



A measure of community members' perceptions of the impacts of research partnerships in health and social services

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ABSTRACT

Currently, there are no psychometrically sound outcome measures by which to assess the impacts of research partnerships. This article describes the development of a 33-item, survey questionnaire measuring community members' perceptions of the impact of research partnerships addressing health or social issues. The Community Impacts of Research Oriented Partnerships (CIROP) was developed using information from the literatures on health promotion, community development, research utilization, and community-based participatory research, and from focus groups involving 29 key informants. Data from 174 community members were used to determine the factor structure, internal consistency, and test–retest reliability of the four CIROP scales, and to provide evidence of construct validity. The CIROP informs research partnerships about the extent of their impact in the areas of Personal Knowledge Development, Personal Research Skill Development, Organizational/Group Access To and Use of Information, and Community and Organizational Development, allowing them to demonstrate accountability to funding bodies. As well, the CIROP can be used as a research tool to assess the effectiveness of knowledge sharing approaches, determine the most influential activities of research partnerships, and determine structural characteristics of partnerships associated with various types of impact. The CIROP provides a better understanding of community members' perspectives and expectations of research partnerships, with important implications for knowledge transfer and uptake.

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Research partnerships between universities and community organizations are proliferating. There are increasing pressures on researchers in these partnerships to demonstrate the impact of their work (Kuruville, Mays, & Walt, 2007; Lavis, Ross, McLeod, & Gildiner, 2003). Research funding bodies and the general public want assurance that investments made in community–university research partnerships have societal benefits (Hanney, Grant, Wooding, & Buxton, 2004; Lavis et al., 2003) and it is important for research partnerships to show that they are achieving their goals (Ribnick & Carrano, 1995; Roussos & Fawcett, 2000; Tash & Sacks, 2004).

Community–university research partnerships in the health and social service fields are collaborative endeavors involving university- and community-based researchers, university students and faculty members, health and social service providers and managers, and service recipients. These partnerships are assumed

to produce knowledge that informs community members, leading to more efficient service delivery, more effective clinical programs, and enhanced community development. The real-world impacts of research partnerships are, however, largely unexplored, and there often are unrealistic expectations about the magnitude of impact that research can have. Although there is anecdotal evidence of the benefits of research alliances, there is little concrete evidence, due to the lack of reliable and valid tools by which to measure impact.

The aim of the present study was, therefore, to develop a conceptually based survey measure to capture quantifiable information about the full range of benefits of research partnerships in the eyes of their target audiences—community members. By “community members,” we mean the group of individuals who are the intended beneficiaries of the research partnership's activities, including groups of individuals with shared interests and values (e.g., parents and teachers of children with physical disabilities) and groups of people living in the same geographical area (Green et al., 1995; McColl, 1998).

Most often, research impact has been examined using traditional measures of productivity such as counts of publications and

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citations (Hunt, Curzio, Hager, & Kinn, 1999; Johnston, 1995) or by taking the perspective of the internal research team (Nanna, Hinderer, Rosenthal, & Gans, 1997; Zuckerman, Kaluzny, & Ricketts, 1995). However, when research is aimed at making a real-world difference, it is important to assess outcomes relevant to the users or target audiences (Lyall, Bruce, Firn, Firn, & Tait, 2004).

In the following sections, we discuss (a) the nature of research oriented community–university partnerships, (b) the need for measures of impact, and (c) various approaches to the assessment of impact. We then describe the development of the Community Impacts of Research-Oriented Partnerships (CIROP) measure, including the context for its development; its intended purpose, conceptual basis, and design (including major methodological decisions that were made); and the specific study objectives.

1. The nature of community–university research partnerships

Community–university research partnerships provide an infrastructure from which knowledge is generated, findings are shared, and research skills are developed. These partnerships consist of groups of people who have come together to address a particular topic in a concerted way. In the field of science/technology, these research entities are referred to as knowledge value alliances. These alliances involve knowledge producers and users pursuing a unifying knowledge goal but with diverse ends in mind, including curiosity, skill development, and application (Rogers & Bozeman, 2001).

Community–university research partnerships in the health and social service fields vary with respect to the number of universities and community organizations involved, the formality of their organizational structure, and their ways of operating (King, Servais, et al., 2008). Despite this variation, community–university research partnerships have three common functions: (a) knowledge generation, (b) knowledge sharing to improve the functioning of community organizations and the well-being of communities, and (c) research education/training to improve the research skills both of university students and community service providers (Currie et al., 2005). Researchers in diverse fields, including health and science/technology, refer to knowledge generation, knowledge sharing, and research education/training as the core missions, functions, or processes of research centers or partnerships (Bozeman & Boardman, 2004; Israel, Schulz, Parker, & Becker, 1998; King, Currie, Smith, Servais, & McDougall, 2008; Youtie, Libaers, & Bozeman, 2006).

2. The need for measures of the impact of research partnerships

There is a need for tools (i.e., methods/approaches, frameworks, standardized measures) by which to assess the outcomes of research partnerships (Arcury, Quandt, & McCauley, 2000; Shavelson & Towne, 2002) and to understand and explain the relevance and impact of applied research (Kuruville, Mays, Pleasant, & Walt, 2006). In particular, there is a need for sensitive, accurate, and acceptable measures of the community impacts of research alliances (Illback, Kalafat, & Sanders, 1997; Paine-Andrews et al., 1997). Identifying end-users of research and capturing their views on research utility is a challenging task. It is important, however, to begin to develop tools by which to assess the societal use and impact of research (Landry, Amara, & Lamari, 2001; Lyall et al., 2004).

A search of the literatures on health promotion, community development, research utilization, and community-based partici-

patory research uncovered no standardized, generic measures of the impacts of research partnerships in the fields of health, social services, or science/technology. As yet, there are no formal assessment measures that adequately differentiate types of impact and provide numerical scores on which to base action, quantify progress, and compare performance (Halliday, Asthana, & Richardson, 2004).

The aim of the present study, therefore, was to develop a psychometrically sound measure of the impacts of community–university research partnerships addressing social or health services issues, as seen by community members who are affected by or otherwise interested in the partnership and its influence (Zuckerman et al., 1995). The measure will provide needed, quantified information about the “payback” of research partnerships (Buxton & Hanney, 1996). Payback refers to a multi-dimensional categorization of research benefits, including the knowledge that is produced, research capacity building and absorption, impact on policy, health benefits, and broader economic benefits (Hanney et al., 2004; Hanney, Packwood, & Buxton, 2000).

3. Approaches to the assessment of the impact of research partnerships

A range of individualized to more structured approaches can be taken to assess the impacts or benefits of partnerships. Each approach has strengths and limitations with respect to conceptual assumptions about the nature of impact, respondent biases, and ability to facilitate comparative analysis. Ideally, a number of methods are used in conjunction to reduce biases in the identification of research impacts. Anecdotal accounts and traditional indicators of productivity have limitations with respect to comparisons over time and across partnerships (Kuruville et al., 2006). Generally, a specialized impact assessment is considered to be superior, but these studies are costly, difficult to implement, and hard to replicate (Kuruville et al., 2006). As a consequence, increasing attention has been paid to providing frameworks and tools that provide a jumping off point for researchers.

Several evaluation frameworks have been proposed that involve interviews with stakeholders, users, and researchers themselves (e.g., Spaapen & Wamelink, 1999). Recently, Kuruville et al. (2006) have described a methodological approach to identifying and describing research impact in four areas, including research-related, policy, service, and societal impacts. This framework provides researchers with prompts and descriptive categories that enable them to identify specific impacts.

Lavis et al. (2003) have provided a useful inventory of approaches by which to examine the decision-making impact of applied health research. Their inventory includes a list of indicators (e.g., number of interactions with decision-makers, decision-makers' self-reported use of research) and outlines possible data sources, such as interviews with decision makers, website records, document reviews, and surveys. The inventory focuses on the influence of research partnerships on decision making, rather than on knowledge, skills, organizational research capacity, or community well-being.

The Australian Technology Network (Furlong, 2005) has developed a 5-point rating scale to assess the impact of technology-related research, ranging from outstanding impact (i.e., use of research in community or policy development) to low impact or little evidence of use. However, this scale does not capture perceptions of different types of impact, nor does it adopt the perspective of community members. In summary, the literature outlines various methodological approaches to identify and describe impact, but there are no standardized measures

designed to provide quantifiable data about the perceptions of end-users, covering all the areas of impact targeted by research partnerships.

4. Measure of Community Impacts of Research-Oriented Partnerships (CIROP)

4.1. Context

For the present project, researchers from five multidisciplinary community–university research partnerships in Ontario, Canada, joined together to develop the CIROP. Each partnership was an organized entity with a common purpose, and each received funding as a research partnership or alliance. The partnerships differed in the length of time they had been in existence (4–20 years), breadth of purview (3 had a local or provincial focus, 2 focused on the national and international levels), and scope of partnering (2 involved fewer than 10 partner organizations, 3 involved between 14 and 19 partner groups). The types of partner organizations were varied and included universities, advocacy groups, community-based organizations (e.g., self-help groups), government agencies, school boards, social service agencies, health service agencies, and hospitals.

4.2. Purpose of the CIROP

The intent was to develop a generic survey measure of the influence of research partnerships on skills, decisions, and community capacity, in the eyes of target audience members, in order to inform the management of research partnerships and to permit quantitative comparisons over time and between partnerships. The CIROP is intended for use by *research* partnerships addressing health or social issues, such as physical disability, mental health difficulties, disadvantaged communities, homelessness, health promotion, and the prevention of risky behavior. Care was taken to develop a measure that would have broad applicability to research partnerships in the fields of health and social services. Consequently, narrowly applicable indicators of impact (such as the availability of culturally appropriate services) are not included in the CIROP.

The CIROP is *not* intended for use by *service-oriented* community partnerships in health or social care. There are a number of formal tools for the assessment of service-oriented partnerships, which are predominantly concerned with process issues (i.e., with organizational processes and interpersonal/group dynamics related to successful collaboration) (Dickinson, 2006; El Ansari & Weiss, 2006).

The CIROP is a measure of outcome rather than process. It was *not* designed to assess organizational relationships or specific approaches (e.g., social marketing methods or community-based participatory research methods) that may be associated with positive impacts perceived by community members. Rather, our interest was in assessing the types and magnitude of the impacts themselves. As well, the CIROP was *not* designed to assess factors affecting the success of research partnerships (such as community partners' availability of time to engage in the work, power issues, or differences in cultural competencies of researchers and community members involved in partnerships). The CIROP can, however, be used to study the relative influence of such factors.

4.3. Conceptual basis of the CIROP

Measuring the use of research is a complex issue (Richardson, Jackson, & Sykes, 1990), requiring both a coherent conceptual underpinning (Schwandt, 2005) and strong attention to metho-

dological issues (Lyll et al., 2004; Richardson et al., 1990). The CIROP measure was based on a multidimensional model of impacts (Currie et al., 2005) that outlines a number of interrelated aspects or types of impact (Buxton & Hanney, 1996; Gillies, 1998; Pirie, Stone, Assaf, Flora, & Maschewsky-Schneider, 1994). The model views research impact as a multidimensional, indirect, and non-linear process (Hanney et al., 2000; Molas-Gallart, Salter, Patel, Scott, & Duran, 2002) involving co-learning between researchers and community members, and the reciprocal transfer of knowledge, skills, and capacities (Israel et al., 1998).

The impact model (see www.impactmeasure.org/model.htm) specifies (a) the functions of research partnerships (i.e., knowledge generation and sharing, research education/training), (b) types of outputs corresponding to these functions (i.e., information products such as easy-to-read summaries), (c) indicators of the utilization of these outputs (e.g., website use statistics), (d) mid-term impacts (i.e., impacts on knowledge, research skills, and the actual application of ideas, findings, and materials), and (e) long-term impacts (e.g., enhanced quality of life or consumer satisfaction).

Although we philosophically ascribe to the view that impact is a process, we took a practical approach in the present study, by developing a questionnaire to capture impact as an outcome. We developed a measure of mid-term impacts (those one would expect to see after a partnership has been sharing information regularly for a 2- or 3-year period) because changes in long-term outcomes do not occur for many years (Lyll et al., 2004; Paine-Andrews et al., 1997; Pirie et al., 1994). The focus was, therefore, on impacts on knowledge, research skills, and the use of research, rather on short-term indicators of impact (such as website use statistics) or on longer-term impacts such as quality of life.

4.4. Design of the CIROP

The CIROP measures the ways and extent to which a particular research partnership has influenced individuals, organizations or groups, and communities. It is completed by community members (including other researchers) who are the intended beneficiaries of a partnership's knowledge generation, knowledge sharing, and research education/training efforts. The CIROP: (a) provides impact information about a particular research partnership, (b) contains items that are broadly applicable to a range of partnerships dealing with research on health or social issues, (c) has a modular format, allowing the selection of groups of items for completion by particular groups of respondents, and (d) has a series of companion questionnaires, which capture background information about respondents and partnerships, and information about interactions between partnerships and community members. These design features are discussed below.

First, the CIROP was designed to provide impact information about a particular partnership. There is space on the survey form for the name of the partnership to be specified; respondents are asked to indicate the extent to which that partnership has had various impacts (with a "don't know" response option included). In this way, the questionnaire straightforwardly addresses the troublesome issue of uncertainty in the attribution of impacts to a partnership. Many factors affect the use of research by an individual or organization (Kuruville et al., 2006; Lyll et al., 2004), including a person's receptiveness to new ideas, the degree to which they were personally engaged in the research (Halliday et al., 2004), their expectations with respect to the partnership (Halliday et al., 2004), and their organization's absorptive capacity (Cohen & Levinthal, 1990). The CIROP does not directly examine these factors, but can be used in research

studies to examine the influence of these factors on perceptions of impact.

Second, the CIROP was designed to be broadly applicable to different groups of end-users. Generic indicators of impact were identified based on a thorough review of the literatures on health promotion, community development, research utilization, and community-based participatory research (e.g., Arcury et al., 2000; Buxton & Hanney, 1996; Gillies, 1998; Hays, Hays, DeVille, & Mulhall, 2000; Illback et al., 1997; Kuruvilla et al., 2006; LeGris et al., 2000; O'Fallon & Dearth, 2002). The indicators reflected the three mid-term impact domains specified in our impact model: (a) knowledge enhancement (e.g., changed beliefs with respect to a topic area), (b) research skill enhancement (e.g., improved ability to critically appraise relevant research), and (c) information use (i.e., use of findings, concepts, and materials). The indicators encompassed awareness, use, and consequences of research information (Rossman, Hober, & Ciarlo, 1979); the instrumental, conceptual, and political uses of research concepts and evidence (Landry, Amara, & Lamari, 2001; Weiss, 1979); individual, organizational, and societal levels of change (Gillies, 1998); and attitudinal, cognitive, and behavioral indices of change (Pirie et al., 1994).

Third, the CIROP was designed in a modular format so that the partnership administering the survey has the option of deciding which aspects of impact to assess. The questionnaire could be mailed or emailed to known end-users, or posted on a website to be completed by individuals unknown to the research partnership.

Last, we developed three companion questionnaires to provide contextual information to assist in the interpretation and reporting of CIROP findings (available at www.impactmeasure.org/tools.htm). The Respondent Form gathers descriptive background information about respondents, including their relationship with the partnership and degree of active involvement. This form can be used to gather information about the ability of respondents to reliably and authoritatively answer questions about whether their group, organization, or community has experienced benefits from the partnership. The Research Contact Checklist can be used to track all requests related to a partnership (i.e., who is contacting the partnership, how, and the nature of their requests) in a period of time selected by a partnership. The Background Information Form for Research Partnerships provides a way to collect descriptive background information about a partnership.

5. Specific study objectives

The purpose of the study was to develop the CIROP measure. The article describes the process of developing the CIROP and provides information about its psychometric properties, including its factor structure, internal consistency, and test–retest reliability.

To provide evidence of construct validity, we examined the ability of the CIROP to discriminate among respondents in terms of (a) their roles with the partnership (active roles versus recipients of information) and (b) their roles at their organization of employment (i.e., academics/educators, managers/directors, service providers, and researchers). We also examined associations between CIROP scale scores and respondents' reports on other variables considered to be associated with impact.

First, based on theories and evidence linking greater perceived impact to greater involvement with a research organization (Innvaer, Vist, Trommald, & Oxman, 2002; Israel et al., 1998; Lomas, 2000), we predicted that community members with more active roles with a partnership would report higher impact on all CIROP scales than would community members who were simply

recipients of information. Second, based on logical relationships, we predicted that (a) researchers would report higher impact with respect to personal knowledge development and research skill development, than would other groups (due to their roles), and (b) managers and service providers would report higher impact with respect to organizational access to and use of information, and community and organizational development (again due to their roles).

Third, we examined relationships between CIROP scale scores and respondents' reports of (a) their level of involvement and feeling of connection with a partnership, (b) the degree of fit of the partnership's theme with personal and organizational interests, (c) the personal and organizational relevance of supplied information, and (d) the extent of use of information and products supplied by the partnership, on both the personal and organizational levels. We expected to see statistically and clinically significant relationships between the "personal level" variables and the personal knowledge development and personal research skill development scales of the CIROP. We also predicted higher correlations between the "organizational level" variables and the CIROP scales measuring organizational access to and use of information, and community and organizational development. These predictions were based on models and frameworks of knowledge transfer (e.g., Reardon, Lavis, & Gibson, 2006), which indicate the importance of tailoring knowledge so that it is relevant to the user, and articles on the effectiveness of alliances (Gillies, 1998), which indicate the importance of distinguishing between indicators of utility on personal versus broader organizational/community levels.

6. Method

The study consisted of three phases: (a) item generation, (b) piloting, and (c) psychometric testing. Separate samples of individuals were involved with each phase. The study was approved by the research ethics boards at McMaster University, The University of Western Ontario, and Brock University.

6.1. Item generation phase

We employed a construct approach to test development in which items are generated to represent domains of interest (Wiggins, 1973). A comprehensive set of items was developed based on (a) indicators of impact from the literature that reflected the mid-term impact domains in our impact model (Currie et al., 2005), and (b) information gained from focus groups. We began by grouping the indicators distilled from the literature into three categories, reflecting impacts on knowledge, research skills, and the actual application of research ideas, findings, and materials. The main ideas from the focus groups were compared to this list of indicators to determine similarities and differences in information content. The list of indicators was then revised to be as comprehensive as possible.

6.1.1. Focus groups

We invited key informants (university and community members who had experience with one of the five partnerships) to participate in focus groups. The key informant approach is a qualitative method that allows an open-ended and detailed exploration of a topic (Marshall & Rossman, 1989). Five focus group sessions were held, involving a total of 29 individuals. The focus groups were facilitated by two members of the research team, and each involved a mix of university and community members. The sessions were audio taped and transcribed to determine indicators of impact.

Participants were asked to describe both positive and negative impacts and experiences with the research partnerships (after

Logan & Graham, 1998; Oakley, Marcy, Swanson, & Swenson, 1989). Prompts were used to focus the discussions, including: What would the ideal community–university partnership have achieved? What do you get out of being involved with a partnership? What did you expect to get out of being involved?

6.1.2. Item writing

A total of 88 items were written based on indicators determined from the literature and focus groups. The focus groups provided some new information beyond that derived from the literature, including the notions of tangible personal benefits, and opportunities for personal, organizational, and community development. The majority of the negative aspects of partnering mentioned in the focus groups dealt with process issues concerning interpersonal relationships or the amount of time it took to be part of a partnership, rather than impacts per se. Accordingly, a decision was made to write items addressing the extent to which positive benefits (rather than negative impacts) had occurred as a result of the existence of a research partnership.

6.1.3. Instrument format

The preliminary version of the CIROP contained 88 items grouped into eight modules. The questionnaire instructed respondents to consider only one partnership (a place was provided in which to name this partnership). To facilitate ease of responding, modules were used to orient respondents to the nature of the items. These modules were: knowledge enhancement (personal and organizational/group levels), research skill enhancement (personal, organizational/group, and community levels), and information use (personal, organizational/group, and community levels).

Different item stems directed respondents to the level (i.e., personal, organizational, community) at which they were to consider the items (see Table 1 footnote). Respondents rated the extent to which they attributed items (positive benefits) to a particular named partnership over a 1-year period, which was considered to be a reasonable time frame in which to make judgments of impact. Ratings were made on a 7-point, Likert-type scale where each point on the scale was labeled (e.g., 1 = “not at

Table 1
Factor loadings of the items on the CIROP scales.

Item ^a	CIROP scales			
	Factor 1: Organizational/Group Access To and Use of Information	Factor 2: Community and Organizational Development	Factor 3: Personal Research Skill Development	Factor 4: Personal Knowledge Development
organization's or group's confidence in being able to use the knowledge in practice or day-to-day activities?	.83	.22	.26	.25
organization's or group's knowledge or understanding about a topic?	.81	.24	.23	.25
organization's or group's access to up-to-date information?	.78	.16	.12	.31
organization's or group's beliefs/understandings with respect to an intervention or approach, a topic, or a group of people?	.77	.23	.21	.25
confirmed your organization's or group's feelings about the importance of particular issues?	.77	.21	.08	.29
to improve the types or nature of the activities, services, programs, or courses offered by your organization or group?	.76	.32	.27	.18
to provide affirmation of the organization's or group's existence and purpose?	.70	.34	.18	.20
to provide information resources for people receiving services from your organization or group?	.69	.32	.16	.20
to provide a stronger platform for further growth and development?	.69	.55	.18	.10
enhanced the importance of evidence in the eyes of people in your organization or group?	.68	.34	.44	.05
improved/developed your community's capacity to undertake research?	.12	.88	.29	.02
generated increased research opportunities for the community?	.19	.87	.26	.01
increased the amount of research being conducted in your community?	.17	.86	.19	.08
helped to generate stronger research connections within your community?	.26	.83	.23	.09
enhanced your community's ability to utilize outside knowledge more effectively?	.22	.80	.33	.12
to promote interagency collaboration or strong cross-agency working relationships?	.30	.80	.05	.26
to strengthen or support community action or advocacy efforts?	.27	.75	.06	.31
to generate a stronger local community?	.32	.74	.06	.37
enhanced the importance of evidence in the eyes of people in your community?	.28	.74	.30	.16
to enhance community awareness or more positive community attitudes?	.36	.68	.01	.43
generated more research opportunities for members of your organization or group?	.37	.60	.41	.01
improved/developed your organization's or group's capacity to undertake research?	.40	.59	.43	.03
enhanced your personal ability or confidence to conduct a research or program evaluation study?	.21	.18	.83	.15
led you to pursue different activities to develop your research skills?	.23	.25	.78	.20
helped you to become better at raising questions to be examined in research?	.20	.30	.75	.37
improved your ability to know how to find or access relevant research information?	.20	.22	.74	.38
provided you with an opportunity for professional or personal development?	.22	.30	.66	.30
increased your receptiveness to new ideas or evidence?	.22	.29	.65	.46
confirmed your feelings about the importance of particular issues?	.28	.13	.19	.77
increased or changed your personal knowledge or understanding about a topic?	.24	.18	.33	.73
changed your beliefs/understandings with respect to an intervention or approach, a topic, or a group of people?	.32	.17	.31	.69
improved your access to up-to-date information (e.g., current research and thinking in the field)?	.30	.14	.31	.68
increased your confidence in your professional or daily practice or day-to-day activities?	.35	.11	.49	.63

^a Personal level items began with “Over the past year, to what extent has your experience with the partnership...” or “Over the past year, to what extent have you personally used information and materials provided by the partnership to...”.

Organizational level items began with “Over the past year, to what extent has your organization's or group's experience with the partnership...” or “Over the past year, to what extent has the partnership...” or “Over the past year, to what extent has your organization or group used information and materials provided by the partnership to...”.

Community level items began with “Over the past year, to what extent has the partnership...” or “Over the past year, to what extent has your community used information and materials provided by the partnership to...”.

all," 4 = "to a moderate extent," 7 = "to a great extent") (after Hays et al., 2000). "Not applicable" and "don't know" response categories were provided to differentiate responses indicating a lack of item applicability from those reflecting a lack of knowledge (after Halliday et al., 2004).

6.2. Piloting phase

Community- and university-based members of research partnerships in the social and health services sectors from across Canada were invited to be involved in the development of the CIROP. These partnerships were known to members of the present research team, through conferences and networking opportunities involving Canadian research partnerships. Participating individuals were asked to evaluate the clarity and usefulness of the items, provide feedback about ease of responding, and identify problematic areas. A total of 68 individuals were approached by means of personal contacts and 23 gave feedback (a response rate of 33.8%). Based on this feedback, we generated instructions to assist respondents in selecting consistent perspectives to keep in mind while answering the CIROP (i.e., what role with the partnership to keep in mind, which organization or group, and which community). Item wording was fine-tuned, resulting in a 90-item version for the psychometric testing phase.

6.3. Psychometric testing phase

6.3.1. Recruitment procedure

The study sample constituted all known end-users or collaborators in each of the five participating research partnerships. Invitation packages were sent to all mail- or email-list members of the partnerships. These individuals were managers and service providers in community or government agencies and hospitals, community-based researchers, elementary school teachers and principals, university professors and students, recipients of services, and community leaders of various types. The packages included an introductory letter, letter of information, consent form, background information form, and a page of instructions to access a web version of the CIROP. Respondents who preferred to complete a paper version were sent the respondent background information form and the CIROP questionnaire by mail. A total of 174 completed questionnaires were received (a mean response rate of 21.5%). Response rate is not a crucial consideration for test development studies. The sample size of 174 was adequate for the factor analysis used to determine the scales of the measure (Kahn, 2006).

6.3.2. Test–retest reliability procedure

From the total sample, 56 individuals were randomly selected to receive a second CIROP questionnaire, with an interval between administrations of approximately 4 weeks. Twenty-one individuals returned a second completed questionnaire.

6.4. CIROP (Community Impacts of Research Oriented Partnerships) Respondent Form

The CIROP Respondent Form (King et al., 2003) is a 27-item questionnaire designed to be completed at the same time as the CIROP. It captures information about the respondent's awareness of the partnership's purpose, products, and information sharing (15 items); the respondent's relationship with the partnership (5 items); and respondent characteristics (7 items). The present article used categorical questions ascertaining the respondent's role with a partnership and their role at their place of employment. In addition, eight continuous items were used (see Table 4), all rated on 5-point scales (ranging from "a great deal" or "very" to

"not at all"). Five items assessed *personal level variables*, including involvement and connection with the partnership, fit, relevance, and extent of use of information/products provided. Three items captured the respondent's perceptions of the relevance and use of partnership information/products by their *organization/group*.

7. Results

7.1. Respondent characteristics

The majority of the 174 respondents had completed university or graduate school (75.3%), were employed at a health services organization or educational institution (57.5%), and worked in managerial or service provider roles (50%). On average, they had known about the partnership for a period of 4 years and 4 months, and reported an average of 4 years and 2 months of involvement. Just over 43% indicated they were recipients of information; 53.4% indicated they were involved in roles of a more active nature. The majority considered themselves to be either a little involved or somewhat involved with the partnership (54.6%); 28.8% considered themselves to be fairly or extremely involved.

7.2. Item reduction

The best items were selected using a combination of conceptual and empirical approaches (after King, King, & Rosenbaum, 2004). We examined the means and ranges of responses on each item (to ensure that the means were not too high and to ensure good variability in responses), and the number of "not applicable" and "don't know" responses. We considered means around 4.0 on the 7-point scale and standard deviations over 1.4 to be desirable. We also considered the clarity of items in terms of wording and meaning, and took several conceptual considerations into account (e.g., ensuring coverage of sub-groups of content and inclusion of items from both the literature and focus groups). Through this iterative and integrative process, a total of 37 items were selected for the next stage.

7.3. Principal components analysis of the CIROP

The purpose of this stage was to construct scales based on items loading together in the analysis. A principal components analysis with a varimax rotation was performed using the data from the 174 respondents. Inspection of eigenvalues, along with interpretation of factor loadings, revealed four principal components. Inspection of the factor loadings led us to drop 4 items, resulting in a 33-item measure. The criteria for retaining items were (a) a factor loading of at least .50, and (b) if an item loaded on two factors, then a minimum difference of .10 was needed to retain the item.

The final principal component analysis accounted for 76.2% of the total variance. The eigenvalues and percent of variance accounted for by each factor were: factor 1 (18.0 and 25.8%), factor 2 (3.3 and 22.2%), factor 3 (2.4 and 15.7%), and factor 4 (1.4 and 12.5%). Table 1 presents the factor loadings of the 33 items on the four factors. The resulting scales were labeled: Organizational/Group Access To and Use of Information (10 items), Community and Organizational Development (12 items), Personal Research Skill Development (6 items), and Personal Knowledge Development (5 items). The full measure can be viewed and downloaded from www.impactmeasure.org/measure.htm.

The initial conceptual framework of the CIROP was supported by the results of the factor analysis. The Organizational/Group Access To and Use of Information scale consisted of (a) items in the organizational information use module, and (b) items in the organizational knowledge enhancement module that stressed the

Table 2

Internal consistency and test–retest reliabilities, means and standard deviations of the CIROP scales.

CIROP Scales	Internal consistency (Cronbach's alpha coefficients)	Test–retest reliability (intraclass correlation coefficients)	Mean	Standard deviation
Personal Knowledge Development	.92 ($n = 149$)	.67 ($n = 20$)	4.74 ($n = 146$)	1.35 ($n = 146$)
Personal Research Skill Development	.95 ($n = 135$)	.57 ($n = 15$)	3.87 ($n = 134$)	1.69 ($n = 134$)
Organizational/Group Access To and Use of Information	.97 ($n = 102$)	.72 ($n = 12$)	3.48 ($n = 80$)	1.69 ($n = 80$)
Community and Organizational Development	.97 ($n = 80$)	.21 ($n = 6$)	3.79 ($n = 102$)	1.54 ($n = 102$)

ideas of access to information and use of information. The Community and Organizational Development scale consisted of organizational and community level items dealing with (a) increased research capacity, and opportunities provided by research initiatives, and (b) the strengthening of communities with respect to collaboration, community action, and awareness. The Personal Research Skill Development scale and the Personal Knowledge Development scale were essentially the same as the personal research skill enhancement module and personal knowledge enhancement module, respectively.

7.4. Internal consistency, test–retest reliability, and impact scale scores

The amount of truly missing data on the CIROP was minimal overall (.8% missing). A total of 15.0% of the data was legitimately missing (6.4% “don't know” and 8.6% “not applicable”). As expected, the highest amounts of legitimately missing data were found for the Community and Organizational Development scale (12.9% “don't know” and 12.0% “not applicable”) and the Organizational/Group Access To and Use of Information scale (8.5% “don't know” and 8.2% “not applicable”). We had included the “don't know” option because we felt that some individuals would be uncertain about the extent to which impacts had occurred on the organization or community level. In the present study, scale scores were calculated only for individuals who answered all of the questions in a given scale, reflecting a conservative approach to test development.

As shown in Table 2, the Cronbach's alpha coefficients for the scales ranged from .92 to .97, indicating excellent internal consistency reliability (Streiner & Norman, 1989). The test–retest reliabilities (intraclass correlation coefficients) were calculated using the data from 21 individuals. Coefficients at .7 or greater are considered to be acceptable (Kirshner & Guyatt, 1985). The coefficients ranged from acceptable (.72 for Organizational/Group Access To and Use of Information) to poor (.21 for Community and Organizational Development). The n for the Community and Organizational Development scale ($n = 6$) was not adequate to establish test–retest reliability.

The highest scale mean was for Personal Knowledge Development ($M = 4.74$), indicating that respondents felt their personal knowledge had developed to a fairly great extent due to the activities of a research partnership. The lowest impact occurred with respect to Organizational/Group Access To and Use of Information ($M = 3.48$), indicating that respondents felt that access to and use of information by organizations and community groups

had occurred to a moderate extent. The standard deviations reported in Table 2 indicate good variability in responses, as desired.

7.5. Correlations among the CIROP scales

As shown in Table 3, the correlations among the CIROP scales ranged from .49 to .75. These correlations indicate that the scales capture different aspects of impact.

7.6. Construct validity predictions

To provide evidence of construct validity, we examined the ability of the CIROP to discriminate among respondents with respect to their roles. Analyses of variance were conducted on scale scores with respondents grouped into more active roles ($n = 93$) versus simply being recipients of information ($n = 75$), based on a question on the CIROP Respondent Form asking about their main role with the partnership. Respondents also were grouped into four types of roles based on a question asking about current positions: academic/educator ($n = 26$), managerial/leadership ($n = 39$), service provider ($n = 48$), and researcher ($n = 26$). We also examined correlations between CIROP scale scores and respondents' reports of variables hypothesized to be associated with types of impacts.

7.6.1. Active versus passive partnership roles

As predicted, respondents who were more actively involved with a partnership reported higher impact on Personal Research Skill Development ($M = 4.4$) and Organizational/Group Access To and Use of Information ($M = 3.9$) than did respondents who indicated they were simply recipients of information ($M = 3.2$ and $M = 2.9$, respectively), $F(1,129) = 16.1$, $p < .0001$ and $F(1,75) = 6.5$, $p < .05$, respectively.

7.6.2. Type of role at place of employment

We predicted that researchers would report higher impact with respect to personal knowledge development and research skill development, whereas managers and service providers would report higher impact with respect to organizational access to and use of information, and community and organizational development. As predicted, post hoc Tukey tests indicated that individuals in researcher roles reported significantly higher scores on Personal Knowledge Development ($M = 5.8$) than did managers/directors ($M = 4.1$), academics/educators ($M = 4.6$), and service providers ($M = 4.8$), $F(3,114) = 8.6$, $p < .0001$. As expected, researchers also reported significantly higher scores on Personal Research Skill

Table 3

Correlations among the CIROP scales.

Scale	Personal Knowledge Development	Personal Research Skill Development	Organizational Access To and Use of Information
Personal Research Skill Development	.75* ($n = 123$)		
Organizational/Group Access To and Use of Information	.49* ($n = 77$)	.58* ($n = 73$)	
Community and Organizational Development	.64* ($n = 98$)	.61* ($n = 91$)	.69* ($n = 69$)

* Pearson product-moment correlation coefficients significant at the .01 level (two-tailed).

Table 4
Correlations of the CIROP scales with involvement, fit, relevance, and extent of use variables^a.

Variable	Personal Knowledge Development	Personal Research Skill Development	Organizational/Group Access To and Use of Information	Community and Organizational Development
Personal level variables				
Level of involvement with partnership	.39* <i>n</i> = 137	.47* <i>n</i> = 125	.38 <i>n</i> = 76	.42* <i>n</i> = 97
Level of connection with partnership	.47* <i>n</i> = 140	.51* <i>n</i> = 129	.48* <i>n</i> = 77	.41* <i>n</i> = 98
Fit of partnership's theme with your professional interests	.45* <i>n</i> = 140	.38* <i>n</i> = 130	.32 <i>n</i> = 77	.33 <i>n</i> = 99
Relevance of received information to you	.58* <i>n</i> = 140	.41* <i>n</i> = 129	.34 <i>n</i> = 78	.35* <i>n</i> = 99
Extent you use information or products	.69* <i>n</i> = 144	.60* <i>n</i> = 133	.53* <i>n</i> = 79	.51* <i>n</i> = 101
Organizational level variables				
Fit of partnership's theme with your organization's or group's interests	.33* <i>n</i> = 137	.19 <i>n</i> = 127	.31 <i>n</i> = 77	.45* <i>n</i> = 98
Relevance of received information to organization or group	.52* <i>n</i> = 142	.27 <i>n</i> = 131	.37 <i>n</i> = 78	.51* <i>n</i> = 100
Extent your organization or group uses information or products	.54* <i>n</i> = 142	.46* <i>n</i> = 130	.47* <i>n</i> = 78	.68* <i>n</i> = 99

Note: Correlations over .50 are in shaded cells; those not significant at the .01 level are in bold font.

^aInformation on these variables was collected using the CIROP Respondent Form.

*Pearson product-moment correlation coefficients significant at the .01 level (two-tailed).

Development ($M = 4.9$) than did managers ($M = 3.2$) and service providers ($M = 3.6$), $F(3,106) = 5.1$, $p < .005$. Unexpectedly, researchers also reported significantly higher scores on Community and Organizational Development ($M = 4.6$) than did service providers ($M = 3.3$), $F(3,84) = 3.3$, $p < .05$.

7.6.3. Correlations with respondent reports of personal and organizational variables

Table 4 presents correlations between the CIROP scores and variables reflecting respondents' perceptions of various personal and organizational level variables from the CIROP Respondent Form. The personal level variables included level of involvement with the partnership and feeling of connection. Three other variables were measured both with respect to the person and the organization or group to which they belonged: degree of fit of the partnership's theme, relevance of information received, and extent of use of information or products supplied by the partnership.

Construct validity is shown through evidence of convergent and discriminant validity (Wiggins, 1973). Convergent validity is demonstrated when a test score is significantly correlated with other measures of the same construct or other variables with which the score would be expected to be correlated. Discriminant validity is demonstrated when a test score is not significantly correlated with variables that measure different yet related constructs. To assess convergent and discriminant validity, we looked at the pattern of

significant and nonsignificant correlations, focusing on correlations greater than .50 in magnitude (shown in shaded cells in Table 4) and those that were *not* significant (shown in bold font). Correlations of .50 were considered to be clinically meaningful, and a statistical significance level of $p < .01$ was chosen due to the relatively large sample size ($n = 174$) and number of correlations performed.

We predicted that Personal Knowledge Development and Personal Research Skill Development scale scores would be most highly associated with the personal level variables and least highly associated with the organizational level variables, whereas the reverse would be true for the Organizational/Group Access To and Use of Information and Community and Organizational Development scales.

As expected, scores on the Personal Knowledge Development scale were most highly associated with personal extent of use of the information (.69) and the perceived personal relevance of the information shared by the partnership (.58) (there were also significant correlations with the same variables measured on the organizational level but these were lower in magnitude—.54 and .52, respectively). Also as predicted, scores on the Personal Research Skill Development scale were most highly significantly associated with extent of personal use of information/products (.60) and personal level of connection with the partnership (.51), but not with items tapping fit or relevance on the organization/group level. Contrary to prediction, scores on the Organizational/

Group Access To and Use of Information scale were most highly associated with extent of personal use of information/products (.53) (the correlation for organizational use of information was .47, and did not meet our established cutoffs) and least highly associated with the fit of the partnership's theme to the organization/group (.31); however, scores on this scale also had low correlations with variables tapping the personal fit of the partnership's theme (.32) and the personal relevance of information (.34), as expected. Last, scores on the Community and Organizational Development scale were most highly associated with organizational use of information/products (.68) and relevance of the information to the organization/group (.51), as predicted, but also with personal use of information (.51), which was not expected.

In summary, the pattern of correlations showed meaningful relationships between CIROP scores and variables tapping the relevance of the information shared, and the extent of use of information/products (but not level of involvement with the partnership or degree of fit of the partnership's theme). As expected, there were higher relationships between the "personal level" variables and the personal level CIROP scales (Personal Knowledge Development and Personal Research Skill Development). There was some evidence of higher associations between the "organizational level" variables and the organizational and community level scales, particularly for the Community and Organizational Level scale. Although there were exceptions to this pattern, the data indicate that the CIROP scales discriminate between reports of research transfer and uptake in expected ways.

8. Discussion

Overall, the CIROP displayed a clear factor structure, accounting for an appreciable 76.2% of the variance in responses. The CIROP scales displayed excellent internal consistency, but only acceptable test–retest reliability (due to insufficient sample size). Content validity of the CIROP was assured through the development process, which used information from the literature and from key informants with diverse perspectives, and through pilot testing with members of partnerships. Construct validity was assessed through hypotheses involving respondents' roles with the partnership and their organizations of employment, and a series of variables assessing aspects of the research transfer, utilization, and uptake process (i.e., involvement, fit, relevance, and extent of use). These analyses indicated that the CIROP discriminated between groups of respondents in expected ways. For example, respondents who were more actively involved with a partnership reported higher impact on their personal research skill development than did respondents who were simply recipients of information. For the most part, the CIROP scales also discriminated meaningfully between people's reports of research transfer and uptake on the personal versus organizational levels.

8.1. Limitations of the CIROP

As with any measurement tool, providing evidence of validity is an ongoing process. Further test–retest reliability information is required, and future research should examine the responsiveness of the CIROP to change over time. The CIROP provides a measure of impacts in a reasonable and not too limited time frame (a 1-year period), but this requires that administrations be separated by 1–2 years for there to be an opportunity to detect changes in levels of impact.

The CIROP was designed to be a measure of the mid-term impact of research, rather than a measure of the quality of research partnerships or end-user engagement. The CIROP can, however, be used in research studies to examine the influence of respondents'

expectations, roles, or degree of engagement on perceptions of research impact. Different expectations about what it means to be a partner and about hoped-for gains may affect respondents' scores on the CIROP scales.

The CIROP provides quantifiable information about the perceived impacts of research partnerships in the eyes of community members. Knowledge is, however, a complex process of "meaning generation" that is inherently contextual in nature (Lave & Wenger, 1991; Schwandt, 2005; Stacey, 2001). We therefore recommend that the CIROP be used in comprehensive examinations of the impact and utility of research partnerships, involving the assessment of structure, processes, and outcomes (Israel et al., 1998; Tash & Sacks, 2004), and the use of tools tailored to target audiences and their environments.

8.2. Implications of the CIROP scales for understanding research impact

The CIROP scales, determined using factor analysis, indicate that community members focus on the benefits of research partnerships with respect to personal development; tangible resources, materials, and opportunities; and useful tools and ideas that contribute to organizational and community outcomes and capacities. Using the impact model (Currie et al., 2005) as our starting point led us to generate items in modules referring to "enhancements" of knowledge and research skills (the researcher's perspective). The groupings of the items in the factors led us, however, to label scales in terms of "development" (the utilizer's perspective).

A visual portrayal of this two-way perspective—researchers "looking out" at the community and community members "looking in" at partnerships—is available at www.impactmeasure.org/newmodelb.htm. This figure portrays the relationship of the CIROP scales, which capture the major types of benefits in the eyes of community members, to the three main functions of research partnerships. The figure shows what researchers *do* (the three key functions) and what recipients of their outputs *see, appreciate, or value*. Recipients/community members see research outputs as tools they can potentially utilize. They focus on the things they gain from the research education/training and knowledge sharing functions of partnerships.

Understanding community members' worldviews, priorities, and expectations has important implications for knowledge transfer and uptake. Because community members see themselves as *active utilizers* of supplied information, they may not fully recognize or value the intensive knowledge generation and synthesis work done by members of research partnerships. The knowledge created and shared by researchers is simply one part of the broader package of knowledge, information, beliefs, and values that community members use to create what is important to them—policy documents, new programs, revisions to existing services, and changes to ways of operating.

8.3. Use and utility of the CIROP

Several features of the CIROP contribute to its usefulness as a measure by which to study the research impact process, and as an assessment and planning tool for research partnerships. First, the CIROP captures several types of impact, which gives it broad applicability. Second, because the CIROP is based on the three basic functions of research partnerships, it provides information that is relevant to any research collaboration. Third, the CIROP captures impact attributed to a particular partnership. By nature, impact is diffuse and evolving, and it is hard to trace the use of a specific product, innovation, or idea to a partnership's specific influence. The CIROP deals with this issue by directing attention to the notion of a partnership rather than a particular product.

8.3.1. Use in research studies on the nature of impact

The CIROP provides a needed outcome measure for research examining the nature of research impact and how to improve it. The CIROP can be used to determine the structural or operational characteristics of partnerships most highly associated with impacts of different types (Hays et al., 2000; Paine-Andrews et al., 1997) and to examine the relative effectiveness of different strategies involved in knowledge mobilization efforts, such as the use of written materials, website dissemination, or face-to-face methods of sharing information. As well, the CIROP can be used to examine relationships between characteristics of community members and their perceptions of impact. It can also be used to ascertain the relative effectiveness of different types of approaches to doing research involving community members, including a participatory action approach. These various potential uses of the CIROP reflect the current emphasis on knowledge utilization, which considers the dynamic and interdependent influence of various structural, process, and user-related factors in the utilization of research information (Landry et al., 2001a).

8.3.2. Use by research partnerships

Partnerships can use the CIROP to examine the real-world usefulness of their activities and the information they share. This would involve defining the community of interest and then selecting a group of respondents to complete the CIROP. For example, there may be interest in knowing whether service providers feel their personal knowledge has grown as a result of receiving materials from a partnership.

To date, information about impact has largely been based on conjecture, anecdote, simple counts of outputs, or the viewpoints of the internal partnership team. In contrast, the CIROP allows partnerships to capture the different types of impacts they have helped to create, from the perspective of their targeted audiences or communities. This is considered to be more valid than assessments that rely on the opinions of those involved with the partnership itself (Florin, Mitchell, Stevenson, & Klein, 2000), as there is sparse evidence that these perceptions are related to community-based outcomes (Hayward, DeMarco, & Lynch, 2000; Kegler, Steckler, McLeroy, & Malek, 1998).

The CIROP can be used to evaluate the success of research partnerships, determine where to make refinements to strategic directions or operations, and demonstrate accountability to community stakeholders, advisory boards, and funding bodies. By including plans to use the CIROP in grant proposals, researchers can assure funding bodies of their commitment to being accountable, and will be able to provide evidence of the value of their work to the community.

In conclusion, the CIROP promises to have utility in assisting researchers to understand more fully the complex phenomenon of impact. The CIROP also has practical utility for community–university research partnerships addressing real-world issues concerning health and social services. The measure provides quantified information that can be used to celebrate successes, provide evidence of accountability, and improve the effectiveness of operations and knowledge sharing efforts.

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