initiative is likely to be the first in which expenditures approximate what was proposed, with the obvious implication for expectations regarding evaluation results.
- There is considerable variability across centers in both budget changes and carryover. For example, even into the third year of the initiative, one center had 40% of its subprojects with significant budget changes and another center had a quarter of its subprojects with carryover of 25% or more. These results do not necessarily indicate that there is a problem. In fact, they could be occurring because projects are being changed when the research takes a different direction due to early findings. However, the variability does suggest further investigation at centers with high rates of budget changes and carryover would be warranted and potentially valuable.
- By far, the most important single cause of significant budgetary changes was related to personnel issues, especially in the first two years of the initiative. This was primarily due to significant changes in the staff percent of effort. This may be indicative of poor initial planning at the proposal stage or of the recognition that staffing allocations needed to be changed once the projects got started. It is worth noting that staffing changes are influenced by the often considerable length of time between the staffing in original proposal and the awarding of grant funds.
- Carryover was primarily caused by delays in the start of the project. The single largest factor was related to granting agency issues in the first year of the initiative.

The financial analysis suggests that center start-up posed some challenges in the TTURC initiative. While some of this may be inevitable in so complex an undertaking, it would be worth exploring in the future whether greater management assistance early on can help mitigate some of these difficulties. While most centers have worked through these issues, one or two still appear to be having nontrivial budget changes or carryover as late as year three. This is not necessarily indicative of a problem, but it would be useful to investigate the issues of management and budgeting in greater detail, especially for those centers.

The primary lesson of the financial analysis may very well be that more aggressive efforts to manage the start-up of the initiative would lead to getting out of the gate more quickly and effectively. A slow start almost certainly affects the timeline within which the initiative can achieve its aims. A less than perfect start-up calls into question the degree to which expectations of progress in the initial proposal can be fulfilled in the timeframe proposed. If a slower than perfect start-up is unavoidable, it would seem sensible to adjust timelines for outcome expectations, perhaps even at the proposal

review stage. Finally, while start-up challenges are in evidence for some of the TTURCs, it's likely that such difficulties are not unique to this initiative. Similar financial analyses should be conducted with other initiatives to explore whether barriers to rapid start-up are common.

Intermediate Markers

Intermediate markers include the logic model categories *methods*, *science and models*, *internal and external recognition and support*, *publications*, *communications*, and *improved interventions*. The primary findings are:

- *Methods* was the highest-rated marker in terms of progress by peer evaluators, while *science and models* was third highest.
- Progress in methods was reported by nearly three-fourths of all subprojects in year 3. Nearly half of the subprojects reported progress in *Science and Models* in year 3.
- Overall, limited progress is reported by the researchers themselves in the development of *science and models* and *methods*, although this may be expected at this point in the evolution of the TTURC initiative. On the methods side, 'good' progress was reported with respect to the development of measures. In terms of scientific theory development, 'good' progress was reported in "understanding the relationships between biological, psychosocial and environmental factors in smoking."
- There are significant differences in results by role. For instance, investigators report significantly lower evidence that collaborative and transdisciplinary research criteria were used in hiring and promotion decisions than either professionals or students. Such a result is likely to be due to differential awareness of certain issues by role.
- The number of all publications and of research publications increased each year.
- TTURC publications are placed in well-cited journals.
- TTURC publication citation rates are significantly higher than for other articles in the same journals.
- TTURC citation rates are significantly higher than for all articles published in all journals in the same fields/disciplines.
- For TTURC research publications, the rate at which observed citations exceed expected increased significantly over the first two complete years of the initiative.
- Investigators report significantly higher productivity than Professionals.
- Communications of research findings was rated on average as 'good' by researchers.
- Moderately good progress is reported on the development of interventions.

Long-Term Markers

Long-term markers include the effects of the TTURC initiative on policy and practice and, ultimately, on health outcomes. The primary findings to date are:

- Based only on research to date, peer evaluators on average expect the TTURC initiative to have a <u>moderate</u> impact on *scientists and the research community* and <u>limited</u> impact on *practitioners and clinical practice*, *policy makers and policies*, and *clients and consumers of health services*. Since the TTURC initiative is in year 3 of five years, these impact estimates are likely to increase as more work is accomplished.
- TTURC researchers report considerable impact on both policies at the state and local levels and on practice with respect to tobacco control.
- TTURC researchers are optimistic that their research will help lead to significant positive health outcomes, especially for consumption and prevalence.

General Results

In addition to reporting results for each outcome marker area, considerable evaluation information is available that cuts across variables or enables more general assessments. Key findings are:

- There are significant differences in results by TTURC center. On 24 of 26 scale or index scores some centers differed significantly from others. This suggests that center differences may be useful in understanding differential evaluation results across centers that may emerge subsequently in TTURC evaluation. Furthermore, there are consistent differences in spending patterns by center.
- Overall, nearly 40% of all projects were rated "on track" by peer evaluators in each year. However, nearly 25% each year were rated from somewhat to significantly behind, suggesting that there is considerable room for improvement. A possible next step to this evaluation would be to explore any connection between the start-up problems at specific sites with the delayed budget expenditure results.
- On average, the TTURC initiative has made limited to moderate progress in each of the three years in each of the thirteen outcome areas.

Pattern of Results

The TTURC logic model suggests a sequence of outcomes of the initiative, beginning with the short-term markers and, over time, reaching the long-term markers. The results are graphed onto the logic model for the three major data sources in Figure 3 (Researcher Form), Figure 4 (Content Analysis), and Figure 5 (Peer Evaluation). The pattern of observed TTURC markers corresponds with the TTURC logic model prediction. In general, short-term markers (i.e., process measures) show the greatest

progress with intermediate and longer-term markers showing lower progress levels as expected. The trends over time suggest that the TTURC initiative is making progress along the lines that would be expected in the logic model.
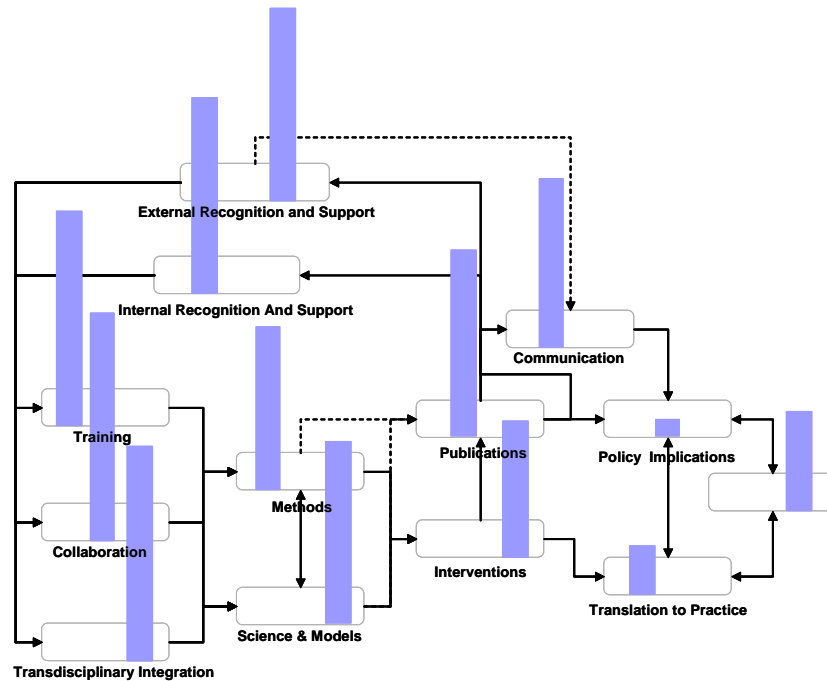

Figure 3. Researcher survey results: Average evaluation rating by TTURC logic model outcome area. Because the researcher form was only administered in year 3 of the initiative, there is only one bar for this data source for each marker.
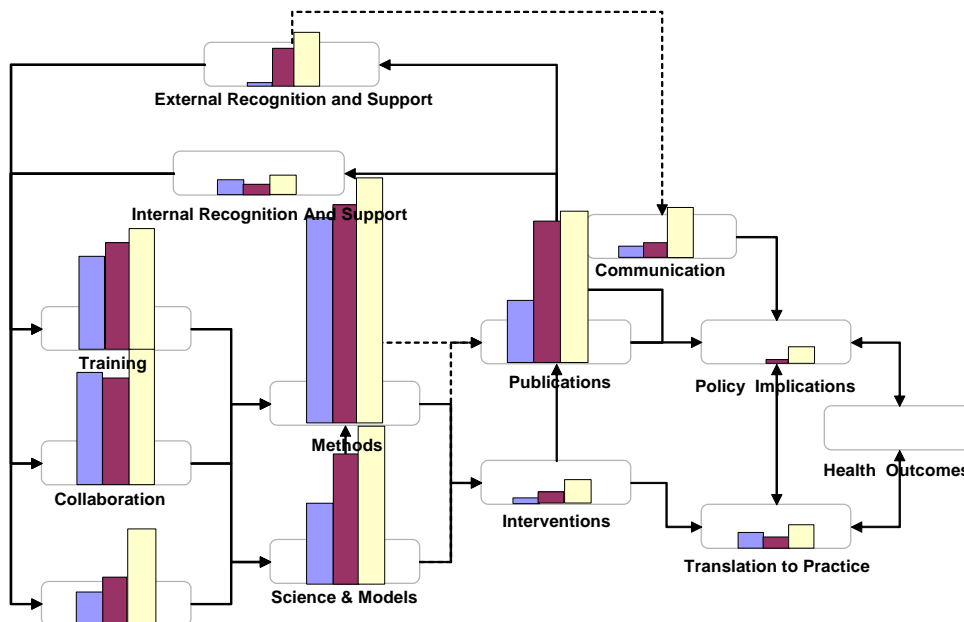

Figure 4. Content analysis results: Percent of subprojects addressing each outcome overlaid onto TTURC Logic Model, Years 1-3.
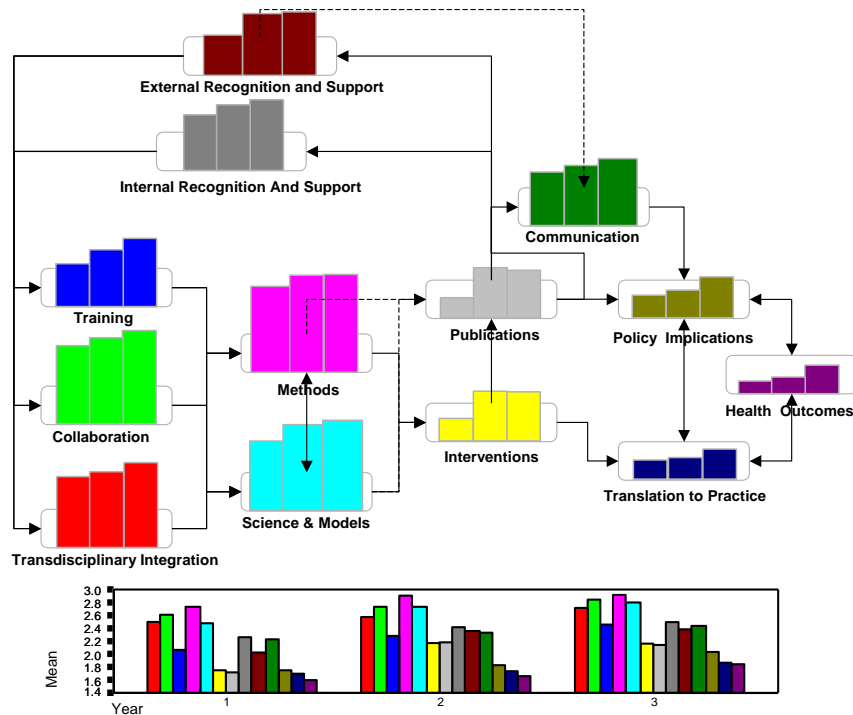
Figure 5. Peer evaluation results: Average progress by year overlaid onto TTURC logic model.

Conclusions

The overall results for the TTURC initiative at this early date are positive. However, there is one major area where attention might be usefully directed to improve the initiative. That is, there is considerable variation in results by center. In spending patterns, for example, even into the third year there were several centers that still had significant carryover of unspent funds from the first two years. And, on virtually every major index measured on the researcher survey, statistically significant center differences were detected. Subsequent analysis is needed to examine center differences and determine whether they are related to outcomes, especially more the intermediate and longer-term markers of success.

Even so, a little more than halfway through the initial five year period, the evaluation results, taken as a whole, provide evidence that the TTURC initiative is "on track" and at least making "limited to moderate" progress. Across multiple data sources, both internal and external to the initiative the hypothesized pattern of outcomes is supported in the results. Peer evaluators and TTURC researchers report considerable progress especially in the development of new methods, science and models. Although the

TTURC initiative is only in its third year, productivity with respect to scientific publications is especially impressive.

Appendices

- Appendix A. Conceptual Framework
- Appendix B. TTURC Initiative Request for Applications (RFA)
- Appendix C. PHS 2590 Grant Progress Report: TTURC Instruction Supplement
- Appendix D. Researcher Survey
- Appendix E. Content Analysis of Annual Progress Reports
- Appendix F. Peer Evaluation of Annual Progress Reports
- Appendix G. Bibliometric Analysis
- Appendix H. Financial Analysis