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A Knowledge Brokering Process for Challenging Behaviours in Special Education

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Abstract

Previous research describes evidence-based ways to reduce challenging behaviours displayed by individuals with intellectual/developmental disabilities (IDD). These findings may not be put into practice because they are rarely delivered in user-friendly ways. Effective knowledge translation and exchange (KTE) may bridge this know-do gap; however, the literature tells us little about KTE processes as applied in special education. Here, we describe the KTE implementation process of our knowledge brokering team for a school that serves students with IDD. Researchers and teachers were highly satisfied with the process and deliverables. Challenges in the process and implications for future KTE research are described.

People with intellectual/developmental disabilities (IDD) have significant difficulty carrying out tasks of daily living (National Coalition on Dual Diagnosis, 2011). Approximately 3% of the world's population has been diagnosed with some form of IDD (World Health Organization, 2001), with 10–15% of these persons engaging in challenging behaviours (e.g., Emerson et al., 2001; Lowe et al., 2007). Challenging behaviours (e.g., physical and verbal aggression and self-injurious behaviour) are associated with poor educational, social, mental, and physical health outcomes (Nehring, 2005). These behaviours occur across a variety of classroom activities (Chiang, 2008) and present significant problems for students with IDD and their teachers and peers. When special education teachers and educational assistants are not trained with the knowledge and the skills for managing challenging behaviours effectively, they may experience significant work-related stress (Male, 2003; Male & May, 1997a, 1997b) and job dissatisfaction causing some to leave the profession (Ingersoll, 2001).

Although the research literature describes many evidence-based approaches that special education teachers and educational assistants can use to manage or reduce the frequency and severity of challenging behaviours displayed by individuals with IDD (Montgomery et al., 2014), these findings are often not put into practice nor are they used to inform decision-making (Logan & Graham, 1998; McGlynn et al., 2003). This may be because the information may not be delivered in user-friendly ways (Montgomery et al., 2014). Thus, there is a gap between what we know and what we do – an unfortunate situation because evidence-based information linked to policy and practice has the greatest potential to bring forth positive outcomes (LaRocca, Yost, Dobbins, Ciliska, & Butt, 2012).

Organized efforts to close the *know-do gap* (Lomas, 2007) are given various names such as research implementation, knowledge translation, knowledge exchange, knowledge mobilization, knowledge utilization, and knowledge translation and exchange (KTE) (McKibbon et al., 2010; Tetroe et al., 2008). Here, we use the term KTE – defined as a dynamic process involving the synthesis, exchange, and ethically sound application of knowledge between researchers and knowledge users (i.e., individuals who use the information generated through research to inform their decisions, including educators, practitioners, administrators, policy makers, and other researchers) (Canadian Institutes of Health Research [CIHR], 2013). Various KTE models are successful in health and health services research (CIHR, 2013; Straus, Tetroe, & Graham, 2011), yet "it has rarely been acknowledged or systematically studied as a formal process in the [IDD] literature" (Ouellette-Kuntz et al., 2010, p. 278). Research that has described this process (Blewett, 2007; Canavan, Gillen, & Shaw, 2009; Ouellette-Kuntz et al., 2010) has focused on the importance of translating knowledge to improve the *health* of children and adults with IDD. However, KTE implementation as it applies to special education teachers and educational assistants working with individuals with IDD displaying challenging behaviours appears to be absent from the literature.

To begin the process of addressing the gaps in KTE research in the education of individuals with IDD, we held three community workshops (Martin, Shooshtari, Temple, & Yu, 2010). These workshops involved 64 stakeholders (i.e., administrators, parents, policymakers, service providers, and researchers) involved in the health and education of individuals with IDD. We introduced a conceptual framework for KTE and asked various stakeholder groups to rate their ability or their organizations' ability to acquire, assess, adapt, and apply research findings. Stakeholders then discussed facilitating and impeding factors for KTE from their own experiences. Although the majority of stakeholders valued research highly and recognized its importance in shaping practices and policies, they indicated that inadequate time, incentives, and resources for locating and applying research findings hampered KTE efforts. Physical access to research information (e.g., locating peer-reviewed journal articles) and comprehension (e.g., understanding the terminology and scientific merit of research studies) were also identified as major barriers (see also Barwick et al., 2008; Bowen, Martens, & The Need to Know Team, 2005).

One approach to overcoming KTE barriers is to identify an individual or group who specializes in knowledge brokering. A knowledge broker receives knowledge requests and facilitates the formation of researcher and knowledge-user teams consisting of individuals with various skills and resources. These skills include access to relevant findings and ability to judge their quality, clear communication skills, and an understanding of the organizational context and knowledge needs (Lomas, 2007). The findings are then delivered to the knowledge users in useful forms. For example, Duncan and colleagues (2008) assisted individuals working at a hospital to create and share personal learning projects, and to access research relevant to those projects. The knowledge brokers searched academic literature and consulted with experts, and disseminated practical guidelines to hospital staff through suitable venues. Over 100 personal learning projects were facilitated; importantly, one-third of projects led to changes in practice, relationships, or policies. Hence, knowledge brokering is a promising method for improving research use in health care settings (CHSRF, 2003). More research is needed, however, to evaluate the benefits of knowledge brokering to special education teachers and understand how to implement it most effectively (CHSRF, 2003; Straus et al., 2011).

Thus, our objectives were to implement *and* evaluate the knowledge-brokering role within special education; specifically at a school for students with autism spectrum disorders (ASD) and/or IDD because they were concerned about training and retaining staff. Through this process, our knowledge brokering team received and vetted requests from knowledge users and assembled working groups to conduct systematic reviews to address specific requests for information concerning the management of challenging behaviours exhibited by students with IDD. Working groups then prepared and disseminated evidence-based practice recommendations to knowledge users to promote uptake. In this report, we describe the implementation and evaluation of this KTE process and the use of the translated knowledge.

Method

Based on the Knowledge-to-Action framework (CIHR, 2003), we developed a logic model (see Figure 1) to guide our KTE activities. We also created a timeline for completion of various stages of the project (see Figure 2a). The activities described in this report occurred over approximately three years (June 2010–September 2013).

Participants and Setting

The Knowledge Brokering Team. KTE implementation was managed by a Knowledge Brokering Team, comprising six researchers and clinician-scientists (from disciplines such as behavioural and school psychology, community health sciences, and knowledge translation) with expertise in IDD, and two knowledge users (i.e., special education teachers employed at St.Amant School, Winnipeg, Manitoba, Canada). On three separate occasions, letters of invitation to attend information sessions and to serve on the knowledge brokering team and/or the working groups were mailed to parents and other family members of the students attending St.Amant School. Despite these recruitment efforts, parents or other family members did not participate as members of the knowledge brokering team nor the working groups.

Working groups. Four working groups, each consisting of two or three researchers from the knowledge brokering team (one served as chair), one knowledge user (i.e., special education teacher), and several research trainees, were formed. Trainees were graduate students from the University of Manitoba enrolled in or who had completed graduate level courses in applied behaviour analysis, community health sciences, IDD, school psychology, and research methods. For the present project, trainees received training specific to conducting systematic literature reviews and the KTE process. Members served on multiple working groups. Membership of the

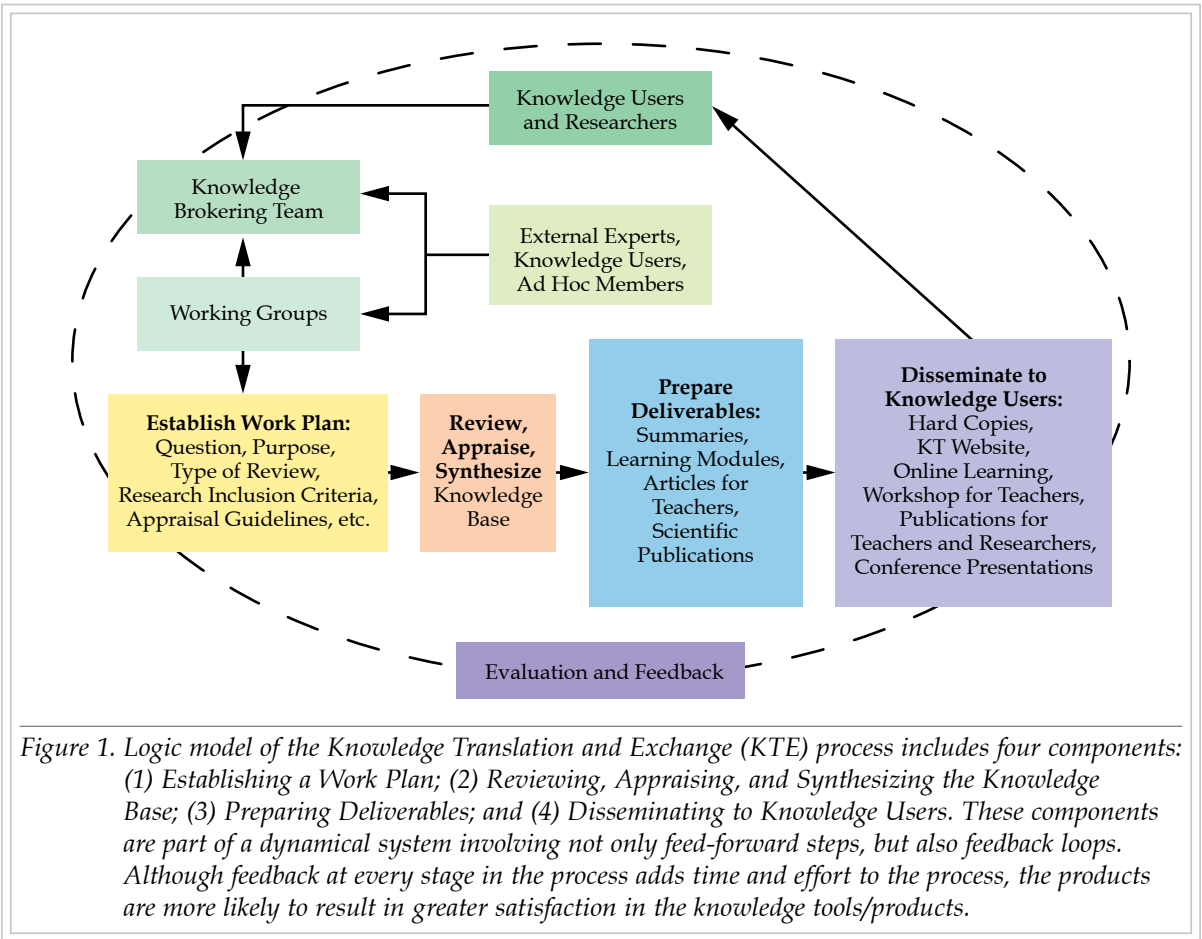

Figure 1. Logic model of the Knowledge Translation and Exchange (KTE) process includes four components: (1) Establishing a Work Plan; (2) Reviewing, Appraising, and Synthesizing the Knowledge Base; (3) Preparing Deliverables; and (4) Disseminating to Knowledge Users. These components are part of a dynamical system involving not only feed-forward steps, but also feedback loops. Although feedback at every stage in the process adds time and effort to the process, the products are more likely to result in greater satisfaction in the knowledge tools/products.

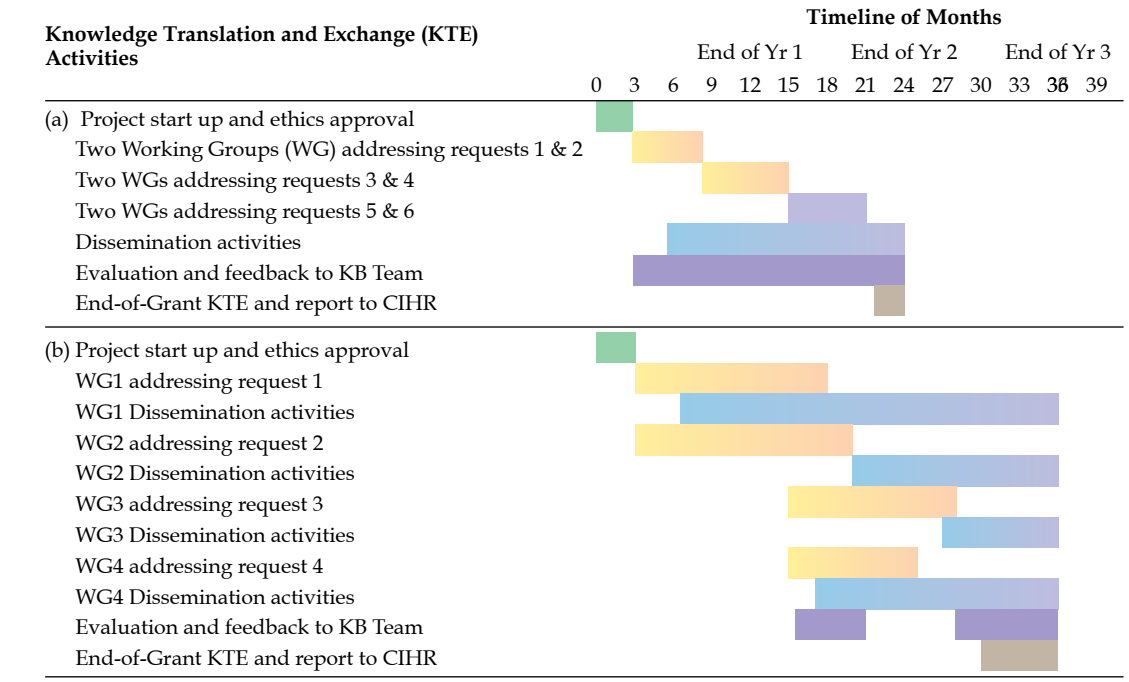

Figure 2. (a) Proposed and (b) actual timelines of the Knowledge Translation and Exchange (KTE) process

working groups remained relatively consistent over the course of the project with exception of the research trainees who were involved for varying durations (i.e., 6-month to 1-year terms that were renewable). The members of a fifth working group (authors of the present report) consisting of two researchers and two trainees were assembled to evaluate the KTE process and resulting deliverables.

Knowledge users. Knowledge users consisted of teachers and educational assistants employed at St.Amant School. St.Amant School provides individualized educational opportunities to persons with IDD aged 4–21 years. At the time of the study, the school employed 7 special education teachers, 30 teacher's assistants, 2 specialists, a recreation facilitator, and a music therapist, served 53 school age students, and provided a literacy program for 16 adult students. St.Amant teachers are a part of an interdisciplinary team including clinicians and caregivers and they implement individualized teaching plans for their students and supervise instructional assistants assigned to their classes. The majority of students have complex needs and many display challenging behaviours (e.g., physical and verbal aggression towards others and property destruction, and self-injury). St.Amant School has a team devoted to addressing challenging behaviours.

The University of Manitoba Research Ethics Board and the St.Amant Research Access Committee approved this study.

Procedures

The knowledge brokering team solicited and received information requests from knowledge users, refined and prioritized the requests (see *Knowledge inquiry and establishing work plans*, below), facilitated the formation of working groups to address requests, and supported working groups as they completed their tasks. Working groups developed work plans, reviewed and synthesized the literature relevant to the request, and prepared and disseminated user-friendly knowledge tools/products/deliverables. In addition to serving on the knowledge brokering team and/or working groups, school staff identified knowledge needs, and provided information regarding their satisfaction with the KTE process and deliverables that were developed.

Each working group chair supervised the completion of specific tasks and met with group members twice monthly to set objectives, review progress, and troubleshoot. Working group chairs reported progress of their activities at monthly knowledge brokering team meetings. Each group documented details of their progress in meeting minutes and work-plans saved in a secure online file-sharing repository. Each working group's specific knowledge requests and problem-solving processes drove KTE activities; thus we expected that the specific tasks and relative time contributed by each group would be variable. Work plans specified the type of review that would be written, established parameters (i.e., inclusion/exclusion criteria) for the review, appraisal systems, deliverables and dissemination activities, timelines, responsibilities, and the resources needed to complete specific tasks. Using the working groups' dated meeting minutes and work-plans, Working Group 5 (WG5) constructed chronological descriptions of the progress of each working group over a 3-year period, and compared them to the initial projections.

Knowledge inquiry and establishing work plans. Identifying knowledge needs was an iterative and multi-method process. An initial written survey of school staff identified approximately six inquiry topics using an open-ended question. This step was followed by a second written survey of the same group, the results of which revised and increased the list to eight candidate topics. Two knowledge brokering team members (themselves school staff) then held a series of three meetings with the school staff to discuss and prioritize the topics. From these meetings, draft versions of knowledge requests 1 through 4 emerged (see Table 1).

The requests received additional refinement after the working groups conducted preliminary literature reviews and began to see how the available findings related to each specific request. To clarify the terms and concepts used in the request, the knowledge brokering team presented school staff with a multiple-choice questionnaire. Items in the questionnaire presented a range of possible meanings for aspects of each request; school staff responses thereby helped the working groups to ensure that they would obtain relevant information. Knowledge brokering team members assembled and chaired working groups 1 and 2 (WG1 and WG2) (Year 1) and working groups 3 and 4 (WG3 and WG4) (Year 2). The original goal to address six requests over three 6-month periods was not met (see Figure 2). The four requests addressed during this project are summarized in Table 1.

Evaluation

We evaluated the knowledge brokering teams and the working groups' satisfaction with KTE implementation at the end of Year 1 and Year 2. In Year 3, we assessed knowledge user satisfaction with the KTE process. Satisfaction with the deliverables was measured upon completion and dissemination of deliverables. Evaluation measures and results are described in detail below.

Results

Knowledge Synthesis

We systematically reviewed existing research findings related to each knowledge request presented in Table 1. Working groups submitted reviews to scientific journals for peer review (Montgomery et al., 2014; Stoesz et al., 2016; Virues-Ortega et al., 2014). Synthesis is an important step that allows knowledge translators to identify and understand the main message delivered to knowledge users (see Grimshaw, Eccles, Lavis, Hill, & Squires, 2012). As can be seen in Figure 2b, the actual time required to address four requests in the *Establish a work plan* and *Review, appraise and synthesize* components of the project (see Figure 1) took longer than proposed. Longer timelines may reflect a lack of clear direction and/or communication between some working groups (see *Process Satisfaction*, below).

Deliverables and Dissemination

Following completion of the reviews, each working group prepared plans for dissemination and developed over 40 user-friendly deliverables, including: (a) non-technical summaries of synthesis papers (i.e., one-page briefings) to allow rapid scanning by teachers and non-researchers; (b) non-technical poster presentations for teacher and parent conferences;

Table 1. Knowledge Requests by Knowledge Users That Were Addressed by Four Working Groups

Knowledge Request	*Working Group (leaders)*	*Remarks*	*Knowledge Tools/Products/ Deliverables*
1. What intervention strategies are the most effective to prevent and manage challenging behaviours of students with severe and/ or profound developmental disabilities?	WG1	Knowledge users (i.e., special education teachers) wanted to learn about the recent evidence regarding interventions for challenging behaviours among students with ASD and/or IDD enrolled in formal preschool programs and K–12 schools. Although there are reviews of challenging behaviour interventions in school settings, there are no syntheses of findings specific to individuals with ASD and/or IDD enrolled in formal preschool programs or K–12 schools. Given this, this group evaluated the effectiveness of interventions for challenging behaviours using established quality assessment and intervention effectiveness criteria (Montgomery et al., 2014).	(1) Table of preliminary findings; (2) Booklet outlining procedures for reducing/ managing challenging behaviours in the classroom; (3) Online article written by a knowledge user describing her experience on a knowledge translation team; (4) Posters presented at professional meetings; and (5) Workshops presented at professional development days for special education teachers.
2. What are the common medications received by students with special needs, and how do they typically affect behaviour?	WG2	Because knowledge users felt they were not sufficiently informed of the medication effects on the behaviour of their students, they indicated that they wanted to learn more about the effects of medication typically prescribed to individuals with developmental disabilities as they relate to classroom behaviour, academic behaviour, and behaviour management in a school setting.	Two-page and half-page versions of Fact Sheets for each of the following medications: Aripiprazole, Citalopram, Divalproex Sodium, Levetiracetam, Loxapine, Olanzapine, Risperidone, Venlafaxine, and Ziprasidone.
3. What are the effective strategies to train school staff members who routinely encounter challenging behaviour among students with developmental disabilities?	WG3	Knowledge users clarified that they required effective training programs (addressing knowledge, skills, and attitudes) that would allow them to learn more about preventing and managing challenging behaviours, and for reducing the impact that repeated exposure to challenging behaviours has on staff (e.g., stress) (Stoesz et al., 2016).	(1) Poster presented at professional meetings; (2) Workshops presented at professional development days for special education teachers; and (3) Online article for teachers summarizing the findings from the review article.

Table 1. Knowledge Requests by Knowledge Users That Were Addressed by Four Working Groups (continued)

4. How can we more easily identify enjoyable activities for students with profound disabilities?	WG4	Knowledge users were interested in learning about simple and time-efficient methods for assessing students' preferred leisure and educational activities that would engage them for longer durations. Knowledge users also indicated their desire to learn how to adapt these methods for students with minimal verbal and motor skills, sensory impairments, and challenging behaviours (Virues-Ortega et al., 2014).	(1) Decision tree; (2) Scripts of preference assessment protocols; and (3) Preference Assessment iOS App.

ASD = autism spectrum disorders, IDD = intellectual/developmental disabilities.

(c) fact sheets; (d) workshops for special education teachers; and (e) technology (i.e., iOS® preference assessment application). Below, we describe three sets of deliverables and the results from their evaluations.

Procedures for reducing challenging behaviours. To address knowledge request 1 (see Table 1), members of WG1 produced a booklet called *Practical Scripts for Decreasing Challenging Behaviors in Students with Autism or Developmental Disabilities* to provide evidence-based recommendations for reducing specific challenging behaviours (e.g., inappropriate vocalizations, physical or verbal aggression towards others, self-injurious behaviour). The booklet includes a glossary of terms and references for additional resources (available from the authors upon request as a PDF or hard-copy). Five knowledge users evaluated the booklet by completing a questionnaire comprised of nine 5-point Likert items with values ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*), and a tenth item requesting additional comments. Overall, knowledge users rated the booklet highly (*Median* = 4; *Mode* = 4; *Range* = 3–5). Two knowledge users provided additional comments, noting positive aspects of the booklet (i.e., well-organized, good use of colours and visuals), but were concerned that it might not be easy for some staff to use. See Table 2.

Medication fact sheets. In response to knowledge request 2 (see Table 1), WG2 produced medication fact sheets for ten drugs commonly prescribed to students with special needs. Full (two-page) and condensed (half-page) versions of the fact sheets were developed that briefly describe each drug, its side effects, when medical assistance should be sought, and ways to support the student taking the medication. These medication fact sheets are available for download (http://stamant.ca/learning-centre2/healthcare/medication-sheets/). Eight knowledge users evaluated the 10 full version fact sheets collectively and 9 knowledge users evaluated the 10 condensed versions collectively using the 10-item questionnaire described above.

Overall, knowledge users rated both versions of the fact sheets highly (*Median* = 4; *Mode* = 4; *Range* = 2–5, data combined for full and condensed versions). The highest rated-items corresponded with evaluations of the condensed versions of the fact sheets. The highest-rated items were those that indicated that the fact sheets were: (a) applicable to their work as teachers, (b) well-organized and user-friendly, (c) delivered in an appropriate format, and (d) provided information in a clear and understandable way. The full versions of the fact sheets had the lowest ratings, which indicated that teachers neither agreed nor disagreed with the statements: "The information provided will influence the service that I provide" (*Median* = 3; *Mode* = 3; *Range* = 2–5) and "The amount of information is appropriate" (*Median* = 3; *Mode* = 4; *Range* = 3–5). Two teachers indicated that the full versions contained too much information, and one teacher suggested including the brand names of medications and noted preference for

the condensed versions. One knowledge user indicated preference for the condensed fact sheets, three respondents offered suggestions for improving the condensed versions, with two requesting inclusion of brand names. One respondent indicated that most of the medications were unfamiliar.

Workshop. Two members of WG3 (a researcher and a trainee) and a trained mindfulness practitioner prepared and delivered a workshop in response to knowledge request 3 (see Table 1). The workshop summarized the KTE project but focused primarily on teaching ways to cope with the stress associated with working with individuals with IDD who exhibit chal-

Table 2. Evaluation of Deliverables Resulting from a Knowledge Translation and Exchange (KTE) in Special Education of Students with Intellectual and Developmental Disabilities

	Booklet			*Medication Fact Sheets (full version, n = 8)*			*Medication Fact Sheets (condensed version, n = 9)*		
Survey Item	*Median*	*Mode*	*Range*	*Median*	*Mode*	*Range*	*Median*	*Mode*	*Range*
The product is well organized and user-friendly.	4	4	4–5	4	4	3–5	5	5	4–5
The information provided is clear and understandable (e.g., unnecessary jargon is avoided).	4	4	4–5	4	4	3–5	5	5	4–5
The product addresses the question that was asked.	4	4	4	4	4	3–5	4	4	3–5
The product is applicable to my work as a teacher.	4	4	3–4	4	4	4–5	5	5	4–5
The information provided is relevant to me.	4	4	3–4	4.5	5	2–5	4	5	2–5
The product is useful.	4	4	4–5	4	4	3–5	4	4	3–5
The amount of information is appropriate.	4	4	4–5	4	3	3–5	4	4	3–5
The information is presented in an appropriate format.	4	4	4	4	4	3–5	5	5	4–5
The information provided will influence the service that I provide.	3	3	3–4	3	3	2–5	4	4	2–5

lenging behaviours. Eleven teachers evaluated the workshop by responding to 10 Likert-type items (1 = *poor*, 2 = *fair*, 3 = *average*, 4 = *good*, 5 = *excellent*), one dichotomous (*yes*/*no*) question, and 5 open-ended questions. See Table 3.

Responses to each of five Likert-type items, relating to the value of the presentation, presenter expertise, clarity of objectives, participants' active involvement in the learning experience, and overall experience were high. Three Likert-type questions relating to learning experience and usefulness were rated moderately. The majority of participants (n = 10) indicated that they would recommend this workshop to others. In response to the open-ended questions, six respondents indicated that the workshop was beneficial; five suggested changes to the format or setting of the workshop; and six indicated that they would try the techniques they learned during the workshop.

KTE Implementation Logic Model

Our logic model of the KTE process (see Figure 1) corresponded closely to the actual KTE process. Despite this, the model could be improved slightly to reflect the fact that working groups modified their goals and tasks as required. Challenges that arose in subsequent components often meant that revisions to the original work plans were compulsory on several occasions, which often resulted in extended timelines. This was particularly evident in WG1 where members of the group originally planned to use a particular method for appraising the research to address their knowledge request; when this failed to meet the requirements of the research, they searched for and used a new appraisal method. The end products were vastly improved as a result; evidenced by the fact that knowledge users were generally pleased with the deliverables. Despite the extended duration of these project components and the project as a whole, the timeframe for the dissemination of activities was largely adhered to.

Satisfaction with the KTE Implementation

The knowledge brokering team's and working groups' satisfaction with the KTE process was evaluated twice (end of Year 1 and end of Year 2) using web-based KTE process satisfaction surveys developed by the knowledge brokering team specifically for this project. The surveys included Likert-type questions to evaluate satisfaction with communication, stakeholder representation, involvement, resources, and effectiveness (1 = *poorly rated* to 5 = *highly rated*). Respondents were asked to explain the reasoning for their responses to each Likert-type question. The surveys also included several open-ended questions designed to identify

Table 3. Evaluation of a Workshop Resulting from a Knowledge Translation and Exchange (KTE) in Special Education of Students with Intellectual and Developmental Disabilities

Survey Item	*Median*	*Mode*	*Range (min–max)*
Value of presentation in meeting your needs	4	4	2–4
Expertise of the presenter	4	4	3–5
Presentation techniques of the presenter	4	4	3–5
Your learning experience	3	3	3–5
Usefulness of handouts or other "take aways"	3	3	2–4
Clarity of objectives	4	4	2–5
Active involvement of participants in learning experience.	4	4	3–5
Timeliness of the material presented	4	4	4–5
Use of practical examples	4	4	3–5
Overall rating of session	4	4	3–5

team members' roles, skills, and assets within each group, challenges, what respondents learned, and how to improve the function of the knowledge brokering team and working groups. Members who served in multiple groups completed one survey for each group in which they were a member. Surveys sent to each member were identical, except that the Year 2 survey included the formation of WG3 and WG4. As there was little variability in the data, comparison between the two evaluation periods was unwarranted and the data were collapsed. Fifty-four surveys were completed.

Overall, team members were satisfied with the KTE process (*Median* = 4; *Mode* = 4; *Range* = 1–5; see Table 4). The highest-rated items were those related to member involvement, resources, and communication within the working groups. The lowest-rated items concerned stakeholder representation and communication between working groups.

Knowledge brokering team and working group members' explanations for their responses to each Likert-type question were coded according to textual content. Analysis of these responses identified several distinct themes that mirrored the ratings from the Likert-type items.

Member involvement. Out of 44 comments, 31 (70%) indicated sufficient opportunities for input were available and 9 (20%) comments indicated opportunities were limited or decreased over time. Those that indicated sufficient opportunities to provide input on decision making commonly attributed their rating to open and collaborative team discussions. Many responses about ratings of confidence in participating as a team member did not appear to be related to confidence in participating. For example, 15 of 37 comments (41%) described their participation and/or specific contributions and 13 (35%) described a positive work environment (e.g., supportive team).

Resources. Out of 47 comments, 37 (79%) indicated that the resources (e.g., research assistants, financial support, informational, technological) were more than adequate to execute each group's work plan.

Communication. Twenty-two of 46 comments (48%) indicated good communication between group members (e.g., "members were respectful toward each other"), whereas 16 comments (35%) noted communication difficulties (e.g., "At times ultimate goals, objectives, procedures, and deadlines were unclear").

Effectiveness. Out of 45 comments, 26 (58%) indicated that their group met the requirements of the *Terms of Reference* (see Table 5) and 15 (33%) referred to challenges (e.g., expectations, timelines). Out of 45 comments regarding the extent to which they contributed to their group's outcomes, 19 (42%) identified contributing to products, 10 (22%) identified contributing as a leader/coordinator, and 9 (20%) identified sharing ideas and information.

Stakeholder representation. Out of 63 comments, 34 (54%) spoke positively about teacher involvement, whereas 16 (25%) noted there was no involvement from parents. Eighteen of 50 comments (36%) indicated that parent representation was missing, 17 (34%) commented that representation was good, and 10 (20%) commented that more knowledge users were needed.

Responses to open-ended questions. As indicated above, the surveys included four open-ended questions (1) *Do you think that members of [your group] brought the appropriate skills and assets to the project? What skills or assets do you think were lacking? Please explain;* (2) *What can be done to improve the function of your group?;* (3) *From your perspective, what was the greatest challenge facing the project over the past year? What factors may have contributed most to this challenge?*; and (4) *What did you personally learn as part of this KT research project over the past year?*

Out of 54 comments, 40 (74%) indicated that team members did bring the appropriate skills and assets to the project, but 12 (22%) comments indicated skills were lacking. Of those 12 comments, 3 commented on a lack of direction and clear expectations, and 2 commented on a lack of organization. Fifteen (38%) of 40 comments about what could be done to improve group function surrounded team meetings (e.g., "more structured meeting agendas and more frequent meetings") and 7 (18%) surrounded communication between and within working groups, and with students.

Table 4. Satisfaction with the Knowledge Translation and Exchange Implementation: Knowledge Brokering Team and Working Group Ratings for Each Survey Question (N = 54)

Survey Question	*Median*	*Mode*	*Range (min–max)*
Member involvement			
To what extent have you had the opportunity to provide input on decision making throughout the process of research? (1 = *Very little* to 5 = *A great deal*)	5	5	1–5
At this point in the project, how confident are you in participating as a team member in KTE activities? (3 = *Not that confident* to 5 = *Very confident*)	5	5	3–5
Rate your satisfaction with equal opportunity to be heard as a member. (1 = *Very dissatisfied* to 5 = *Very satisfied*)	5	5	1–5
To what extent do you think you have contributed to your group's outcome? (1 = *Not at all* to 5 = *A lot*)	4	4	2–5
Resources (1 = *Poor* to 5 = *Very adequate*)			
In your opinion, how adequate were the resources to execute your group's research work plan?	5	5	1–5
Communication (1 = *Very dissatisfied* to 5 = *Very satisfied*)			
How satisfied are you with how members of your group communicated with each other?	4	4	2–5
How satisfied are you with the communication between your group and the knowledge brokering team?	4	4	3–5
How satisfied are you with the communication between your group and another working group?	3.5	5	1–5
Effectiveness			
Rate your group's overall performance in meeting its purpose and objectives as stated in the *Terms of Reference 1* [a] (1 = *Poor* to 5 = *Excellent*)	4	4	2–5
Knowledge brokering team's clear response and direction to the working groups (1 = *Very dissatisfied* to 5 = *Very satisfied*)	4	4	2–5
Frequency of meetings (1 = *Very dissatisfied* to 5 = *Very satisfied*)	4	5	2–5
Stakeholder representation			
In your opinion, how was the representation of different stakeholder groups? (1 = *Poor* to 5 = *Excellent*)	4	4	1–5
To what extent have you had the opportunity to solicit input from knowledge-users? (1 = *Very little* to 5 = A great deal)	3	3	1–5

[a] *Terms of Reference refer to two documents that state the responsibilities of the knowledge brokering team and each working group.*

Out of 58 comments, the most commonly identified challenges facing the project were adhering to timelines (23, 40%), communication (14, 24%), and completing tasks (6, 10%). Time management (6, 30%), leadership (4, 20%), communication (4, 20%), a demanding workload (3, 15%), and a lack of clear direction (3, 15%) were identified as factors contributing to failure to adhere to timelines. Factors contributing to communication challenges included leadership (2 comments), a demanding workload (1 comment), technology limitations (1 comment), a lack of clear direction (1 comment), and changes in working group membership (1 comment). Communication (2 comments), a broad research question (2 comments), and changes in membership (1 comment) were identified as factors that contributed to the challenge of completing tasks. Despite the challenges, respondents indicated that they learned a great deal from participating in the KTE process. Out of 73 comments, 17 (23%) indicated that they learned to work in a multi-disciplinary group, 11 (15%) learned the importance of understanding various perspectives and needs, and 8 (11%) indicated learning more about their group's research topic.

Knowledge Users' Satisfaction with KTE

In Year 3, a group of knowledge users evaluated the KTE process, with a particular emphasis on the knowledge-needs assessment stage. Teachers and educational assistants (N = 34) completed an 8-item paper-based satisfaction survey containing 7 Likert-type items, with possible responses ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*), and an eighth item soliciting free-form comments. For items 1–7, the median and mode were "3" (*Neither Agree or Disagree*) for most questions. The large proportion of "3" responses (94/219) may reflect a limitation of the survey as a "not applicable" option was not included. Based on this assumption, we analyzed responses by combining ratings of 1 and 2 and coding them as disagreeing with the statement and combining ratings of 4 and 5 and coding them as agreeing with the statement. Knowledge users were generally satisfied with the KTE process and indicated that the final questions identified were important and accurately reflected their needs. Five respondents wrote free-form comments, with three speaking to the importance of the project or of specific knowledge needs, and one indicating that KTE projects should continue at the school. See Table 5.

Discussion

Our research team implemented and evaluated a formal KTE process to address the knowledge needs of special education teachers working with students with IDD displaying challenging behaviours. Although KTE and the knowledge brokering role are not new ideas, to our knowledge, this is the first study to describe how the process unfolded in a special education setting. Overall, the knowledge brokering team was satisfied with the KTE process and knowledge users were generally satisfied with the knowledge needs assessment process and products that were developed. Below, we describe several challenges and successes in our KTE implementation process, implications of this research, and potential solutions for improving the KTE process.

Challenges and Successes in Process Implementation

Working group members noted a lack of clear direction and inadequate communication within and/or between groups, which may have contributed to problems adhering to project timelines and work plans. Whereas one group member stated that fewer meetings would suffice, several others indicated the need for more frequent meetings. The process of educating one another about discipline-based terminology and working toward the accomplishment of mutual goals required substantial time and effort. Communication issues are common among interdisciplinary research groups, and competing philosophies often exist among team members (Innvaer, Vist, Trommald, & Oxman, 2002; Lomas, 1997); however, a combination of disparate viewpoints or biases often encourages the emergence of new knowledge (Nonaka, 1994; Nonaka & Konno, 1998).

As noted above, adhering to proposed timelines was difficult for all working groups. Longer timelines may simply be a reflection of the pragmatic design of the project – that to be successful in a normal workplace, the KTE process needs to be applied flexibly (see Bhattacharyya et al., 2011). Flexibility was particularly important in this project because the membership of the working groups changed during its duration; although not atypical in

Table 5. Satisfaction with the Knowledge Translation and Exchange (KTE) Process: Results of the Knowledge Users' Survey (N = 34)

Survey Question	*Disagree n*	*Agree n*
The final questions identified by the needs identification process are important.	0	27(100%)
I generally understand the purpose and method of this research project.	3 (13%)	21 (88%)
The final questions identified by the needs identification process accurately reflect teachers' knowledge needs.	2 (11%)	16 (89%)
The process used to identify and prioritize teachers' knowledge needs was sensible.	4 (31%)	9 (69%)
Communication during the knowledge needs identification process was clear and timely.	4 (31%)	9 (69%)
The process used to identify and prioritize teachers' knowledge needs was transparent.	5 (42%)	7 (58%)
I have had adequate opportunities to provide input and influence decision-making regarding this project (e.g., through the teachers on the research team).	11 (61%)	7 (39%)

normal workplaces, this limitation may have affected the proposed timelines as knowledge and skills were lost when a team member left the project (see also Kislov, Wilson, & Boaden, 2016). Moreover, the proposed timelines may have been too ambitious and delays that are typical of KTE research may have been underestimated. Extended timelines may affect the relevance of the information provided to stakeholders because of an urgency to obtain the knowledge immediately leading stakeholders to seek the information outside of the project or the need for particular information becomes greater over time. Results of the process satisfaction survey identified time management, leadership, and communication as the factors most contributing to delays. The specific time management suggestions offered by team members held few surprises: clear task assignments, deadlines, and accountability were cited several times. The extent to which working groups missed their timeline goals may speak to how the importance of time management, leadership, and communication skills is magnified when working with the large, diverse teams involved in KTE projects.

Another significant challenge was the unsuccessful recruitment of parents or other family members, despite the efforts made by knowledge brokering team members. We received little indication from potential parent collaborators about why they did not get involved, although one parent admitted to a knowledge brokering team member that the prospect of attending meetings with a group of scientists was intimidating. We also recognize that parents of children with special needs face many additional time demands. Rather than ask parents to join a committee with monthly meetings, it may have been more realistic to invite a parent to assist with a specific task (e.g., to evaluate a proposal for a deliverable) and then to build on that relationship. Finally, greater efforts could have been made to communicate to parents and other family members regarding the benefits of participation in KTE research (Bowen et al., 2005). Such participation may have changed the overall goals and outcomes of the present project. Successful partnerships between researchers and knowledge users with a variety of expertise and experiences are more likely to carry on to future KTE projects when there are potential payoffs, particularly for those who have not had prior experience with research.

Our study had several methodological limitations that could be improved upon in future research. First, there has been no long-term

follow-up or assessment of uptake. We do not know whether our teachers continued to use and appreciate the deliverables in the months and years after the final evaluations, nor the ultimate impact the use of the deliverables has had on students. Second, a consistent group of individuals did not complete evaluations because several individuals joined and then left the working groups throughout the project. This may have influenced evaluation outcomes, but it may also accurately reflect a typical knowledge brokering arrangement that serves a relatively large organization. Finally, all evaluation respondents were to some extent connected with or invested in the project, whether directly (as team members) or indirectly (e.g., as co-workers of team members). We believe that it was appropriate and necessary to address these users, but it may also have biased responses to an unknown degree. Follow-up interviews with respondents may have led to greater insight into these biases and its impact on the evaluation of the KTE implementation process. Future studies may wish to ask both the organization served and "outside" knowledge users to evaluate products and processes.

Despite the challenges described above, our efforts to recruit special education teachers to the knowledge brokering team and working groups were successful. The culture of both research and practice (i.e., special education) were well represented, which likely contributed to the success of the KTE project (see Kislov et al., 2016; Lomas, 2007). Working with knowledge users is an essential component of any KTE process (see Figure 1), and doing so in the present project enabled the working groups to prioritize requests appropriately and translate evidence-based knowledge into usable deliverables for other knowledge users. In particular, staff indicated that the booklet of procedures for managing challenging behaviours and the medication fact sheets are useful resources applicable to their work as educators. Supplemental resources (e.g., demonstrations, workshops for practicing) would substantially improve the *Practical Scripts for Decreasing Challenging Behaviours in Students with Autism or Developmental Disabilities* and potentially increase the uptake of the knowledge and skills that the booklet contains. Finally, the workshop designed to provide staff with ways to reduce workplace stress was rated positively and met the needs of the majority of its participants. Overall, the research team contributed deliverables relevant to the services school staff provides.

Impact of KTE and Next Steps

The long-term impact of the KTE process and our products on special education teachers and students with IDD remains unknown. Our primary goals were to develop, implement, and assess a replicable KTE process before undertaking uptake evaluations. Follow-up surveys and interviews will be necessary to assess the degree of implementation of new knowledge and any barriers perceived by school staff. Interestingly, in the health field, data regarding benefits to patients is often missing in knowledge translation studies (see Bizovi, Wears, & Lowe, 2002). To our knowledge, the benefits of KTE in the special education setting have also never been described in the literature. Thus, an important next step in KTE research involving special education is to determine the direct impact of translational activities on student outcomes, in terms of education and challenging behaviours in the classroom.

Conclusions

The results from the present study address a significant gap in the KTE literature. We demonstrated that researchers and special education teachers can collaborate to form an effective knowledge brokering team for product development. We contributed to the *science* of KTE by sharing what we learned about its implementation in a special education setting, and to the *practice* of KTE by preparing user-friendly deliverables. What remains unknown is whether this particular implementation of the process can be transferred to other settings (e.g., schools serving other populations, such as typically developing students). The field of IDD presents many opportunities to examine the applicability of our knowledge brokering process and, in so doing, to further promote evidence-based practice.

Key Messages From This Article

People with disabilities. We hope that this project will help people understand that your special education teachers and educational assistants need appropriate training so that you

can receive the education that you deserve and that you feel safe at school.

Professionals. Special education teachers and educational assistants may feel significant stress and job dissatisfaction if they are not equipped with the skills needed to deal effectively with their students' challenging behaviours. We need to find ways to help educators gain these skills; not only would this benefit the educator, but may also influence student outcomes positively.

Policymakers. Researchers and special education teachers can collaborate to form an effective knowledge brokering team to bridge the gap between knowledge and practice.

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References

Barwick, M. A., Boydell, K. M., Stasiulis, E., Ferguson, H. B., Blasé, K., & Fixsen, D. (2008). Research utilization among children's mental health providers. *Implementation Science*, *3*, 19. Retrieved from http://www.implementationscience.com/content/3/1/19

Bhattacharyya, O. K., Estey, E. A., & Zwarenstein, M. (2011). Methodologies to evalaute the effectiveness of knowledge translation interventions: A primer for researchers and health care managers. *Journal of Clinical Epidemiology, 64*(1), 32–40. s10.1016/j.jclinepi.2010.02.022

Bizovi, K. E., Wears, R., & Lowe, R. A. (2002). Researching quality in emergency medicine. *Academic Emergency Medicine*, *9*, 1116–1123.

Blewett, J. (2007). Towards evidence-based care: The challenge of making research count. *Evidence & Policy: A Journal of Research, Debate and Practice*, *3*, 287–300.

Bowen, S., Martens, P., & The Need to Know Team. (2005). Demystifying knowledge translation: Learning from the community. *Journal of Health Service and Research Policy, 10*, 203–211. doi:10.1258/135581905774414213

Canadian Health Services Research Foundation [CHSRF]. (2003). *The theory and practice of knowledge brokering in Canada's health system* (December) Retrieved from http://www.cfhi-fcass.ca/migrated/pdf/Theory_and_Practice_e.pdf

Canadian Institutes of Health Research [CIHR]. (2013). *More about knowledge translation at CIHR*. Retrieved from http://www.cihr-irsc.gc.ca/e/39033.html

Canavan, J., Gillen, A., & Shaw, A. (2009). Measuring research impact: Developing practical and cost-effective approaches. *Evidence & Policy: A Journal of Research, Debate and Practice*, *5*, 167–177.

Chiang, H.-M. (2008). Expressive communication of children with autism: the use of challenging behaviour. *Journal of Intellectual Disability Research, 52*, 966–972. doi:10.1111/j.1365-2788.2008.01042.x

Duncan, C., Langlais, S., Danyluk-Hall, J., & Simonson, K. (2008). Knowledge translation: Empowering health. *Journal of Continuing Education in the Health Professions, 28*, 282–283. doi:10.1002/chp

Emerson, E., Kiernana, C., Alborza, A., Reevesa, D., Masona, H., Swarbricka, R., … Hattona, C. (2001). The prevalence of challenging behaviors: A total population study. *Research in Developmental Disabilities*, *22,* 77–93.

Grimshaw, J. M., Eccles, M. P., Lavis, J. N., Hill, S. J., & Squires, J. E. (2012). Knowledge translation of research findings. *Implementation Science*, *7*, 50. doi:10.1186/1748-5908-7-50

Ingersoll, R. (2001). Teacher Turnover and Teacher Shortages : An Organizational Analysis Teacher Turnover and Teacher Shortages: An Organizational Analysis. *American Educational Research Journal*, *38*, 499–534. Retrieved from http://hdl.library.upenn.edu/

Innvaer, S., Vist, G., Trommald, M., & Oxman, A. (2002). Health policy-makers perceptions of their use of evidence: A systematic review. *Journal of Health Services Research*, *7*, 239–244.

Kislov, R., Wilson, P., & Boaden, R. (2016). The "dark side" of knowledge brokering. *Journal of Health Services Research & Policy, 0(0)*, 1–6. doi:10.1177/1355819616653981

LaRocca, R., Yost, J., Dobbins, M., Ciliska, D., & Butt, M. (2012). The effectiveness of knowledge translation strategies used in public health: A systematic review. *BMC Public Health*, *12*(1), 751. doi:10.1186/1471-2458-12-751

Logan, J., & Graham, I. D. (1998). Toward a comprehensive interdisciplinary model of health care research use. *Science Communication*, *20*, 227–246. doi:10.1177/1075547098020002004

Lomas, J. (1997). Devolving authority for health care in Canada's provinces: 4. Emerging issues and prospects. *Canadian Medical Association Journal*, *156*, 817–823.

Lomas, J. (2007). The in-between world of knowledge brokering. *British Medical Journal*, *334*, 129–132.

Lowe, K., Allen, D., Jones, E., Brophy, S., Moore, K., & James, W. (2007). Challenging behaviours: Prevalence and topographies. *Journal of Intellectual Disabilities Research*, *51*, 625–636.

Male, D. B. (2003). Challenging behaviour: The perceptions of teachers of children and young people with severe learning disabilities. *Journal of Research in Special Education Needs*, *3*, 162–171. doi:10.1111/1471-3802.00011

Male, D. B., & May, D. S. (1997a). Stress, burnout and workload in teachers of children with severe learning difficulties. *British Journal of Learning Disabilities*, *25*, 117–121. doi:10.1111/j.1468-3156.1997.tb00023.x

Male, D. B., & May, D. S. (1997b). Stress, burnout and workload in teachers of children with special educational needs. *British Journal of Special Education*, *24*, 133–140. Retrieved from 10.1111/1467-8527.t01-1-00029

Martin, T., Shooshtari, S., Temple, B., & Yu, C.T. (2010). Facilitating and impeding factors for knowledge translation in developmental disabilities: Outcomes of community-based workshops. *Journal on Developmental Disabilities, 16*(3), 41–47.

McGlynn, E. A., Asch, S. M., Adams, J., Keesey, J., Hicks, J., DeCristofaro, A., & Kerr, E. A. (2003). The quality of health care delivered to adults in the United States. *The New England Journal of Medicine*, *348*, 2635–2645. doi:10.1056/NEJMsa022615

McKibbon, K. A., Lokker, C., Wilczynsk, N. L., Ciliska, D., Dobbins, M., Davi, D. A., … Straus, S. E. (2010). A cross-sectional study of the number and frequency of terms used to refer to knowledge translation in a body of health literature in 2006: a Tower of Babel? *Implementation Science*, *5*,16. doi:10.1186/1748-5908-5-16

Montgomery, J., Martin, T. L., Shooshtari, S., Stoesz, B. M., Heinrichs, D., North, S., … Douglas, KATYDID research team. (2014). Interventions for challenging behaviours of children and youth with autism and developmental disorders in school settings: A synthesis paper. *Exceptionality Education International, 23*, 2–21.

National Coalition on Dual Diagnosis. (2011). *Moving forward: National action on dual diagnosis in Canada (Developmental disability and mental health difficulties).* Retrieved from http://care-id.com/dual-diagnosis

Nehring, W. (2005). Core curriculum for specializing in intellectual and developmental disability. In W. Nehring (Ed.), *A resource for nurses and other health care professionals*. Mississauga, ON: Jones and Bartlett Publishers.

Nonaka, I. (1994). A dynamic theory of organization knowledge creation. *Organization Science*, *5*, 14–37.

Nonaka, I., & Konno, N. (1998). The concept of "ba": Building a foundation for knowledge creation. *California Management Review*, *40*(3), 40–54.

Ouellette-Kuntz, H., Brown, H. K., Baur, L., Davis, R., Emerson, E., Kerr, M., … Van Schrojenstein Lantman-de Valk, H. (2010). Using a knowledge translation lens to develop international collaborations to improve the health of individuals with intellectual disabilities. *Journal of Policy and Practice in Intellectual Disabilities*, *7*, 278–282. doi:10.1111/j.1741-1130.2010.00277.x

Straus, S. E., Tetroe, J. M., & Graham, I. D. (2011). Knowledge translation is the use of knowledge in health care decision making. *Journal of Clinical Epidemiology, 64*(1), 6–10. doi:10.1016/j.jclinepi.2009.08.016

Stoesz, B. M., Shooshtari, S., Montgomery, J. M., Martin, T., Heinrichs, D. J., & Douglas, J. (2016). Reduce, manage, or cope: A review of strategies for training school staff to address challenging behaviours displayed by students with intellectual/developmental disabilities. *Journal of Research in Special Educational Needs, 16*, 199–214. doi:10.1111/1471-3802.12074

Tetroe, J. M., Graham, I. D., Foy, R., Robinson, N., Eccles, M. P., Wensing, M., … Grimshaw, J. M. (2008). Health research funding agencies' support and promotion of knowledge translation: an international study. *The Milbank Quarterly, 86*, 125–155. doi:10.1111/j.1468-0009.2007.00515.x

Virues-Ortega, J., Pritchard, K., Grant, R. L., North, S., Hurtado-Parrado, C., Lee, M. S., Temple, B., Julio, F., & Yu, C. T. (2014). Clinical decision making and preference assessment for individuals with intellectual and developmental disabilities. *American Journal on Intellectual and Developmental Disabilities, 119*, 151–170. doi:10.1352/1944-7558-119.2.151

World Health Organization. (2001). *International classification of functioning disability and health*. Geneva, SZ: Author.