

## Factors Influencing Information Seeking by Physical Therapists Providing Stroke Management

Nancy M. Salbach, Sara J.T. Guilcher, Susan B. Jaglal, David A. Davis

**Background.** Searching and reading the research literature are essential activities for enhancing the use of research and optimizing the quality of physical therapist practice.

**Objectives.** The objectives of this study were to identify practitioner, organization, and research characteristics that are associated with searching or reading the research literature among physical therapists involved in stroke management.

**Design.** A cross-sectional study design was used.

**Methods.** A survey questionnaire was mailed to 1,155 physical therapists in neurological practice in Ontario, Canada. Therapists who treated people with stroke were eligible to participate.

**Results.** Of the 334 eligible respondents, 270 (80.8%) completed a questionnaire. Among participants with complete data, 37.7% of 265 participants conducted online literature searches and 73.3% of 266 participants read the research literature 2 or more times in a typical month. The following factors were associated with conducting online literature searches 2 or more times in a typical month: participation in research, self-efficacy for implementing evidence-based practice (EBP), being male, perceived facility support of research use, and Internet access to bibliographic databases at work. The following factors were associated with reading the literature 2 or more times in a typical month: participation in research, EBP self-efficacy, membership in a professional organization, perceived facility support of research use, and positive perceptions about the usefulness of the research literature and the relevance of walking interventions evaluated in the stroke rehabilitation research literature. A positive association between searching and reading was observed (odds ratio=16.5, 95% confidence interval=5.8–47.1).

**Limitations.** The cross-sectional design limited inferences of causality.

**Conclusion.** Despite a low frequency of searching, the majority of the participating therapists acquired and read the research literature on a monthly basis. Online searching and reading are closely linked behaviors. Modifiable practitioner characteristics, including self-efficacy for implementing EBP and participation in research, appear to be key determinants of EBP.

N.M. Salbach, PhD, MSc, BScPT, BSc (Physiology), is Assistant Professor, Department of Physical Therapy, University of Toronto, 160-500 University Ave, Toronto, Ontario, Canada M5G 1V7. Address all correspondence to Dr Salbach at: nancy.salbach@utoronto.ca.

S.J.T. Guilcher, MSc, MScPT, BSc, is a PhD candidate, Department of Health, Policy, Management, and Evaluation, University of Toronto.

S.B. Jaglal, PhD, MSc, BSc, is Associate Professor, Department of Physical Therapy, University of Toronto.

D.A. Davis, MD, FCFP, CCFP, FRCP (hon), is Senior Director, Continuing Education & Performance Improvement, Association of American Medical Colleges, Washington, DC.

[Salbach NM, Guilcher SJT, Jaglal SB, Davis DA. Factors influencing information seeking by physical therapists providing stroke management. *Phys Ther.* 2009;89:1039–1050.]

© 2009 American Physical Therapy Association



Post a Rapid Response or  
find The Bottom Line:  
[www.ptjournal.org](http://www.ptjournal.org)

Evidence-based practice (EBP) is a relatively new concept that Sackett et al defined in 1996 as “integrating individual clinical expertise with the best available external clinical evidence from systematic research.”<sup>1(p71)</sup> Academic physical therapy programs<sup>2-5</sup> have embraced EBP and strive to prepare students with the knowledge and skills needed to undertake the steps of EBP. These steps include expressing questions that arise from clinical practice in a searchable format; effectively finding the best evidence to address the question, a step that may require an online literature search; and critically appraising the evidence for validity, impact, and applicability to the clinical question.<sup>6,7</sup> After considering the research evidence, clinical expertise, and the patient’s needs and preferences, the practitioner decides on a course of action. Continual evaluation of the effect of clinical practice is considered the final step in the EBP process.<sup>1,6-9</sup> Although physical therapists have indicated that the application of EBP is necessary and improves the quality of patient care,<sup>10,11</sup> many do not identify research evidence as a primary source of information to guide clinical practice.<sup>11-16</sup>

Underuse of research evidence may be attributable to challenges in undertaking the steps of EBP that precede the use of research, including searching and appraising the research literature.<sup>7</sup> Effectively searching the research literature is an EBP

activity that requires considerable knowledge and skills given the extensive Web-based resources currently available to inform physical therapist practice.<sup>17-22</sup> Recent reports indicated that physical therapists who graduated a minimum of 15 years ago are less likely to have learned the foundations of EBP in their academic programs and are more likely to report lower levels of confidence in performing EBP activities, such as searching and appraising the research literature, than therapists who graduated recently.<sup>10,11</sup> Furthermore, health care professionals identify lack of time as the most important barrier to updating clinical practice with new knowledge.<sup>10,11,15,23-25</sup> It is important to know whether therapists are finding time to read the professional literature, given that reading is a prerequisite to appraisal and to appropriate application of research findings to clinical practice. For the nursing literature, time spent using the Internet and time spent reading research articles have been identified as correlates of the use of research,<sup>26,27</sup> highlighting the value of determining what motivates physical therapists to engage in these activities.

Few studies have investigated the extent to which physical therapists are searching and reviewing the research literature. A 2002 survey<sup>11</sup> of 488 American physical therapists showed that the majority of the respondents rarely conducted online literature searches. As many as 65% of the respondents reported searching the literature with MEDLINE or other bibliographic databases only one time or not at all in a typical month.<sup>11</sup> Compared with the rate of searching, the rate of reading the professional literature was higher; 66% of American physical therapists reported reading the professional literature 2 to 5 times in a typical month.<sup>11</sup> In comparison, a survey of 206 Canadian physical therapists

working in neurological practice showed that 54% reported reading the professional literature on a monthly basis and that 21% reported reading on a weekly basis.<sup>13</sup> The samples in both studies included members of national professional associations that provided peer-reviewed physical therapy journals as part of their memberships. This benefit may have led to a rate of reading higher than that in the general population of physical therapists.

The factors influencing physical therapists to search and review the research literature are largely unknown. Evaluations to date have targeted a limited number of variables, including practice and work setting characteristics (eg, number of patients seen, hours worked per day, number of physical therapists, and access to sources of evidence<sup>11</sup>) and practitioner characteristics (eg, time since graduation<sup>13</sup>). None of these variables has been related to conducting literature searches, whereas Internet access to bibliographic databases at home has been associated with reading the research literature more than one time in a typical month.<sup>11</sup> After a systematic review of individual determinants of the use of research among nurses, Estabrooks et al<sup>28</sup> recommended that future studies focus not only on practitioner characteristics but also on influential attributes of the research and of the organization. Given that physical therapists’ engagement in EBP may be influenced by a complex set of variables, a conceptual framework is needed to guide the selection of variables for study and the interpretation of study findings in this field of investigation.

Several researchers have attempted to classify factors that influence the rate of adoption of an innovation with the goal of understanding the level at which intervention is need-

 Available With  
This Article at  
[www.ptjournal.org](http://www.ptjournal.org)

• [Audio Abstracts Podcast](#)

*This article was published ahead of print on August 6, 2009, at [www.ptjournal.org](http://www.ptjournal.org).*

ed.<sup>29-31</sup> Berwick<sup>29</sup> provided a clear and broad classification of factors as characteristics of the adopter (ie, the practitioner), the organization (ie, the practice setting), or the innovation (ie, the research literature). In addition, leading knowledge translation researchers advocated the use of theoretical frameworks of behavioral change to guide investigations of processes, such as EBP, that require health care professionals to acquire knowledge and potentially modify clinical practice.<sup>28,32-35</sup> Self-efficacy theory<sup>36</sup> is an internationally recognized theory that has been used to study the determinants of human behavior and to guide interventions aimed at changing behavior.<sup>37</sup> Self-efficacy beliefs, defined as judgments of one's ability to organize and execute given types of performances,<sup>38</sup> are considered to have a primary influence on decisions to engage in or avoid particular activities or settings. For example, a clinician who wants to answer a clinical question by using research evidence is unlikely to undertake an online literature search if he or she believes his or her ability to conduct a search is poor. Although self-efficacy for implementing EBP may be an important predictor of engagement in EBP activities, this notion has not been examined to date.

An examination of physical therapists' engagement in the initial steps of EBP, such as searching online bibliographic databases and reading the research literature, is a prerequisite to understanding the use of research. However, little research has been conducted to investigate physical therapists' engagement in EBP activities. Studies to date have failed to evaluate a comprehensive set of variables, including characteristics of the physical therapist, the organization, and the research literature, or to use theories of behavioral change to guide the selection of variables and the interpretation of findings. A base-

line is needed to understand the extent to which physical therapists are performing steps of EBP that are a prerequisite to research use. Identifying the factors that influence engagement in searching and reading the research literature will enhance understanding of the demographics and practice environments of therapists who undertake these activities and what actions can be taken to enhance the performance of these activities in the clinical setting.

We recently conducted a mail survey and applied Berwick's framework<sup>29</sup> to identifying barriers to EBP at the practitioner, organization, and research levels and to measuring the performance of EBP activities among physical therapists who deliver services to people with stroke.<sup>10</sup> The survey questionnaire included a new scale developed to measure self-efficacy for implementing EBP, defined as the judgment of one's ability to organize and execute the steps of EBP.<sup>10</sup> Stroke rehabilitation is an ideal practice domain in which to study EBP, given existing evidence that the implementation of findings from high-quality research in post-acute rehabilitation after stroke has been associated with both functional recovery and patient satisfaction.<sup>39,40</sup> Data from the mail survey were used in the present study to identify practitioner, organization, and research characteristics that are associated with searching and reading the research literature among physical therapists involved in stroke management. A secondary objective was to explore the relationship between searching and reading the research literature.

## Method

### Study Design

Data were available from a cross-sectional mail survey that we conducted to investigate barriers to implementing EBP; findings related to practitioner and organization barriers

have been published.<sup>10</sup> For the survey, we used a modified Dillman<sup>41</sup> 3-step approach to mailing to maximize the response rate. We mailed the survey questionnaire in May 2005 and sent a thank-you/reminder postcard 3 weeks later. The questionnaire was mailed a second time to nonrespondents at the end of June 2005. For the present study, we analyzed data collected from questionnaire items measuring characteristics of the practitioner and the organization, physical therapists' perceptions of the stroke rehabilitation research literature, and frequencies of conducting online literature searches and reading the research literature.

## Participants and Sampling

Physical therapists who were in clinical practice and who provided physical therapy services to adults with stroke were considered eligible to participate. We sampled potential participants from a mailing list obtained from the College of Physiotherapists of Ontario (the provincial regulatory body); we searched for registrants who were in clinical practice and who had specified neurology as an area of practice at their primary or secondary workplace. We excluded registered therapists who had indicated pediatrics as a practice area. We mailed the questionnaires and asked the therapists to indicate in the first item of the questionnaire whether they provided services to people with stroke. Those who did not were considered ineligible and were asked to leave the rest of the questionnaire blank and to return it in a prestamped envelope provided with the questionnaire. Therapists who were eligible but who did not wish to participate also were asked to return the questionnaire with the remaining items unanswered to indicate that they chose not to participate.

### Questionnaire

We developed a questionnaire to identify barriers to implementing EBP at the practitioner, organization, and research levels and to measure the performance of EBP activities. We present the questionnaire items and corresponding response options, conceptually grouped into blocks, in the Appendix to make the analysis transparent and to enable replication in future research. Practitioner blocks used in the analysis included education about EBP (3 items), attitudes toward and beliefs about EBP (7 items), interest (2 items) and perceived role (3 items) in engaging in EBP, sociodemographic characteristics (age, sex, highest degree earned, and years in clinical practice), and professional activities (4 items). An additional practitioner characteristic was self-efficacy for performing EBP activities, which was evaluated with a new 12-item scale that we described previously.<sup>10</sup> Each item in the scale presents an activity considered integral to the process of EBP; the items include searching, appraising, and applying the research literature with a patient's needs and treatment preferences in mind.<sup>1,7-9</sup> Participants were asked to rate their level of confidence in their ability to perform each activity by using an 11-point scale ranging from 0% (cannot do at all) to 100% (certain can do). Item-level ratings were averaged to determine the total score (range=0%-100%), which was analyzed in the present study. The internal consistency estimated with the Cronbach alpha test for data collected in the present study ( $n=261$ ) was .90; this value met the level required for the use of the scale at the individual level.<sup>42</sup> Organization blocks included perceived organization and peer support for EBP (2 items), organization resources to promote EBP (6 items), and practice and work setting characteristics (7 items).<sup>10</sup>

We evaluated perceptions of the stroke rehabilitation research literature by using 4 items that asked participants about their perceptions of the relevance and clarity of existing research literature in guiding the treatment of walking limitations. We specified research related to walking rehabilitation because walking is an essential activity that is commonly limited after stroke<sup>43</sup> and because there is a substantial body of literature devoted to walking rehabilitation. Physical therapists' judgments about the relevance of this specific literature rather than the entire body of literature about stroke were expected to provide useful feedback to the research community.

To gauge the performance of searching and reading the research literature, we asked the participants to indicate how often in a typical month they searched online bibliographic databases, such as MEDLINE, and how often they read or reviewed research literature related to their clinical practice by using the following response options: up to 1 time, 2 to 5 times, 6 to 10 times, 11 to 15 times, and 16 or more times.<sup>11</sup> The majority of the items were statements with which the respondents indicated their level of agreement by using a 5-point Likert scale with the following response options: "strongly disagree," "disagree," "neutral," "agree," and "strongly agree." Response options for items relating to the availability of organization resources were "yes," "no," and "do not know."

We pilot tested the questionnaire with 3 physical therapists delivering health care services to people with stroke in acute care or rehabilitation hospital settings; these therapists verified the readability and relevance of the questionnaire. We made minor revisions, such as shortening the questionnaire and rewording se-

lected items to enhance clarity, on the basis of their feedback.

### Statistical Methods

We used descriptive statistics, including frequencies and percentages for categorical variables and means, standard deviations, and ranges for variables rated on a continuous scale, to summarize participants' responses to questionnaire items. Logistic regression then was used to examine relationships between practitioner, organization, and research characteristics (ie, independent variables) and each of the 2 dependent variables (ie, frequency of searching online bibliographic databases and frequency of reading the research literature). Considering the large number of independent variables, we first modeled each subgroup or block of independent variables (outlined in the Appendix) separately with each dependent variable.<sup>44</sup> Each independent variable that was significantly associated with the dependent variable within each block (ie, 95% confidence interval [CI] excluded 1) was carried forward to the final multivariable model.<sup>44</sup>

Before conducting logistic regression, we recategorized the independent variables rated with a Likert scale to obtain binary variables.<sup>11</sup> For positively worded statements, we collapsed the "strongly agree" and the "agree" categories to form an "agree" category and combined the "neutral," "disagree," and "strongly disagree" categories to form a "disagree" category. For negatively worded items, we collapsed the "strongly disagree" and "disagree" categories to form a "disagree" category and combined the "neutral," "agree," and "strongly agree" categories to form an "agree" category. For items with response categories of "yes," "no," and "do not know," we pooled the "no" and "do not know" categories on the basis of the assumption that the effect of not

knowing about the availability of a resource, for example, would be similar to the effect of not having the resource.

Categories of demographic variables with low cell counts also were collapsed before we conducted logistic regression to obtain stable estimates of associations.<sup>44</sup> Participation in research, initially expressed as the percentage of work time spent on research activities, was transformed into a binary variable (0%=no, 1%-100%=yes) because the responses were skewed toward lower percentages.

Before examining the relationship between the frequency of searching and the frequency of reading the research literature and in preparation for logistic regression, we collapsed the response categories for these variables to form a dichotomous scale of up to 1 time and 2 or more times in a typical month because of the low rate of endorsement of the higher-frequency categories.

We reported odds ratios (ORs) and associated 95% CIs from logistic regression for significant associations observed within each block of items and for all variables in the final multivariable model. We verified the assumption of a linear relationship between EBP self-efficacy and the logit of each dependent variable and ruled out multicollinearity by examining the variance inflation factor.<sup>44</sup> For each regression model, we reported the Hosmer-Lemeshow statistic to indicate the goodness of fit (a nonsignificant test result indicates good fit) and the C statistic to indicate the discriminative power of the model.<sup>44</sup> For the C statistic, a value between .5 and 1.0 is desired, and a higher value reflects a better ability of the model to discriminate participants who search or read the research literature at different frequencies.<sup>44</sup> Finally, logistic regression was used to exam-

ine the relationship between the frequency of searching and the frequency of reading the research literature in a typical month.

Consent was considered implied for physical therapists who returned a completed questionnaire. Data were analyzed with SAS version 9.1.\*

## Results

The questionnaire was mailed to 1,155 physical therapists. A total of 702 therapists returned a questionnaire, and of these respondents, 334 (47.6%) were eligible to participate in the study. Of the eligible respondents, 64 (19.2%) chose not to participate and 270 (80.8%) completed a questionnaire. Analyses were conducted with data from this sample of 270 physical therapists.

Table 1 shows the characteristics of the respondents and their practice settings. The respondents were between 23 and 68 years old ( $\bar{X}$ =40 years,  $SD$ =10 years). The percentages of respondents who were women, who held a bachelor's degree as the highest degree obtained, and who had more than 15 years of practice experience were 88.8%, 76.9%, and 45.4%, respectively. The percentages of participants who spent 0% and 1% to 5% of their work time on research activities were 67.9% and 23.9%, respectively. The most frequently cited workplaces were a teaching hospital (67.3%),<sup>10</sup> an urban setting (60.9%),<sup>10</sup> and an acute care hospital (39.6%).

Table 2 shows the frequencies at which the respondents reported searching or reading the research literature in a typical month. The percentages of physical therapists who reported searching bibliographic databases up to 1 time and 2 to 5 times per month were 62.3% and 32.8%,

respectively. The percentages of respondents who reported reading the literature up to 1 time and 2 to 5 times per month were 26.7% and 56.0%, respectively.

Factors that were associated with searching online bibliographic databases 2 or more times in a typical month in block regression modeling included being male, participation in research, self-efficacy for implementing EBP, perceived facility support of the use of research, and Internet access to bibliographic databases at work. Table 3 shows the block ORs and final model ORs for these factors. In the multivariable model, EBP self-efficacy had the largest OR; we found that physical therapists with high ratings of EBP self-efficacy were 4 times more likely than peers who rated their self-efficacy 30% lower to search the research literature 2 or more times in a typical month (OR=4.0, 95% CI=2.0-7.9) after adjustment for the effects of sex, research participation, perceived facility support of research use, and Internet access to databases at work.

Factors that were independently associated with reading the research literature 2 or more times in a typical month in block regression modeling included membership in a professional physical therapy organization, research participation, EBP self-efficacy, perceived facility support of research use, and perceptions that literature findings are useful in daily practice and that walking interventions evaluated in the research literature are relevant to clinical practice. Table 4 shows the block ORs and final model ORs for these factors. Membership in a professional organization had the largest OR; we found that physical therapists with such a membership were 3.5 times more likely than nonmembers to read the research literature 2 or more times in a typical month (OR=3.5, 95% CI=1.7-7.3) after adjustment for the

\*SAS Institute Inc, PO Box 8000, Cary, NC 27511.

## Information Seeking by Physical Therapists Providing Stroke Management

**Table 1.**  
Participant and Practice Characteristics

Characteristic	n	%
Age (y)		
20–29	40	14.9
30–39	93	34.7
40–49	75	28.0
≥50	60	22.4
Sex		
Male	30	11.2
Female	239	88.8
Highest degree earned		
Certificate or diploma	30	11.4
Bachelor's degree	203	76.9
Professional master's degree	8	3.0
Applied or research master's degree	23	8.7
Years in practice		
<5	40	14.9
5–10	59	21.9
11–15	48	17.8
>15	122	45.4
Member of professional organization		
Yes	196	73.4
No	71	26.6
Percentage of time spent on research activities		
0	182	67.9
1–5	64	23.9
6–10	16	6.0
11–100	6	2.3
Hours worked per week		
<20	28	10.4
20–30	51	19.0
31–40	154	57.5
>40	35	13.1
Type of facility		
Acute care hospital	106	39.6
Rehabilitation hospital	43	16.0
Long-term care	13	4.9
Complex continuing care	10	3.7
Community health center	3	1.1
Community care access center	14	5.2
Home visiting agency	17	6.3
Private practice or clinic	28	10.5
University or educational institution	1	0.4
Other	33	12.3

effects of the other variables in the model.

In Tables 3 and 4, the ORs associated with EBP self-efficacy relate to the odds of conducting either online searching or reading for participants who differed in EBP self-efficacy scores by, on average, 10%, 20%, or 30%.

The final multivariable models demonstrated good fit, as indicated by nonsignificant Hosmer-Lemeshow test results and discriminative ability reflected by C statistic values above .75. The assumption of linearity for self-efficacy, the only continuous variable modeled in logistic regression, was verified.

Table 5 shows the descriptive cross-tabulation of the frequency of searching and the frequency of reading the research literature in a typical month. The logistic regression analysis revealed a significant and positive association between these 2 variables; we found that physical therapists who searched online bibliographic databases 2 or more times in a typical month were 16.5 times more likely than those who searched up to 1 time in a typical month to read the research literature 2 or more times in a typical month (OR=16.5, 95% CI=5.8–47.1).

### Discussion

The present study provides baseline rates of searching and reading the research literature and highlights factors that are associated with these important EBP activities among Canadian physical therapists in stroke rehabilitation practice. The results indicated that the majority of the therapists rarely searched the research literature by using MEDLINE or other bibliographic databases on a monthly basis. However, the reported frequency of reading the research literature was higher; more than half of the respondents (56.0%)

**Table 2.**  
Frequencies of Searching and Reading Research Literature

Behavior Statement	n	No. (%) Responding				
		≤1 Time	2-5 Times	6-10 Times	11-15 Times	≥16 Times
Use MEDLINE or other databases to search for practice-relevant research literature	265	165 (62.3)	87 (32.8)	12 (4.5)	0	1 (0.4)
Read or review research literature related to clinical practice	266	71 (26.7)	149 (56.0)	37 (13.9)	5 (1.9)	4 (1.5)

reported reading the research literature 2 to 5 times in a typical month. Factors that were associated with both searching and reading the research literature at higher frequencies included having a higher level of EBP self-efficacy, participation in research activities at work, and the perception that the facility or organization supports the use of research in clinical practice. Additional factors that were related to searching were being male and having Internet access to bibliographic databases at work. Additional factors that were associated with reading included membership in a professional organization and positive perceptions about the usefulness of the research literature in general and the relevance of walking interventions eval-

uated in the stroke rehabilitation research literature. The findings clearly demonstrate that searching and reading the research literature are strongly related EBP activities. A unique contribution of the present study relates to modeling of the influence of physical therapists' judgments about a specific body of research literature on their engagement in EBP.

The block modeling phase of the present study showed that characteristics not only of the practitioner (ie, sex, self-efficacy, research participation, membership in a professional organization, and general attitude toward research) but also of the organization (ie, Internet access and facility support of research use) as well

as the stroke rehabilitation research literature (ie, relevance of investigated walking interventions to clinical practice) may influence the steps leading to research use among physical therapists. These findings directly support Berwick's classification of factors influencing the dissemination of innovations.<sup>29</sup>

In addition to Berwick's framework,<sup>29</sup> the conceptual framework of self-efficacy theory<sup>38</sup> was effective in guiding the selection of variables influencing practitioner behavior in the context of EBP. Self-efficacy for implementing EBP was associated with self-reported performance of both online searching and reading the research literature to inform physical therapist practice after

**Table 3.**  
Factors Associated With Searching the Research Literature 2 or More Times in a Typical Month

Factor	Level	Odds Ratio <sup>a</sup> (95% Confidence Interval)	
		Block	Final Model <sup>b</sup>
Male sex	Female	Reference	
	Male	3.9 (1.7-9.0)	3.3 (1.4-8.0)
Participation in research	No	Reference	
	Yes	3.1 (1.8-5.4)	2.7 (1.5-4.9)
Evidence-based practice self-efficacy	10% difference	1.7 (1.4-2.1)	1.6 (1.3-2.0)
	20% difference	2.9 (1.9-4.3)	2.5 (1.6-4.0)
	30% difference	4.9 (2.6-9.0)	4.0 (2.0-7.9)
Perceived facility support of use of research	No	Reference	
	Yes	2.3 (1.2-4.4)	1.3 (0.6-2.8)
Internet access to bibliographic databases at work	No	Reference	
	Yes	3.3 (1.4-7.9)	2.0 (0.8-4.8)

<sup>a</sup> Ratio of the odds of searching ≥2 times compared with searching ≤1 time in a typical month after adjustment for the effects of the other variables in the model.

<sup>b</sup> Hosmer-Lemeshow test, *P* = .65; C statistic = .77.

**Table 4.**  
Factors Associated With Reading the Research Literature 2 or More Times in a Typical Month

Factor	Level	Odds Ratio <sup>a</sup> (95% Confidence Interval)	
		Block	Final Model <sup>b</sup>
Membership in professional organization	No	Reference	
	Yes	3.0 (1.6–5.5)	3.5 (1.7–7.3)
Participation in research	No	Reference	
	Yes	3.4 (1.6–7.1)	2.4 (1.1–5.5)
Evidence-based practice self-efficacy	10% difference	1.6 (1.3–2.0)	1.5 (1.2–1.9)
	20% difference	2.7 (1.8–4.2)	2.2 (1.3–3.6)
	30% difference	4.4 (2.3–8.5)	3.2 (1.5–6.7)
Perceived facility support of use of research	No	Reference	
	Yes	2.7 (1.5–4.9)	2.0 (1.0–4.1)
Literature findings perceived as being useful in daily practice	No	Reference	
	Yes	2.8 (1.3–5.7)	2.0 (0.9–4.3)
Walking interventions evaluated in research perceived as being relevant to practice	No	Reference	
	Yes	3.0 (1.4–6.4)	2.9 (1.3–6.6)

<sup>a</sup> Ratio of the odds of reading  $\geq 2$  times compared with reading  $\leq 1$  time in a typical month after adjustment for the effects of the other variables in the model.

<sup>b</sup> Hosmer-Lemeshow test,  $P = .29$ ; C statistic = .81.

stroke. The strength of the relationship between self-efficacy and each dependent variable was comparable, as reflected by the similar magnitudes of the unadjusted ORs in the models (Tabs. 3 and 4). For example, therapists with a higher level of EBP self-efficacy were 4.9 times more likely (95% CI=2.6–9.0) to search online and 4.4 times more likely (95% CI=2.3–8.5) to read the research literature 2 or more times in a typical month than peers with self-efficacy ratings that were 30% lower. These findings support the primary tenet of self-efficacy theory: that an individual’s judgment of his or her ability to perform a specific task in-

fluences his or her decision to engage in that task.<sup>36</sup>

The causality of the relationships between EBP self-efficacy and searching and reading the research literature in the present study cannot be inferred because the data were collected at one point in time; however, the results provide direction for future prospective investigations of these variables. These findings are particularly relevant to the field of knowledge translation and, specifically, EBP because self-efficacy is a modifiable variable. Researchers have described how strategies for increasing self-efficacy beliefs, includ-

ing social modeling (observing others), verbal persuasion (receiving positive feedback on ability), emotional arousal (positive physiological states), and mastery experiences,<sup>36</sup> can be incorporated into a continuing education event; researchers also have used measures of self-efficacy to capture the effects of the event among physicians.<sup>45,46</sup> This work<sup>45,46</sup> has direct application to the translation of knowledge and EBP in physical therapy.

The percentage of respondents searching up to 1 time in a typical month in the present study (62.3%) was similar to that documented

**Table 5.**  
2 × 2 Table Showing the Relationship Between the Frequency of Searching Online Bibliographic Databases and the Frequency of Reading the Research Literature in a Typical Month (n=262)

Searching Online Bibliographic Databases	No. (% of Total) Reading the Research Literature		Total
	$\leq 1$ Time/mo	$\geq 2$ Times/mo	
$\leq 1$ time/mo	66 (25.2)	96 (36.6)	162
$\geq 2$ times/mo	4 (1.5)	96 (36.6)	100
Total	70	192	262



among American physical therapists (65%) with the same question and response scale.<sup>11</sup> The findings show that this low frequency of searching may be attributable, in part, to the availability of Internet access to online bibliographic databases at work that was lacking for 20.0% of the survey respondents. It was not related in the current study, however, to physical therapists' perceptions of their role in performing this activity, even though 50.6% of the respondents reported they were neutral or disagreed that physical therapists should be responsible for conducting their own literature reviews to answer their clinical questions.<sup>10</sup> Although 62.3% of the therapists rarely conducted online literature searches, the majority of them read the research literature 2 to 5 times in a typical month; these data raise the question of how these therapists were accessing the research literature. The findings of a qualitative study that we conducted subsequent to this survey help to answer this question. During semistructured interviews with 23 survey respondents, therapists described how they delegated the task of searching the research literature to hospital librarians, research therapists, younger colleagues, or physical therapist students.<sup>47</sup> Some therapists delegated this task because of a lack of searching skills, and others delegated this task to save time. Delegating tasks may explain why therapists reported reviewing the research literature at a higher frequency than searching.

A related finding is that male therapists reported conducting online searches more frequently than female therapists, although the rates of reading the research literature were comparable for men and women. This finding may be explained by previous research showing that, in general, men seek information from the Internet more often than women<sup>48</sup> and report finding information

online with less effort than women.<sup>49</sup> Studies investigating physicians' use of personal digital assistants in clinical practice have found that men are more likely than women to use these electronic tools.<sup>50,51</sup>

Interestingly, the percentage of respondents who reported reading the research literature 2 or more times in a typical month (73.3%) in the present study was lower than that of American physical therapists (82%) responding to the same questionnaire item.<sup>11</sup> Our finding that membership in a professional organization was linked to a higher frequency of reading the research literature helps to explain this discrepancy. Therapists in the American study may have reported reading more frequently than those in the present study because they were all members of the national professional association that provides members with the peer-reviewed scientific journal *Physical Therapy*, which is published monthly. Only 73.4% of the participants in the present study were members of a professional association at the national or provincial level. Members of the national professional association are provided with the peer-reviewed scientific journal *Physiotherapy Canada*, which is published 4 times per year—less frequently than its American counterpart. Thus, membership in a professional association may have played a role in facilitating the review of published peer-reviewed research, although it does not guarantee that the articles read were relevant to stroke rehabilitation practice.

Another notable finding was the emergence of involvement in research activities as a correlate of searching and reading the research literature. Almost 70% of the participants reported spending none of their work time on research activi-

ties; approximately a third of the respondents reported spending a small proportion (1%–10%) of their work time on some kind of research activity. This research activity was coupled with a greater likelihood of conducting online searches and reading the research literature. Previous examinations of research participation among nurses showed that this factor is a predictor of research use in some studies but not in others.<sup>28,52</sup> The survey questionnaire used in the present study was not designed to identify the type of research activity performed; thus, we are unable to shed light on which work-related research activities may promote EBP activities among physical therapists. Further investigation of the influence of this factor in the context of EBP is needed.

Although factors that were associated with searching and reading and that emerged from the block modeling phase of the present study represented characteristics of the practitioner, the organization, and the research literature, variables that remained significantly related to these behaviors in the final multivariable model were largely modifiable individual characteristics, including membership in a professional organization, research participation, and self-efficacy. Findings related to membership in a professional organization may indicate that the benefits of membership, such as access to a journal subscription, promote reading the research literature; alternatively, membership may simply represent a behavior that is commonly coupled with a higher rate of participation in EBP activities. The cross-sectional nature of the design of the present study prevents clear interpretation of this finding and suggests an area for future research. With respect to research participation, a better understanding of which research activities facilitate searching and reading the research literature is nec-

essary to inform recommendations for action. The findings of the present study also indicate that educational interventions designed to build capacity to implement EBP may be effective in increasing the frequencies of searching and reading the research literature if they incorporate mechanisms for improving self-efficacy. Finally, the results of the present study suggest that physical therapists' perceptions of the relevance of the specific research literature that informs their clinical practice influence whether they read or review that literature.

### Limitations

Some limitations of the study design should be considered in the interpretation of the results presented here. This investigation was a cross-sectional study; thus, causality of the associations observed cannot be assumed. Moreover, respondents likely had a greater interest in and were more engaged in EBP than nonrespondents. Coupled with the fact that participants may have wished to provide socially desirable responses, we may have overestimated the frequencies of searching and reading the research literature for the population of practitioners studied. The results also apply primarily to the Canadian context and would require replication in other countries because of differences in health care systems and professional physical therapy programs.

In addition, measurement of practitioner behavior in the context of EBP is challenging. In the present study, we measured the frequencies of searching and reading the research literature in a typical month. Whether the rating scale that we used is reflective of best practice in EBP is uncertain. A therapist with efficient search skills may not need to search at a high frequency in a typical month and may initiate a search only when a knowledge gap

that can be addressed with the research literature arises. Despite these limitations, time spent using the Internet and time spent reading research articles have been identified as correlates of the use of research among nurses<sup>26,27</sup>; these data support the important roles of these EBP activities because similar relationships are likely to exist for physical therapists.

The strengths of our research are the use of conceptual and behavioral change frameworks to identify potentially influential variables related to engagement in EBP activities. Participants were sampled from a provincial registry of physical therapists; this fact supports the generalizability of the results for Canadian physical therapists in stroke rehabilitation practice.

### Conclusion

The findings of the present study suggest that although the majority of physical therapists in stroke rehabilitation practice rarely search online bibliographic databases for research, they access research articles in other ways because they report reviewing the research literature at a higher frequency. Therapists who search online bibliographic databases are highly likely to read the research literature as well. The findings emphasize the importance of organizations providing environments not only to facilitate access to research both online and through memberships in professional organizations but also to promote involvement in research activities as part of physical therapists' duties. Continuing education targeting EBP may play a vital role in boosting EBP self-efficacy. Finally, strategies that optimize the relevance to clinical practice of the interventions developed and evaluated in research have the potential to enhance the use of these interventions by clinicians.

All authors provided concept/idea/research design. Dr Salbach, Ms Guilcher, and Dr Jaglal provided writing, data analysis, and consultation (including review of manuscript before submission). Dr Salbach provided data collection and project management. Dr Jaglal provided facilities/equipment and fund procurement for the original study.

The Office of Research Ethics at the University of Toronto approved the study protocol.

This article was received March 9, 2009, and was accepted May 28, 2009.

DOI: 10.2522/ptj.20090081

### References

- 1 Sackett DL, Rosenberg WM, Gray JA, et al. Evidence based medicine: what it is and what it isn't. *BMJ*. 1996;312:71-72.
- 2 University of Toronto Physical Therapy Program. Available at: <http://www.physicaltherapy.utoronto.ca/>. Accessed April 30, 2009.
- 3 McMaster University Physical Therapy Program. Available at: <http://www.mcmaster.ca/graduate/2003-2004/pt.html>. Accessed May 8, 2009.
- 4 Duke University Doctor of Physical Therapy Program. Available at: [http://dpt.duhs.duke.edu/modules/cfmdpt\\_home/](http://dpt.duhs.duke.edu/modules/cfmdpt_home/). Accessed May 8, 2009.
- 5 University of Florida Doctor of Physical Therapy Program. Available at: <http://pt.php.ufl.edu/dpt.html>. Accessed May 8, 2009.
- 6 Straus SE, Richardson WS, Glasziou P, Haynes RB. *Evidence-Based Medicine: How To Practice and Teach EBM*. Edinburgh, United Kingdom: Elsevier Churchill Livingstone; 2005.
- 7 Guyatt GH, Haynes RB, Jaeschke RZ, et al. Users' guides to the medical literature, XXV: evidence-based medicine—principles for applying the users' guides to patient care. *JAMA*. 2000;284:1290-1296.
- 8 Rappolt S. The role of professional expertise in evidence-based occupational therapy. *Am J Occup Ther*. 2003;57:589-593.
- 9 Davidoff F, Haynes B, Sackett D, Smith R. Evidence based medicine. *BMJ*. 1995;310:1085-1086.
- 10 Salbach NM, Jaglal SB, Korner-Bitensky N, et al. Practitioner and organizational barriers to evidence-based practice of physical therapists for people with stroke. *Phys Ther*. 2007;87:1284-1303.
- 11 Jette DU, Bacon K, Batty C, et al. Evidence-based practice: beliefs, attitudes, knowledge, and behaviors of physical therapists. *Phys Ther*. 2003;83:786-805.
- 12 Jette DU, Grover L, Keck CP. A qualitative study of clinical decision making in recommending discharge placement from the acute care setting. *Phys Ther*. 2003;83:224-236.

- 13 Stevenson TJ, Barclay-Goddard R, Ripat J. Influences on treatment choices in stroke rehabilitation: survey of Canadian physical therapists. *Physiother Can.* 2005; 57:135-144.
- 14 Huijbregts MPJ, Myers AM, Kay TM, Gavin TS. Systematic outcome measurement in clinical practice: challenges experienced by physiotherapists. *Physiother Can.* 2002;54:25-31, 36.
- 15 Rappolt S, Tassone M. How rehabilitation therapists gather, evaluate, and implement new knowledge. *J Contin Educ Health Prof.* 2002;22:170-180.
- 16 Turner P, Whitfield TW. Physiotherapists' use of evidence based practice: a cross-national study. *Physiother Res Int.* 1997; 2:17-29.
- 17 Maher CG, Moseley AM, Sherrington C, et al. A description of the trials, reviews, and practice guidelines indexed in the PEDro database. *Phys Ther.* 2008;88: 1068-1077.
- 18 Maher CG, Sherrington C, Elkins M, et al. Challenges for evidence-based physical therapy: accessing and interpreting high-quality evidence on therapy. *Phys Ther.* 2004;84:644-654.
- 19 Li L, Irvin E, Guzman J, Bombardier C. Surfing for back pain patients: the nature and quality of back pain information on the Internet. *Spine.* 2001;26:545-557.
- 20 Korner-Bitensky N, Roy MA, Teasell R, et al. Creation and pilot testing of Strok-Engine: a stroke rehabilitation intervention Web site for clinicians and families. *J Rehabil Med.* 2008;40:329-333.
- 21 Teasell R. Evidence-based review of stroke rehabilitation (EBRSR), edition 9. Available at: [www.ebrsr.com](http://www.ebrsr.com). Accessed July 10, 2008.
- 22 American Physical Therapy Association. Hooked on evidence. Available at: <http://www.hookedonevidence.com/>. Accessed June 18, 2009.
- 23 McColl A, Smith H, White P, Field J. General practitioner's perceptions of the route to evidence based medicine: a questionnaire survey. *BMJ.* 1998;316:361-365.
- 24 Pollock AS, Legg L, Langhorne P, Sellars C. Barriers to achieving evidence-based stroke rehabilitation. *Clin Rehabil.* 2000; 14:611-617.
- 25 Closs SJ, Lewin BJP. Perceived barriers to research utilization: a survey of four therapists. *British Journal of Therapy and Rehabilitation.* 1998;5:151-155.
- 26 Estabrooks CA, Midodzi WK, Cummings GG, Wallin L. Predicting research use in nursing organizations: a multilevel analysis. *Nurs Res.* 2007;56:S7-S23.
- 27 Milner M, Estabrooks CA, Myrick F. Research utilization and clinical nurse educators: a systematic review. *J Eval Clin Pract.* 2006;12:639-655.
- 28 Estabrooks CA, Floyd JA, Scott-Findlay S, et al. Individual determinants of research utilization: a systematic review. *J Adv Nurs.* 2003;43:506-520.
- 29 Berwick DM. Disseminating innovations in health care. *JAMA.* 2003;289:1969-1975.
- 30 Grol R, Wensing M. What drives change? Barriers to and incentives for achieving evidence-based practice. *Med J Aust.* 2004;180:S57-S60.
- 31 Cabana MD, Rand CS, Powe NR, et al. Why don't physicians follow clinical practice guidelines? A framework for improvement. *JAMA.* 1999;282:1458-1465.
- 32 Ceccato NE, Ferris LE, Manuel D, Grimshaw JM. Adopting health behavior change theory throughout the clinical practice guideline process. *J Contin Educ Health Prof.* 2007;27:201-207.
- 33 Grimshaw JM, Thomas RE, MacLennan G, et al. Effectiveness and efficiency of guideline dissemination and implementation strategies. *Health Technol Assess.* 2004; 8(6).
- 34 Grimshaw JM, Eccles MP, Tetroe J. Implementing clinical guidelines: current evidence and future implications. *J Contin Educ Health Prof.* 2004;24(suppl 1):S31-S37.
- 35 Eccles M, Grimshaw J, Walker A, et al. Changing the behavior of healthcare professionals: the use of theory in promoting the uptake of research findings. *J Clin Epidemiol.* 2005;58:107-112.
- 36 Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev.* 1977;84:191-215.
- 37 Judge TA, Jackson CL, Shaw JC, et al. Self-efficacy and work-related performance: the integral role of individual differences. *J Appl Psychol.* 2007;92:107-127.
- 38 Bandura A. *Self-Efficacy: The Exercise of Control.* New York, NY: W.H. Freeman; 1997.
- 39 Duncan PW, Horner RD, Reker DM, et al. Adherence to postacute rehabilitation guidelines is associated with functional recovery in stroke. *Stroke.* 2002;33: 167-177.
- 40 Reker DM, Duncan PW, Horner RD, et al. Postacute stroke guideline compliance is associated with greater patient satisfaction. *Arch Phys Med Rehabil.* 2002; 83:750-756.
- 41 Dillman DA. *Mail and Internet Surveys: The Tailored Design Method.* New York, NY: John Wiley & Sons Inc; 2000.
- 42 Nunnally JC, Bernstein IH. *Psychometric Theory.* New York, NY: McGraw-Hill; 1994.
- 43 Jorgensen HS, Nakayama H, Raaschou HO, Olsen TS. Recovery of walking function in stroke patients: the Copenhagen Stroke Study. *Arch Phys Med Rehabil.* 1995;76: 27-32.
- 44 Tabachnick BG, Fidell LS. *Using Multivariate Statistics.* Boston, MA: Allyn and Bacon; 2001.
- 45 Peterson ED. Measures of perceived self-efficacy as a method of evaluating educational outcomes: an introduction. *CE Measurement.* 2006;1:35-39.
- 46 Peterson ED, Lulejian A, Laussucq S. Using perceived self-efficacy to measure outcomes: evaluation of a two-day course. *J Outcome Meas.* 2007;1:59-64.
- 47 Salbach NM, Veinot P, Rappolt S, et al. Physical therapists' experiences updating the clinical management of walking rehabilitation after stroke: a qualitative study. *Phys Ther.* 2009;89:556-568.
- 48 Jackson LA, Ervin KS, Gardner PD, Schmitt N. Gender and the Internet: women communicating and men searching. *Sex Roles.* 2001;44:363-380.
- 49 Ybarra M, Suman M. Reasons, assessments and actions taken: sex and age differences in uses of Internet health information. *Health Educ Res.* 2008;23:512-521.
- 50 Menachemi N, Perkins RM, van Durme DJ, Brooks RG. Examining the adoption of electronic health records and personal digital assistants by family physicians in Florida. *Inform Prim Care.* 2006;14:1-9.
- 51 Carroll AE, Christakis DA. Pediatricians' use of and attitudes about personal digital assistants. *Pediatrics.* 2004;113:238-242.
- 52 Tsai SL. Nurses' participation and utilization of research in the Republic of China. *Int J Nurs Stud.* 2000;37:435-444.

## Information Seeking by Physical Therapists Providing Stroke Management

### Appendix.

Blocks of Questionnaire Items Modeled Using Logistic Regression

Block	Items <sup>a</sup> (Scoring for Regression Modeling <sup>b</sup> )
Practitioner	
Education in evidence-based practice (EBP) (3 items)	I learned EBP as part of academic preparation I received formal training to do literature searches I received formal training in critical appraisal of literature as part of academic preparation
Attitude toward EBP (7 items)	EBP is necessary to physical therapist practice Literature or research findings are useful in daily practice EBP improves quality of care EBP helps me make decisions about patient care EBP places an unreasonable demand on physical therapists EBP does not account for patients' preferences There is a definite divide between research and practice
Interest in EBP (2 items)	I need to increase use of evidence in my daily practice I am interested in improving my EBP skills
Perceived role in EBP (3 items)	Physical therapists should be responsible for conducting their own literature reviews Physical therapists should be responsible for critical appraisal Physical therapists should be responsible for interpreting whether research applies to their patients
Sociodemographic characteristics	Age (20–29, 30–39, 40–49, or ≥50 y) Sex Highest degree earned (diploma or certificate, bachelor's degree, or graduate degree) Years in clinical practice (<5, 5–10, 11–15, or >15)
Professional activities	Membership in professional organization ("no" or "yes") Spend work time participating in research ("no" or "yes") Percentage of work time spent on patient care (0%–75% or >75%) I am a clinical instructor ("no" or "yes")
Self-efficacy for implementing EBP (12-item scale)	Self-efficacy for implementing EBP (0%–100%)
Organization	
Organization and peer support for EBP (2 items)	Facility supports use of current research in practice Colleagues are skeptical of new EBP
Organization resources (6 items)	Access to a resource person ("no or do not know" or "yes") Facility provides money for continuing education ("no or do not know" or "yes") Access to Internet and databases at facility ("no or do not know" or "yes") Access to printed journals at facility ("no or do not know" or "yes") Facility mandates use of research in practice ("no or do not know" or "yes") Facility provides protected time to search literature ("no or do not know" or "yes")
Practice and work setting characteristics (7 items)	I work in a multidisciplinary team ("no" or "yes") I work at a teaching institution ("no" or "yes") Hours worked per week (<20, 20–30, 31–40, or >40) Patients seen per day (1–10, 11–15, or >15) Location of practice setting (urban, suburban, or rural) Type of facility or setting (acute care, rehabilitation or complex continuing care, or community) Full-time physical therapists in facility (<5, 5–10, 11–20, or >20)
Perceptions about research (4 items)	Randomized controlled trial evidence is lacking to support most of the interventions I use to enhance walking ability Research evaluating walking interventions can be easily applied to individual patients Walking interventions evaluated in research are relevant to my clinical practice Research is clear about which therapies will enhance walking capacity in each phase of recovery after stroke

<sup>a</sup> See Salbach et al<sup>10</sup> for original item wording. EBP=evidence-based practice.

<sup>b</sup> Unless otherwise indicated, all items were rated with a Likert scale of agreement and were recategorized for regression as described in the "Statistical Methods" section of the text.