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Human Relations 2007 60: 259
DOI: 10.1177/0018726706076025

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What is This?
Personal and organizational knowledge transfer: Implications for worklife engagement

Michael P. Leiter, Arla L. Day, Phyllis Harvie and Krystelle Shaughnessy

ABSTRACT
Although knowledge transfer (KT) in healthcare organizations is increasingly important, models have typically focused on the transfer of clinical knowledge. Despite numerous reports and studies on worklife issues for healthcare professionals, few recommendations have been implemented, and many of these professionals are unfamiliar with the reports. Using measures of knowledge transfer of quality of worklife information developed from a model of transfer of clinical knowledge, we tested the relationship between individual and organizational knowledge transfer among 769 nurses in hospitals across four provinces in Canada. We also examined a model that integrated these two knowledge transfer measures with burnout/engagement in the workplace. Our data supported a two-factor structure for the measure of knowledge transfer involving a) individual perceptions of personal knowledge transfer activities and b) organizations’ support for knowledge transfer. Data from structural equation modeling demonstrated the importance of knowledge transfer pertaining to quality of worklife to nurses’ experience of energy, involvement, and efficacy that underlies the burnout/engagement construct.

KEYWORDS
burnout • engagement with work • healthcare management • knowledge transfer • nursing • quality of worklife
Sustaining and building professional competence is an ongoing challenge in healthcare work because providers interact with an ever-growing body of knowledge, technology, and procedures. This challenge is the responsibility of individual professionals as well as the organizations within which they work. From the perspective of healthcare organizations, practices that are informed by current research are consistent with a mission of high-quality healthcare. The challenge of putting knowledge into action effectively has prompted the study of knowledge utilization.

Therefore, we propose a new perspective on meeting this challenge by measuring individual and organizational knowledge transfer in the healthcare setting. We also consider the relationship of knowledge utilization with the extensively researched syndrome of job burnout or engagement, with an emphasis on the relatively unexplored aspect of diminished professional efficacy. Overall, this research presents a fresh approach to studying knowledge transfer in nursing and adds to research on engagement with work.

Knowledge transfer

Knowledge utilization is a large field of inquiry that crosses disciplines and encompasses multiple theoretical backgrounds. Knowledge transfer involves ‘the process through which one unit is affected by the experience of another’ (Argote & Ingram, 2000: 151). Although some of the work on knowledge transfer has focused on the evidence or knowledge, more recent work expands the view to draw greater attention to the context and process of knowledge transfer (e.g. Fitzgerald et al., 2002; Rycroft-Malone et al., 2004a, 2004b). Encouraging knowledge transfer involves the creation and implementation of practices, policies, and structures to support individuals in ongoing professional development and the integration of individual experiences into shared knowledge across the organization (Senge, 1990). Knowledge transfer, as the process of sharing new knowledge among members of an organization, is a process within the broad scope of organizational learning that also includes the codification and retention of existing knowledge and practices. Organizational priorities and systems for sharing knowledge provide a context for understanding the process of knowledge transfer. In addition to organizational systems, individual activity is a significant part of the process of knowledge transfer. Responsible professional performance involves maintaining current knowledge of innovations, especially those innovations with a potential to enhance the provision of services, and sharing this knowledge with others (Rycroft-Malone et al., 2004b).
The importance of understanding how knowledge is transferred for use within the healthcare system is evident by the significant proportion of work on knowledge transfer and utilization that focuses on nursing. The PARIHS (Promoting Action on Research Implementation in Health Services) framework of research utilization (Kitson et al., 1998) is one model developed by nursing researchers. The model’s core elements explore evidence, context, and facilitation (Harvey et al., 2002; McCormack et al., 2002; Rycroft-Malone et al., 2002, 2004a). Although this model has not been tested empirically, it does shed light on important issues that are likely to influence the active transfer and use of information in nursing practice. In highlighting context that helps or hinders knowledge transfer, the PARIHS model considers organizational values, established practices, and informal social networks as well as formal organizational structures. A central objective of this framework is identifying the context and process conditions that facilitate transferring and using new knowledge for the benefit of healthcare recipients.

A pivotal juncture in the path from new knowledge to practice implementation is the interaction of individual practitioners with their organizations. That is, the priority which organizations give to knowledge sharing, innovation, and learning shape the context in which nurses work. Policies, procedures, and resource allocation may increase the flow of information through the organization or stifle it (Schein, 1992). Through their structures and practices, organizations may encourage or discourage innovation and learning (Rycroft-Malone et al., 2004a). The organizational context has the potential to influence individual participation in knowledge transfer (Fitzgerald et al., 2002).

Knowledge utilization and quality of worklife

Knowledge transfer pertaining to quality of worklife has received less attention in research literature than has knowledge transfer on clinical practice. In contrast with biological or physical sciences that form the basis for clinical practice changes, research findings from social sciences that form the basis for quality of worklife initiatives are rarely clear cut, authoritative, or readily applicable to a full range of settings (Weiss, 1979). The dynamics of change in this area are only minimally understood, especially on the organizational level. Despite occasional examples of progress, observers are generally disappointed with the extent to which organizations have implemented meaningful, enduring interventions to enhance the quality of worklife (Cooper, 2004).
These challenges do not, however, limit the importance of quality of worklife to providing competent, responsive care in healthcare settings. Patient perceptions of the care they receive from nurses has been linked with nurses’ self-reports of feelings about their work and their sense of burnout (Leiter et al., 1998). Beyond gaining and using knowledge related to the technical aspects of patient care, gaining, using, and sharing knowledge about quality of worklife provides another opportunity for sustaining and further developing competence in providing quality care. The PARIHS framework was developed with a focus on clinical practice, but it may provide guidance for considering healthcare professionals’ use of new knowledge to enhance the quality of their worklife. That is, successful initiatives to enhance worklife should consider the quality of the evidence, require facilitation, and depend upon a good fit with organizational context.

Although knowledge around clinical innovations may be directly applicable to patient treatment, knowledge around organizational support for care providers can contribute to socio-emotional care that patients observe when nurses are engaged with their work rather than experiencing burnout (Leiter et al., 1998). Within the hospital setting, knowledge that improves technical care and knowledge that improves quality of worklife to support nurses’ socio-emotional care contribute to patient care. Both types of knowledge require organizational transfer and personal or individual transfer.

**Knowledge transfer perspectives and relationships with work**

Examining relationships with work and perspectives on knowledge transfer can contribute significantly to understanding both burnout (or engagement with work) and the interaction of organizations with individuals on knowledge transfer. Burnout is a chronic syndrome of exhaustion, cynicism, and low professional efficacy that is prevalent among people working in service and knowledge sectors of the economy (Leiter & Maslach, 2004; Maslach et al., 2001). Burnout is incompatible with the capacity to accept new challenges or to undertake fundamental change at work (Leiter & Harvie, 1998). The positive end of the continuum – engagement with work – is a cognitive and emotional state consistent with an active approach to problem solving (Leiter & Maslach, 2004). Personal qualities of energy, involvement, and efficacy are consistent with personal participation in learning, sharing information, and adapting practice to enhance the quality of services.

Research on burnout has demonstrated that exhaustion, cynicism, and efficacy are not enduring individual qualities, but responsive to employees’ organizational context (Leiter & Laschinger, 2006; Schaufeli & Enzmann,
A defining feature of burnout is chronic exhaustion arising from persistent work overload. Research has consistently identified that workload is a predictor of exhaustion and has found that exhaustion is a strong predictor of cynicism (Maslach et al., 2001). Research has been less conclusive regarding predictors of efficacy. One reason for this difference is that studies of burnout tend to assess stressful, demanding aspects of work more thoroughly than they consider aspects that enhance professional efficacy.

The professional efficacy dimension comprises self-evaluation that is specific to the work domain. It complements the focus of the exhaustion dimension on the fundamental resource of energy and that of the cynicism dimension on the capacity for involvement in people, activities, or problems within the work environment (Leiter & Harvie, 1998). Generally, one’s energy level is sensitive to the balance of demands and resources that have been the focus of research in occupational stress and burnout (Maslach et al., 2001), whereas one’s level of involvement closely corresponds to the energy dimension as well as organizational justice and value congruence at work (Leiter & Maslach, 2004).

Employees’ participation in knowledge transfer activities may act as a contributor to professional efficacy. Farel et al. (2001) found that nurses participating in a training program that involved collecting, analyzing, and interpreting data experienced increased self-efficacy in their ability to respond to situations that required further knowledge gathering. In keeping with Bandura’s (1997) work on self-efficacy development through active mastery, participating in knowledge transfer experiences that develop important expertise helps employees feel capable of addressing a variety of situations in the workplace. That is, doing important work that matters to important people builds a sense of professional efficacy regardless of the energy and involvement dimensions of the burnout/engagement continuum. In contrast, employees’ assessment of the organizational values pertaining to knowledge transfer is a matter of value congruence rather than a reflection on their personal efficacy. If so, examining employees’ perspectives on both organizational knowledge transfer would be more closely related to the cynicism/involvement dimension than to professional efficacy. Examining these relationships has the potential to provide a more complete picture of organizational environments as they pertain to healthcare professionals’ relationships with work.

Summary and hypotheses

Knowledge transfer is important to organizations to ensure that they maintain high-quality performance, remain competitive, and in the case of
quality of worklife, safeguard the health and well-being of nurses. Research, however, has not thoroughly examined either the mechanisms through which knowledge transfer can have an impact on individual employees or the conditions under which it is most likely to occur.

Therefore, in the present studies, we had two primary goals: 1) to introduce a measure of organizational and individual perspectives on knowledge transfer; and 2) to examine a model of knowledge transfer, workload, and burnout (see Figure 1). More specifically, we made the following hypotheses:

*Hypothesis 1*: The Knowledge Transfer Inventory will demonstrate good reliability and validity in that: a) its two scales will differentiate between respondents’ perspectives on their personal participation in knowledge transfer and the organization’s values on knowledge transfer, by demonstrating two clear and distinct factors (Study 1 and Study 2); b) individual knowledge transfer will correlate more strongly with individuals’ familiarity with key healthcare recommendation reports than will organizational knowledge transfer. Conversely, organizational knowledge transfer will correlate more strongly with measures of organizational values than will individual knowledge transfer; and c) nurses who are on committees with professional development and knowledge transfer functions will have a higher level of individual knowledge transfer than those nurses who do not have this function (Study 2).

**Figure 1** Hypothesized Model (Study 2)
Hypothesis 2: Our proposed model in Study 2 will demonstrate good fit, and the proposed relationships will be significant. More specifically a) because of the stressful impact of work overload and time demands on employees’ energy, manageable workload will be associated with higher exhaustion; b) exhaustion will be associated with higher cynicism, which in turn will be associated with lower efficacy; c) an organization’s commitment to knowledge transfer will be associated with increased individual involvement in knowledge transfer and lower cynicism; and d) personal knowledge transfer will be associated with increased efficacy, reflecting the relationship between personal involvement in sharing knowledge and individual employees’ sense of professional effectiveness.

Therefore, we first explored the factor structure of previously developed scales of knowledge transfer – personal and organizational – using standard psychometrics test development procedures (e.g. Crocker & Algina, 1986). We then conducted a second study to validate the knowledge transfer measures and tested a model of knowledge transfer, workload, and burnout (in terms of exhaustion, cynicism, and personal efficacy).

Study 1: Method

Procedure

Nurses were recruited to participate in the study at a provincial nursing leadership conference: the researchers distributed the survey package to interested individuals and asked the package be returned before the end of the conference. The researchers provided a written description of the research objectives, procedures for confidentiality, and directions to a web site that provided information on the research program. Participants were instructed to seal the survey package in the envelope provided upon completion of the survey and return it to the survey booth.

Participants

Of the 250 participants at the conference, 102 nurses requested questionnaire packages for a participation rate of 40.8 percent. All of the nurses who requested questionnaires returned them, for a completion rate of 100 percent. The sample comprised 92 females and six males (four participants did not indicate their gender). The majority of participants were registered nurses ($n = 78$), with the remainder being Licensed Practical Nurses ($n = 9$),
Clinical Nurse Specialists \((n = 2)\), Clinical Nurse Educators \((n = 5)\) or ‘other’ \((n = 6);\) two participants did not indicate their specific occupation). The majority of respondents were between the ages of 46 and 55 \((n = 46)\), followed by 36–45 years \((n = 29)\), 25–35 years \((n = 21)\), and 56–65 years \((n = 5);\) one respondent did not report his/her age). The vast majority of respondents were full-time employees \((n = 75)\) and half \((n = 51)\) worked at tertiary hospitals with the other half working in other settings. Respondents included staff nurses \((n = 48)\), managers \((n = 24)\), and other positions \((n = 27);\) three individuals did not report their position). The majority of respondents had worked at their present organization for five years or less \((n = 58)\); others for 6–10 years \((n = 17)\), for 11–15 years \((n = 7)\), for 16–20 years \((n = 8)\), for 20–30 years \((n = 10);\) two individuals did not report tenure). Because participants were drawn from a nursing leadership conference, they likely had a more active participation in knowledge transfer relative to point-of-care nurses. The sample includes a relatively large proportion of nurse managers.

**Measures**

**Personal knowledge transfer**

The knowledge sharing and transfer literature was reviewed in order to develop a measure of personal knowledge transfer (e.g. Connelly & Kelloway, 2003; Slaunwhite et al., 2004). Analysis of the interviews identified roles in the knowledge transfer process, including acquiring (e.g. gaining access to documents), reading (e.g. reading the documents), evaluating (e.g. assessing the value of the information), filtering (e.g. abstracting selected information from documents), condensing (e.g. writing abstracts or outlines of documents), distributing (e.g. sharing copies of documents with colleagues), and using information (e.g. participating in projects that use the information). This item pool was reviewed using the criteria outlined in Crocker and Algina (1986) and reduced to nine items. Items describing these roles (presented in a subsequent section) were rated on a seven-point Likert frequency scale from 0 (never) to 6 (daily). In Study 1, the internal consistency was high \((\alpha = .93)\), with all item-total correlations above \(r = .36\).

**Organizational knowledge transfer**

Slaunwhite et al. (2004) developed the items by reviewing the knowledge sharing and transfer literature (e.g. Bock & Kim, 2002). Their review process involved Q sorting, in which 10 subject matter experts reviewed the items and sorted them into different categories. Items with higher than 80 percent correct sorting were retained. Items were evaluated further to ensure that the
wording was clear and unambiguous. This process reduced the original number of items in half. A principal components analysis confirmed the two factors (i.e. organizational- and leader-based factors and individual-based factors; Slauwwhite et al., 2004). Participants rated items on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). The items (examples presented in a subsequent section), which refer to the respondent’s perception of organizational perspectives on knowledge sharing, were selected to emphasize management processes and values on knowledge sharing, with some items making specific reference to quality of worklife. In Study 1, internal consistency was high ($\alpha = .88$), with all item-total correlations above $r = .35$.

Data analysis

Data analysis considered the status of the knowledge transfer measures from the perspective of factor structure and internal consistency (Cronbach’s alpha). The analysis assessed items in reference to their factor coefficients as well as correlations among error terms. Correlated errors indicate a systematic relationship among items beyond what is specified in the model. Likely sources of systematic error are negative affectivity and social desirability (MacCallum et al., 1996; Palmer et al., 2002). Restricting items to those with low error correlations focuses the measure on the construct of interest.

Study 1: Results

Factor structure of KT measures

In order to explore the factor structure of the knowledge transfer scales, a confirmatory factor analysis (CFA) was conducted with EQS (EQuationS) (Bentler & Chou, 1987). Whereas some items showed a moderate kurtosis, the analysis used the robust analysis option of EQS, which corrects for multivariate kurtosis (Byrne, 1994). The following section reports the robust statistics for chi square (Satorra-Bentler Scaled Statistics; Satorra & Bentler, 1988), the Bentler-Bonett Non-normed Fit Index (BBNNFI), Comparative Fit Index (CFI), and Root Mean-Square Error of Approximation (RMSEA). In all models the first item of each factor is fixed to establish the factor’s scale.

The initial confirmatory factor analysis (CFA) assessed the significance of item coefficients on their respective factors and the level of correlation among items. The factors were freed to correlate. This analysis produced a good fit ($\chi^2(118) = 168.40, p = .00161; CFI = .942; \text{RMSEA} = .068$), although there were large correlated errors among items in both the personal knowledge transfer and organizational knowledge transfer scales. On the basis of
the modification indices, three items were removed from each of the two scales. Although these items had significant coefficients on the designated factor and no significant coefficients with the other factor, the large significant modification indices for their error correlations with other item error terms suggested that their scores reflected a response set in a systematic manner. The items in the resulting abbreviated scales covered less of the domains of individual and organizational knowledge transfer, but, having deleted the items with high error correlations, they provided a clearer assessment of those constructs.

The next stage of the analysis, using the abbreviated versions of the two scales, contrasted the Two-Factor Model with a One-Factor Model that assigned all 11 items to a single factor. The method for contrasting models was developed by Bentler and Bonnett (1980) who demonstrated that the difference in chi-square values between two nested models (i.e. one in which the less complex model contains only a subset of the paths in the more complex model) can be assessed with a chi-square test with the degrees of freedom equal to the difference in degrees of freedom between the two models. Mulaik et al. (1989) recommended this method to contrast the fit of structural models.

The results clearly favored the Two-Factor Model ($\chi^2(43) = 56.66, p = .079$; BBNNFI = .963; CFI = .971; RMSEA = .058) over the One-Factor Model ($\chi^2(44) = 134.64, p < .00001$; BBNNFI = .763; CFI = .811; RMSEA = .147). The Chi-Square Difference Test confirmed the improvement in fit provided by the Two-Factor Model ($\chi^2(1) = 77.98, p < .001$).

The small sample size relative to number of degrees of freedom raises the issue of power in relation to the model tested. In structural equation modeling, power can be assessed for three different types of hypotheses, 1) exact fit, 2) close fit, and 3) not close fit (MacCallum et al., 1996). Power for the hypothesis of close fit as calculated using R software is 0.744 (Preacher & Coffman, 2006). In order to affirm the factor structure and further assess the validity of this scale, and to assess a knowledge transfer model, Study 2 was conducted.

**Study 2: Method**

**Participants**

Most of the sample ($n = 667$) were female (25 respondents did not specify their gender). Respondents included Registered Nurses ($n = 589$), Licensed Practical Nurses ($n = 85$), Clinical Nurse Specialists ($n = 5$), Clinical Nurse Educators ($n = 5$), Nurse Practitioners ($n = 3$), and ‘other’ ($n = 15$; 23
respondents did not specify their job title). Participants worked in Tertiary Hospitals \((n = 226)\), Regional Hospitals \((n = 362)\), Community Hospitals \((n = 89)\), or other settings (24; 24 respondents did not specify their work environment). The majority of participants worked full time \((n = 437)\), with 135 respondents working part time, and 46 respondents working casual (107 did not specify their work status). The majority of respondents were staff nurses \((n = 601)\), and there were 29 managers and 68 classified as ‘other’ (27 respondents did not indicate their position). Respondents included members of the District Nurse Advisory Council \((n = 19)\) and members of the Practice Council \((n = 37)\), but most respondents were not members of either type of council \((n = 669)\). Of the participants, 54 of them had worked at their present organization for less than a year; 240 had worked at their organization for 2–10 years, 210 had worked for 11–20 years, and 199 had worked at their present organization for over 20 years (22 participants did not specify their time with their organization). The sample represents a 29 percent response rate for the 2500 surveys distributed to acute care settings in Atlantic Canada. The large proportion of full-time, female, point-of-care Registered Nurses is representative of the population in this region (Canadian Institute for Health Information, 2005a, 2005b).

Procedure

Participation in the study involved completion of the questionnaire package. The researchers distributed paper questionnaire packages to nurse managers at selected hospitals in all four Atlantic Provinces in Canada. Nurse Managers were responsible for distributing the packages to point-of-care nurses working on their units either during unit meetings, by placing the packages in mailboxes, or by leaving a stack of packages with ward clerks to help distribute. All of the packages included the survey, an information letter detailing the procedures and reason for the study, a flyer to advertise the online version of the survey, and a ballot and ballot envelope. As an incentive to participate, all nurses who completed the survey were given the opportunity to enter their name into a prize draw.

Measures

**Personal knowledge transfer**

On the basis of the analysis reported above, the analysis proceeded with six items that assessed personal knowledge transfer (for example, ‘I have read
material on quality of worklife as part of my job responsibilities; ‘I use my knowledge of research to back my opinions about worklife issues’).

To maintain consistency with the organizational knowledge transfer measure, participants rated items on the five-point Disagree/Agree format in this study.

**Organizational knowledge transfer**

On the basis of the analysis reported above, five items comprised the short measure of organizational knowledge transfer (e.g. ‘The culture at my organization fosters knowledge sharing’; ‘My supervisor fosters a work environment where employees feel safe sharing their knowledge’).

**Burnout**

Burnout was measured using the Maslach Burnout Inventory-General Scale (MBI-GS; Schaufeli et al., 1996). The MBI-GS measures the three dimensions of the burnout–engagement continuum: exhaustion–energy, cynicism–involvement, and inefficacy–efficacy. The items are framed as statements of job-related feelings (e.g. ‘I feel burned out from my work’; ‘I feel confident that I am effective at getting things done’), and are rated on a six-point frequency scale (ranging from 0 = ‘never’ to 6 = ‘daily’). Burnout is reflected in higher scores on exhaustion and cynicism, and lower scores on efficacy, whereas the opposite pattern reflects greater engagement. Developed from the original MBI (Maslach et al., 1996), which was designed for human service occupations, the MBI-GS is a 16-item measure that evaluates burnout among people in all occupations.

**Manageable workload**

Manageable workload was measured by using three items from the Manageable Workload subscale of the Areas of Worklife (AWS) measure (Leiter & Maslach, 2004). The items are worded as statements of perceived congruence or incongruence between oneself and the job (e.g. ‘I have enough time to do what’s important in my job’), and they are rated on a five-point Likert scale from 1 = strongly disagree to 5 = strongly agree. Reliability testing of the scale using a normative sample (N = 6815) has shown the Manageable Workload subscale to be internally consistent with a Cronbach’s alpha of .70 (Leiter & Maslach, 2004). In the present study, the internal reliability was acceptable (α = .71), with all item-total correlations above r = .49.
Healthcare report use

A measure of familiarity with six key governmental reports related to healthcare work environments was developed based on Knott and Wildavsky’s (1980) conceptualization of indications of research use. Using a six-point Likert scale, respondents were asked to rate their level of awareness of each of the reports (from 0 = I have never heard of it; 1 = I have heard of it; 2 = I have received it; 3 = I have read it; 4 = I know about its recommendations; to 5 = I have implemented its recommendations). The average of all report ratings provides an indication of personal knowledge transfer activity. In the present study, the internal reliability was high ($\alpha = .86$), with all item-total correlations above $r = 58$.

Organizational priorities

Participants rated the priority that they believed their organization placed on several issues. These seven issues were identified through interviews and documents pertaining to the Canadian healthcare system. They involved workload, workforce supply, hours of work, health impact of work, nursing leadership, scope of practice, and information systems. The perceived priority ratings were averaged across the seven issues to measure the overall importance the organization placed on these issues. In the present study, the internal reliability was high ($\alpha = .84$), with all item-total correlations above $r = .35$.

Confirmatory factor analysis: Replication of pilot analysis

A confirmatory factor analysis was conducted in order to assess the factor structure of the personal and organizational knowledge transfer scales. The results supported the results from Study 1, indicating that the Two-Factor Model fit the data well ($\chi^2(43) = 82.61, p = .00027$; BBNNFI = .946; CFI = .958; RMSEA = .058). Furthermore, the results supported Hypothesis 1a, in that the Two-Factor Model had a better fit than a One-Factor Model ($\chi^2(44) = 320.28, p < .00001$; BBNNFI = .631; CFI = .705; RMSEA = .151). The specific item coefficients will be presented in the context of the structural equation analysis.

Descriptive statistics and correlations

Table 1 displays the means, standard deviations, alphas, and correlations among the measures. The alpha levels for the full scale measures are all above
Table 1  Study 2: Means, standard deviations, Cronbach’s alpha values, and correlations among variables

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Cronbach’s alpha</th>
<th>Cronbach’s alpha short form</th>
<th>Organizational KT</th>
<th>Exhaustion</th>
<th>Cynicism</th>
<th>Efficacy</th>
<th>Manageable workload</th>
<th>Report use</th>
<th>Organizational priorities</th>
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</thead>
<tbody>
<tr>
<td>Personal KT</td>
<td>3.13</td>
<td>0.75</td>
<td>.89</td>
<td>.86</td>
<td>.35</td>
<td>-.06</td>
<td>-.15</td>
<td>.25</td>
<td>.05</td>
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<td>.20</td>
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<tr>
<td>Organizational KT</td>
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<td>.89</td>
<td>.80</td>
<td>-.29</td>
<td>-.38</td>
<td>.30</td>
<td>.33</td>
<td>.28</td>
<td>.61</td>
<td>.61</td>
</tr>
<tr>
<td>Exhaustion</td>
<td>2.67</td>
<td>1.47</td>
<td>.92</td>
<td>.88</td>
<td>-.61</td>
<td>-.28</td>
<td>-.62</td>
<td>-.14</td>
<td>-.33</td>
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<tr>
<td>Cynicism</td>
<td>1.81</td>
<td>1.41</td>
<td>.85</td>
<td>.69</td>
<td>-.39</td>
<td>-.40</td>
<td>-.17</td>
<td>-.37</td>
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<tr>
<td>Efficacy</td>
<td>4.45</td>
<td>0.98</td>
<td>.76</td>
<td>.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.23</td>
<td>.16</td>
<td>.27</td>
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<tr>
<td>Manageable workload</td>
<td>2.75</td>
<td>0.73</td>
<td>.80</td>
<td>.61</td>
<td></td>
<td></td>
<td></td>
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<td>.09</td>
<td>.31</td>
<td></td>
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<tr>
<td>Report use</td>
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<td>0.82</td>
<td>.80</td>
<td>n/a</td>
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<td></td>
<td></td>
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<td>.09</td>
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<tr>
<td>Organizational priorities</td>
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<td>.86</td>
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Note. N = 687. Correlations ≥ .07; p < .05; Correlations ≥ .10; p < .01.
Correlation of long form with short form of measure: Personal KT (r = .98), Organizational KT (r = .96), Exhaustion (r = .96), Cynicism (r = .97), Efficacy (r = .86), Manageable workload (r = .89).
The correlations among the three aspects of burnout followed the expected pattern of results, with exhaustion being strongly correlated with cynicism ($r = .61$, $p < .001$) and cynicism being strongly correlated with efficacy ($r = -.39$, $p < .001$). Table 1 also presents the alpha values for the short form (three items) of the measures described below for the structural equation analysis. Due to the direct relationship of alpha to the number of items, a two- or three-item scale, a coefficient alpha of .60 (Cortina, 1993) or .50 (Nunnally & Bernstein, 1994) is acceptable as a minimum standard, reflecting the sensitivity of correlation coefficients to sample size, because internal consistency alpha is a function of the test length as much as it is a function of the interrelatedness of the items.

Personal knowledge transfer was correlated with organizational knowledge transfer ($r = .35$, $p < .001$). As hypothesized (see Hypothesis 1b), these knowledge transfer scales were expected to correlate with other measures in a manner that reflected each scale's distinct focus, on personal in contrast to organizational, knowledge transfer. Personal knowledge transfer was more strongly correlated with use of healthcare reports ($r = .45$, $p < .001$) than was organizational knowledge transfer ($r = .34$, $p < .01$; $z = 2.34$, $p < .01$). Organizational knowledge transfer was more strongly correlated with organizational priorities ($r = .61$, $p < .001$) than was personal knowledge transfer ($r = .20$, $p < .001$; $z = 9.10$, $p < .001$).

Regarding Hypothesis 1c, additional evidence for construct validity is the significant correlation of Personal KT with membership on regional nursing councils that are cross-institutional committees with a professional development and a knowledge transfer function ($r = .14$, $p < .01$). Organizational KT was unrelated to council membership and correlated positively with managerial responsibility ($r = 16$, $p < .01$).

**Structural model: Analysis plan**

A structural equation analysis using EQS evaluated the Hypothesized Model. This analysis used the six items for Personal KT and five items for Organizational KT. Because we selected these items on the basis of low error correlations, we restricted items in the other constructs to those with low error correlations: exhaustion (MBI-3, MBI-4, MBI-6); cynicism (MBI-9, MBI-13, MBI-15); professional efficacy (MBI-10, MBI-11, MBI-12); manageable workload (Workload-3, Workload-4, Workload-6). The constructs based on the restricted set of items correlated very strongly with their full-scale counterparts, ranging from .86 for efficacy to .98 for personal knowledge transfer, indicating a close correspondence between the two item sets.
Using few items has the advantage of focusing the analysis on the structural relationships among constructs. The model retains its factor analytic component, assigning it a secondary role. This approach is appropriate for this analysis of the structural equation underlying the Hypothesized Model. The CFA presented above focused on the factor structure of personal and organizational knowledge transfer. The model analysis that follows contrasts the EQS Independence Model (including all items, but assigning no factor loadings and no structural relationships) with a Structural Null Model (assigning items to their respective independent factors) and with the Hypothesized Model.

Theoretical model analysis

The Hypothesized Model was tested using latent variables as defined in the factor analysis above. One criterion for model fit was an absolute reference point of a CFI ≥ .900 (Byrne, 1994). The model was also assessed through increments in explained chi square that provide a metric for the relative contributions made by each of a model’s distinct components. The Structural Null Model made a significant improvement over the Independence Model (Difference $\chi^2(23\text{ d.f.}) = 4078.90, p < .001$; see Table 2). Including the pathways specified in the Hypothesized Model improved the fit significantly (Difference $\chi^2(7\text{ d.f.}) = 775.35, p < .001$) beyond the criterion level of CFI ≥ .900 ($\chi^2(223) = 434.33, p < .001$; CFI = .958; see Table 2).

Figure 2 displays the Hypothesized Model with path coefficients and error values. All of the paths specified in the Hypothesized Model were statistically significant. The modification indices did not indicate any additional structural links that would improve the model.

The factor loadings (see Table 3) showed that the items loaded on their appropriate factor. Testing the knowledge transfer items in the context of the other constructs in the study further supports their differentiation from one another, and from the other concepts in the model. Table 3 presents the $R^2$

<table>
<thead>
<tr>
<th>Model analysis</th>
<th>Chi square</th>
<th>d.f.</th>
<th>BBNNFI</th>
<th>CFI</th>
<th>RMSEA</th>
<th>Chi-square difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independence Model</td>
<td>5288.62</td>
<td>253</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structural Null Model</td>
<td>1209.68</td>
<td>230</td>
<td>.786</td>
<td>.805</td>
<td>.081</td>
<td>4078.90</td>
</tr>
<tr>
<td>Hypothesized Model</td>
<td>434.33</td>
<td>223</td>
<td>.952</td>
<td>.958</td>
<td>.038</td>
<td>775.35</td>
</tr>
</tbody>
</table>

Table 2 Comparisons of model fit
values for the structural equation aspect of the analysis as well. It is noteworthy that the addition of the two knowledge transfer variables in the equation for efficacy yielded an $R^2$ value for efficacy that is greater than those for exhaustion and for cynicism, which is unusual in burnout research.

Demographic variables

An additional series of structural equation analyses considered the potential contribution of demographic variables to the model. While it is possible to include both categorical and continuous variables in structural equation model, introducing a large number of demographic variables simultaneously presents serious problems to the analysis. A series of analyses introduced each demographic variable as a new latent variable with a single indicator. The demographic variable was introduced as an additional predictor for all four endogenous variables. One exception to this approach was that time in position and time in profession worked well as a single latent variable (tenure) with two indicators.

As indicated in Table 4, the analysis identified two significant coefficients for demographics in the models. Position made a significant contribution to explaining personal KT in that supervisory position was associated with greater personal KT, and tenure made a significant contribution to efficacy in that longer tenure was associated with greater efficacy activity.
The introduction of the demographic variables into the structural equation did not have a consequential impact on the significance level of any of the predictors in the model.

Response bias

Relying on data from a single questionnaire introduces a risk of response bias. To assess the extent to which the data reflect a response bias across the items in the study, an additional analysis tested a model that included two additional latent variables across all 23 items in the study (Podsakoff et al.,

<table>
<thead>
<tr>
<th>Item</th>
<th>Coefficient</th>
<th>Construct</th>
<th>Error</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBI—GS 3</td>
<td>0.846</td>
<td>Exhaustion</td>
<td>0.533</td>
<td>0.716</td>
</tr>
<tr>
<td>MBI—GS 4</td>
<td>0.849</td>
<td>Exhaustion</td>
<td>0.529</td>
<td>0.720</td>
</tr>
<tr>
<td>MBI—GS 6</td>
<td>0.809</td>
<td>Exhaustion</td>
<td>0.588</td>
<td>0.654</td>
</tr>
<tr>
<td>MBI—GS 9</td>
<td>0.801</td>
<td>Cynicism</td>
<td>0.598</td>
<td>0.642</td>
</tr>
<tr>
<td>MBI—GS 10</td>
<td>0.383</td>
<td>Efficacy</td>
<td>0.924</td>
<td>0.147</td>
</tr>
<tr>
<td>MBI—GS 11</td>
<td>0.742</td>
<td>Efficacy</td>
<td>0.670</td>
<td>0.551</td>
</tr>
<tr>
<td>MBI—GS 12</td>
<td>0.831</td>
<td>Efficacy</td>
<td>0.556</td>
<td>0.691</td>
</tr>
<tr>
<td>MBI—GS 13</td>
<td>0.485</td>
<td>Cynicism</td>
<td>0.875</td>
<td>0.235</td>
</tr>
<tr>
<td>MBI—GS 15</td>
<td>0.681</td>
<td>Cynicism</td>
<td>0.732</td>
<td>0.464</td>
</tr>
<tr>
<td>Workload 3</td>
<td>0.586</td>
<td>Workload</td>
<td>0.810</td>
<td>0.344</td>
</tr>
<tr>
<td>Workload 4</td>
<td>0.707</td>
<td>Workload</td>
<td>0.707</td>
<td>0.500</td>
</tr>
<tr>
<td>Workload 6</td>
<td>0.783</td>
<td>Workload</td>
<td>0.622</td>
<td>0.613</td>
</tr>
<tr>
<td>Personal KT 1</td>
<td>0.733</td>
<td>Personal KT</td>
<td>0.681</td>
<td>0.537</td>
</tr>
<tr>
<td>Personal KT 2</td>
<td>0.730</td>
<td>Personal KT</td>
<td>0.683</td>
<td>0.533</td>
</tr>
<tr>
<td>Personal KT 3</td>
<td>0.802</td>
<td>Personal KT</td>
<td>0.598</td>
<td>0.643</td>
</tr>
<tr>
<td>Personal KT 4</td>
<td>0.607</td>
<td>Personal KT</td>
<td>0.795</td>
<td>0.368</td>
</tr>
<tr>
<td>Personal KT 5</td>
<td>0.591</td>
<td>Personal KT</td>
<td>0.807</td>
<td>0.349</td>
</tr>
<tr>
<td>Personal KT 6</td>
<td>0.778</td>
<td>Personal KT</td>
<td>0.629</td>
<td>0.605</td>
</tr>
<tr>
<td>Organizational KT 1</td>
<td>0.788</td>
<td>Organization KT</td>
<td>0.616</td>
<td>0.621</td>
</tr>
<tr>
<td>Organizational KT 2</td>
<td>0.602</td>
<td>Organization KT</td>
<td>0.798</td>
<td>0.363</td>
</tr>
<tr>
<td>Organizational KT 3</td>
<td>0.778</td>
<td>Organization KT</td>
<td>0.628</td>
<td>0.605</td>
</tr>
<tr>
<td>Organizational KT 4</td>
<td>0.760</td>
<td>Organization KT</td>
<td>0.650</td>
<td>0.577</td>
</tr>
<tr>
<td>Organizational KT 5</td>
<td>0.301</td>
<td>Organization KT</td>
<td>0.953</td>
<td>0.091</td>
</tr>
</tbody>
</table>

Note: Underlined items were fixed at 1.00 to set the scale in the SEM.
One of the variables was associated with the negatively worded items; the other variable was associated with the positively worded items. The additional variables produced a model ($\chi^2(200) = 359.77, p < .001; \text{CFI} = .968$) that provided a significant improvement of fit (Difference $\chi^2(23 \text{ d.f.}) = 75.08, p < .001$). Although assigning the shared variance to these latent variables did improve the model fit, all factor loadings and structural equation elements in the original model remained statistically significant.

### Discussion

The goals of this research were to assess the psychometric properties of a measure of knowledge transfer, and to assess a model of job burnout/engagement that encompassed personal and organizational knowledge transfer. Our findings provide support for the validity of the Knowledge Transfer Inventory (see Hypothesis 1) by showing that the items clearly cluster onto two distinct factors. In Study 1, a two-factor structure emerged (i.e. personal commitment to knowledge transfer and organizational support for knowledge transfer). This factor structure was further supported by the CFA in Study 2. These scales have the potential to make valuable contributions to the literature by identifying each component’s unique relationship with outcome variables.

Personal knowledge transfer was correlated with healthcare report use and membership on regional nursing councils. These results further demonstrate the construct validity of the measure because we would expect reported individual knowledge transfer to be associated with active involvement in

### Table 4  Chi-square values for demographic variables in the structural equation model

<table>
<thead>
<tr>
<th>Gender</th>
<th>Position</th>
<th>Council member</th>
<th>Setting</th>
<th>Tenure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal knowledge transfer activity</td>
<td>0.09 ($\beta = .11), p &lt; .05$</td>
<td>0.04</td>
<td>2.95</td>
<td>3.56</td>
</tr>
<tr>
<td>Exhaustion</td>
<td>0.13</td>
<td>0.01</td>
<td>0.09</td>
<td>0.24</td>
</tr>
<tr>
<td>Cynicism</td>
<td>2.04</td>
<td>1.55</td>
<td>0.36</td>
<td>2.11</td>
</tr>
<tr>
<td>Efficacy</td>
<td>2.89</td>
<td>0.33</td>
<td>3.82</td>
<td>0.26 ($\beta = .15), p &lt; .05$</td>
</tr>
</tbody>
</table>

Note: All Chi-square values (1 d.f.) are non-significant ($p < .05$); path coefficients are reported for paths that are statistically significant.
knowledge transfer. The relationship between organizational knowledge transfer with organizational priorities around healthcare issues and management roles further supports the use of these measures to provide distinct perspectives on these two sides of the knowledge transfer relationship. Together, the knowledge transfer scales have the potential to advance research in this area by providing quantitative assessments of individuals’ perspective on knowledge transfer in their organization and in their professional activities.

The results of Study 2 demonstrated the relevance of knowledge transfer perspectives at both the personal and organizational level to aspects of burnout (specifically, cynicism and efficacy), thus supporting Hypothesis 2. That is, the test of the model identified the contribution of both personal and organizational knowledge transfer as enhancing cynicism’s prediction of efficacy in the Burnout Model. These findings support the view that knowledge transfer is a core issue for healthcare professionals, consistent with a relationship with work characterized by involvement and efficacy. We consider the implications of this pattern of relationships for further refining a framework for knowledge transfer.

The Structural Equation Model integrates the knowledge transfer measures with the three aspects of the burnout/engagement continuum. The factor-analytic dimension of the analysis supports the distinction of personal knowledge transfer from the qualities of burnout, while confirming relationships among these constructs. The path from organizational knowledge transfer to personal knowledge transfer reflects the dynamics that encourage individuals to align their perspective with the values of their organizational environment and for the organization to create values that reflect the perspective of employees.

Together, both organizational and personal knowledge transfer perspectives enhanced the prediction of efficacy beyond that provided by cynicism in the Burnout Model. This development is important because efficacy has received less attention in burnout research. Moreover, there has been less success in identifying meaningful predictors of efficacy relative to the research on exhaustion. A focus on efficacy emphasizes the positive aspects of relationships with work. Professional efficacy as measured by the MBI may play a strong role in personal involvement in knowledge transfer. As depicted in the model, an active perspective toward and participation in knowledge transfer activities has the potential to support individuals’ sense of professional efficacy. Although not explored in this study, it may be possible that this relationship is reciprocal: that is, a strong sense of professional efficacy may increase nurses’ likelihood to develop a positive,
active perspective on knowledge transfer. Future research should explore this relationship further.

The relatively weaker links between knowledge transfer – personal or organizational – and exhaustion counter common speculation that nurses avoid knowledge transfer activities because of fatigue. Studies focusing on research utilization have consistently reported time as a barrier (Carrion et al., 2004; Funk et al., 1995; Oranta et al., 2002). Lack of time implies a workload that involves high demand during a nurse’s shift resulting in not enough time to partake in activities related to research utilization including knowledge transfer. Although workload and exhaustion are important considerations in both quality of worklife experience and care for patients, they are not key factors in understanding knowledge transfer in the model in this study.

The results of this study shed some light on the special qualities of knowledge transfer as it pertains to quality of worklife in contrast to clinical knowledge: the relationship between organizational knowledge transfer and personal knowledge transfer is consistent with individuals operating with an awareness of their larger social context. This relationship is moderate, but statistically significant, with the organizational construct explaining only 12.3 percent of the variance in personal knowledge transfer. Clearly, other issues beyond the scope of this study have a role to play in determining an individual’s participation in knowledge-transfer activities. The nature of these influences is a focus for future research.

The study is limited by its reliance on cross-sectional questionnaire data. There is no basis for discerning causal relationships. Assessment of the measures’ relevance is limited to construct validity through evaluating the association of personal and organizational knowledge transfer with other constructs measured in the questionnaire. The study is presented as a first evaluation of a measure with potential relevance to a wide range of knowledge transfer research. The analyses reported here are encouraging, but extensive research is needed to evaluate the scale’s full potential. Future research may test variations on the personal knowledge transfer scale by substituting ‘clinical practice’ for ‘quality of worklife’ in the item wording. Although common method variance may be seen as problematic, the presence of some non-significant relationships among the variables and the comparison of nested models alleviate some of these concerns. However, the analysis indicating that shared variance across the negatively worded items and across the positively worded items demonstrates that method variance accounts for a significant amount of the relationships among the variables. Future research using multiple sources of data would increase the confidence in these findings.
Conclusion

This study has made several contributions to the knowledge transfer literature. Its first contribution is testing and validating a measure that assesses both the respondents’ view of organizational perspectives on knowledge transfer and their personal inclination to participate in knowledge transfer activities related to improving worklife. Second, we also found that organizational knowledge transfer influences personal knowledge transfer. Third, we demonstrated that the knowledge transfer components are related to the three components of burnout, but have closer links with efficacy than with exhaustion, with cynicism having an intermediate role. Together, these contributions have the potential to enrich and extend research on this important topic of knowledge transfer and utilization regarding the quality of professional life.

Acknowledgement

This research was conducted with support from Health Canada and the Social Sciences and Humanities Research Council of Canada.

References


Michael P. Leiter is the Director of the Center for Organizational Research & Development that applies high-quality research methods to human resource issues confronting organizations. He holds the Canada Research Chair in Occupational Health and Wellness at Acadia University. He is a registered psychologist in Nova Scotia, Canada. The research center provides a lively bridge between university studies and organizational consultation for himself and his students. Dr Leiter has received ongoing research funding for 20 years from the Social Sciences and Humanities Research Council of Canada as well as from international foundations. He is actively involved as a consultant on occupational issues in Canada, the USA, and Europe. Through the Center for Organizational Research and Development he has developed an excellent capacity for survey research resulting in major research projects, in new approaches to data analysis, and the publication of new survey measures.

[E-mail: michael.leiter@acadiau.ca]

Arla L. Day (BA, MASc, PhD) is the Canada Research Chair in Industrial/Organizational Psychology at Saint Mary’s University. She has held concurrent roles as a visiting scholar at the University of Calgary and a Research Associate of the Canadian Forces Leadership Institute. Her research activities include employee health and well-being (in terms of work–family balance, stress, and coping), knowledge sharing, emotional intelligence, test validation, and selection. She is a founding member of
both the CN Centre for Occupational Health and Safety and the Centre for Leadership Excellence. She has consulted with private and public organizations to develop work–life balance and stress workshops, to develop and administer organizational surveys, to select employees, and to provide performance feedback.

[E-mail: arla.day@smu.ca]

**Phyllis Harvie** is a Research Associate with the Centre for Organizational Research and Development and instructor at Acadia University. A registered psychologist, she has been involved in research, consultation, and teaching on organizational change, leadership, and health and wellness at the university and in the community. Phyllis brings a background in hospital work, population health, and adult learning to her interest in how knowledge is used within healthcare systems.

[E-mail: phyllis.harvie@acadiau.ca]

**Krystelle Shaughnessy** is a Master’s student and research assistant at the Centre for Organizational Research and Development at Acadia University. She has a BA Honours Psychology with Concentration in French as a Second Language from the University of Ottawa. She is actively involved in research on knowledge transfer and health services systems at the center. She received a Social Sciences and Humanities Research Council of Canada Canadian Graduate Scholarship to aid in her research pursuits.

[E-mail: krystelle.shaughnessy@acadiau.ca]