

1 **Title:** Integrated knowledge translation guidelines for trainees in health research: An environmental
2 scan
3

4
5 **Abstract:**
6

7 **Background:** Collaborative health research, such as integrated knowledge translation (IKT), requires
8 researchers to have specific knowledge and skills in working in partnership with knowledge users.
9 Graduate students are often not provided with the opportunity to learn skills in how to establish
10 collaborative relationships with knowledge users in the health system or communities, despite its
11 importance in research. The objective of this environmental scan is to identify available guidelines for
12 graduate trainees to use an IKT approach in their research.
13

14 **Methods:** We conducted an environmental scan with three separate systematic searches to identify
15 guidelines available to support graduate students in engaging in an IKT approach to research: i) a
16 customized Google search; ii) a targeted university website search of Canadian universities; and iii)
17 emails to administrators of graduate studies programs asking for available guidelines and documents
18 designed for graduate students. Data were extracted using a standardized data extraction tool and
19 analyzed using a directed content analysis approach. Due to the minimal results included based on the a
20 priori eligibility criteria, we returned to the excluded records to further review the current state of the
21 environment on trainee support for IKT research.
22

23 **Results:** Our search strategy yielded 22,900 items and three documents met the eligibility criteria. All
24 three documents highlighted the need for a concrete IKT plan to facilitate success and sustainability of
25 knowledge user involvement throughout the research process. There was an emphasis of having steps
26 outlined to support graduate students to ensure successful communication with knowledge users from
27 project inception through to dissemination. Due to the lack of identified resources, we conducted a
28 thematic analysis of excluded resources and identified five themes demonstrating increased education
29 and engagement in an IKT approach at an interpersonal and organizational level.
30

31 **Conclusion:** We identified three documents providing guidance to trainees using an IKT approach in
32 their health research. This scan highlighted two key findings including the importance of empowering
33 knowledge user engagement with trainees and preparing an IKT plan alongside a research plan. Further
34 research is needed to co-design guidelines to support graduate students and trainees in engaging in an
35 IKT approach.
36
37

38 **Keywords:** Integrated Knowledge Translation, graduate students, health systems research, partnership
39 research, research collaboration
40

41

42

43

44

45 Introduction

46 Collaborative research approaches, such as co-production, co-design, engaged scholarship, and
47 integrated knowledge translation (IKT), aim to bridge the evidence to practice gap, and subsequent
48 policy gaps (1). IKT is defined as “a model of collaborative research, where researchers work with
49 knowledge users (i.e., patients, families, clinicians, decision-makers) who identify a problem and have
50 the authority to implement the research recommendations (p.299).”(2) IKT has shown to improve the
51 quality of research completed (3), enhance the value of the research for decision-makers (4), improve
52 the capacity of key stakeholders to engage meaningfully in research (4–6), and yield more useful results
53 that provide greater impact to those affected (3,7,8).

54 Despite efforts to promote collaborative research approaches, most health research continues
55 to operate independently from the health care system (9). Key stakeholders, decision makers, and other
56 individuals impacted by research evidence are often left out of the research process. This fragmented
57 and disconnected approach to research has led to challenges in ensuring successful completion of
58 research projects, and implementation of meaningful changes based on research findings (9).

59 Several barriers to collaborative health research have been reported. For example, establishing
60 and maintaining research partnerships with key knowledge users can pose a significant barrier in
61 successfully using an IKT approach (3,4,10). IKT is resource intensive, requiring a specific set of skills,
62 knowledge, and sufficient time (3). A lack of understanding and skills of the collaboration process are
63 significant barriers to the success of research partnerships with key knowledge users and other
64 stakeholders (4). Effective collaborative health research requires researchers to have specific knowledge
65 and skills to work in partnership with knowledge users (11).

66 Although, there is a growing emphasis on researchers establishing knowledge and skills in
67 collaborative partnerships, traditionally, IKT has not been taught in graduate research programs (11). A

68 survey of PhD-prepared researchers showed that they have unmet learning needs related to
69 collaboration in research during their training (12). Graduate students are often not provided with the
70 opportunity to learn skills on how to establish collaborative relationships with knowledge users in the
71 health system(10) and most do not receive training on collaborative health research approaches (13,14).

72 We recently conducted a scoping review to identify how trainees have used an IKT approach in
73 their health research (15). The review identified significant barriers in using an IKT approach for trainees
74 at the individual, interpersonal, and organizational level. There is a need for increased graduate level
75 education and skills in conducting IKT, and a need to promote the value of IKT in trainee led research
76 (15). Specifically, one major finding at the individual level was that trainees reported a lack of knowledge
77 and skills on co-production and difficulty navigating multiple competing priorities with their knowledge
78 users. Despite the lack of knowledge and skills, trainees across diverse disciplines (e.g., nursing,
79 physiotherapy, medicine, education) showed an overwhelming interest in using an IKT approach to
80 research (15). Currently, trainees who engage in research partnerships with knowledge users are often
81 self-motivated, supported with experiential learning opportunities, and are supervised or receive
82 mentorship from established researchers with expertise in IKT (16). Establishing effective skills in
83 building trusting, collaborative partnerships with knowledge users is imperative to ensure all health
84 research trainees are engaging in meaningful, ethical research with relevant outcomes (17). Efforts are
85 needed to improve academic preparation for engaging in health research partnerships (16,18). As such
86 ,the objective of this environmental scan is to identify available guidelines and/or resources for graduate
87 students and trainees to use an IKT approach in their research.

88 **Research Purpose**

89 This paper reports on phase one of a multiphase study that aims to co-design guidelines for
90 engaging in an IKT approach in graduate studies. The larger program of work aims to address the
91 following research question: How can graduate students use an IKT approach in their thesis work? As a

92 first step in this study, we conducted an environmental scan of relevant documents related to guiding
93 graduate students to engage in an IKT approach to research (19).

94 **Methods**

95 The environmental scan followed Godin's (2015) grey literature search methodology (20). This
96 methodology encompasses complementary search strategies including, 1) customized Google searches;
97 2) targeted website search; and 3) expert consultations (20). The review question was: what guidance
98 exists for graduate students to use an integrated knowledge translation approach in their research?

99 **Search Strategy**

100 We worked with a librarian scientist to identify keywords to be used in the searches. We
101 completed the environmental scan between April 2022 and August 2022. We screened the potential
102 resources using the following inclusion criteria: trainees in health research (population); documents,
103 guidelines, papers and/or resources, here by referred to as documents, providing guidance on how to
104 engage in an IKT approach to research (concept); and health research programs (context). We used a
105 pre-determined inclusion criteria template [see appendix], based on findings from our previously
106 conducted scoping review, to ensure relevant resources were included to meet the outlined research
107 question (15). Furthermore, we only included documents in the English language, and no limits were set
108 on publication date to document the evolution of documents overtime. Each of the three searches are
109 detailed below.

110 **Part One: Customized Google Search**

111 We conducted a customized search based on the power of relevancy ranking within the Google
112 search engine to bring the most relevant results to the top of the list (20). Then we predetermined the
113 number of pages we screened to ensure feasibility and consistency across searches. We used the google
114 search engine in "incognito" mode to ensure no recommended websites were in the search due to
115 personal history. We completed six separate searches based on the keywords determined in

116 consultation with the librarian specialist. The following key phrases were used in each search 1)
117 “Integrated Knowledge Translation” Guide; 2) “Co-design” “In research” Guide; 3) “Knowledge User
118 Engagement” “in research” Guide; 4) “Co-Production Research” Guide; 5) “Engaged scholarship” “in
119 research” guide; and 6) “Collaborative Research Approach” Guide.

120 For this search, we first conducted a Google search using the above outlined search phrases to
121 identify the relevant organizations and websites publishing documents on the relevant subject area. The
122 team reviewed the first ten pages of each search’s hits (representing 100 results) for potentially relevant
123 titles (supplemented with the text under the title). We recorded the website’s name/organization and
124 URL into an Excel spreadsheet of potential documents meeting the inclusion criteria distinguished. We
125 saved the URLs to be further screened by two independent reviewers.

126 Next, we hand-searched each of the relevant websites’ homepage for potentially relevant
127 documents (e.g., web pages, reports). Within this step, we documented each website and the date each
128 search was completed. Two independent reviewers screened all applicable documents and resources
129 using a standardized inclusion template, discussed above. The documents meeting the inclusion
130 requirements were kept for data extraction.

131 **Part Two: Targeted Canadian University Website Search**

132 One reviewer (Author 1) completed a Google search to determine all possible Canadian
133 Universities that offered graduate programs in health (N=45). We chose to limit the targeted University
134 website search to Canadian universities because IKT is a primarily Canadian term and it was beyond the
135 scope of the project to do a targeted search of all universities. Further, documents from non-Canadian
136 universities would be captured in the Google search. We used the search function on the qualifying
137 university websites to search for each of the following terms: 1) “Integrated Knowledge Translation
138 Guide” ; 2) “Co-design guide”; 3) “Knowledge user engagement guide” ; 4) “Co-Production Research

139 Guide”; 5) “Engaged scholarship guide”; 6) “Collaborative Research Approach guide”. We reviewed the
140 first 100 results from each individual search. The university websites use Google as a search engine for
141 their website, therefore the power of relevancy was assumed in the first 100 results.

142 First, we screened all titles and short descriptions to be included in a second stage screening
143 process. We documented results from each individual search outlining the keywords used, date
144 searched, total results retrieved, an email contact (for search three detailed below) and number of items
145 for more detailed screening. We saved documents meeting the inclusion criteria as a PDF. Second, we
146 screened the PDFs using the standardized inclusion template. The documents meeting the inclusion
147 requirements were included for data extraction.

148 **Part Three: Consultations with Administrators via Email**

149 During the previous searches, we noted the email address of any expert (e.g., university
150 administrators) to include in the final search. We saved a total of (N=45) emails and sent an initial email
151 on June 23, 2022 to prospective graduate student administrators. The email outlined the purpose of the
152 proposed project and requested graduate student administrators to send any known documents
153 available at their perspective universities that could be used as a guide for trainees to engage in an IKT
154 research approach. Emails were sent directly to the Associate Dean of graduate studies where available,
155 and if not available, an email was sent to the graduate studies email.

156 We sent the email using a secure university account (Author 1). We documented the date the
157 email was sent, responses, documents received, and any follow up. We were open to receiving
158 responses up to two months following the sent date. Follow up emails were sent where deemed
159 necessary (e.g., another contact was provided).

160 Two independent reviewers screened all applicable documents using standardized inclusion
161 criteria. The documents meeting the inclusion requirements were kept for data extraction.

162 **Data Extraction**

163 We created a data extraction tool to collect general information on the documents in three
164 specific categories. First, we captured general information on the document's characteristic including
165 author, type of author, year of publication, purpose of document, setting, location, and format of the
166 document. Next, we identified characteristics of the documents that were specific to graduate students,
167 including the following topics: health discipline, stage of training, and type of program the document
168 was geared towards. Finally, we reviewed all IKT content that was included in the document including a
169 description of (1) the type of knowledge users involved; (2) the level of engagement based on the
170 International Association of Public Participation (IAP2) tool (21), (3) the steps taken to engage in an IKT
171 approach, and (4) reported outcomes of using an IKT guideline. We piloted the data extraction tool with
172 two independent reviewers (Author 1, Author 2). No modifications were made following the pilot
173 testing. We extracted data using an excel spread sheet and a third reviewer (Author 7) addressed any
174 discrepancies between reviewers.

175 **Data Analysis**

176 We used a directed content analysis approach (22) to analyze the extracted data. Specifically,
177 we coded the data using the International Association of Public Participation (IAP2) to determine how
178 the resources suggested involving knowledge users in an IKT approach to research (21). The IAP2
179 provides a framework to guide public participation in research endeavours. It encompasses a spectrum
180 from 'least' involved to the 'most' involved the public can be on research projects. The spectrum
181 includes the following categories from least to most involved; (1) Inform, where the public is informed of
182 the project; (2) Consult, where the researcher elicits feedback from the public; (3) Involve, where the
183 public is involved in the research process; (4) Collaborate, where the public is involved in decision
184 making processes for the project; and (5) Empowerment, where the public makes the final decisions for
185 research processes(21).

186 Furthermore, we examined the stages of research that trainees were encouraged to engage
187 knowledge users in, using Dillion et al.'s (2017) engagement in the research process categories (23).
188 Finally, we narratively synthesized a description of outcomes explicitly shared in the document along
189 with the content related to IKT.

190 **Results**

191 Our search strategy yielded a total of 22,900 items. After initial screening of titles, 183 resources
192 remained for assessment based on detailed inclusion criteria. After second stage screening and
193 removing duplicates (N=2), three resources were included in the final review (please see Figure 1). We
194 report each search below separately. A summary of the results are included in **Table 1.0**.

195 [FIGURE ONE TO BE INCLUDED HERE]

196 **Part One: Customized Google Search**

197 In total, 577 results were reviewed from the customized google search and 50 potential
198 resources were identified for full-text review. Of these, only two documents (24)(25) met the inclusion
199 criteria. Neither of these documents were written directly for graduate students/ trainees; however,
200 they included a category of researchers, including students, as part of the description. Both documents
201 aimed to provide direction for researchers to engage in an IKT or similar type of collaborative research
202 approach. Both documents were created in partnership: one document was a partnership between The
203 Center for Excellence in Assisted Living [a health organization] and University of South Carolina [a
204 university] (25), while the other was a partnership between Australian Health Research Alliance [a
205 health organization] and Western Australian Health Translation Network [a knowledge translation
206 institution] (24). Documents were developed in the United States (n=1) and Australia (n=1). One
207 document was developed in 2013 (25), while the other was more recent in 2021(24). Both documents
208 were accessible online through a Google search in the format of a PDF.

209 In terms of IKT content for both documents, knowledge users were described as any consumer
210 or person who would be affected by research (24,25). This statement was purposefully broad to include
211 all possible consumers of research including patients, health organizations, funding agencies,
212 community members, etc. Both documents emphasized the importance of knowledge users being
213 involved in all aspects of the research, with a clear recommendation for knowledge users to be decision
214 makers in the research process. Due to the emphasis and focus on decision making, we classified both
215 documents on the IAP2 scale as collaborate (21).

216 Both documents describe steps to ensure a seamless IKT approach, including a cyclical planning
217 process (24,25). Both documents emphasized the importance of developing a plan for IKT, including a
218 detailed step-by-step engagement and communication plan to ensure successful engagement
219 throughout the research design. Furthermore, in applying a research process lens to the engagement of
220 knowledge users, both documents identified the importance of early engagement from the project
221 conception and planning stages (23). Finally, both documents outlined the potential outcomes of using
222 their resource to improve relevance and effectiveness of proposed research by using an IKT approach to
223 research (24,25).

224 **Part Two: Targeted University Search**

225 In total 22,322 results were reviewed from the targeted university search; from these 132 were
226 identified as potential documents guiding graduate trainees in using an IKT approach to research. Two
227 duplicates were removed. Of these 130 potential documents, only one met the detailed inclusion
228 criteria (26). The document was identified as a resource for engaging students in projects and research
229 across a continuum. Although not directed to graduate students specifically, the document included all
230 students at the university. The document was created in 2015 at the University of Alberta, with the
231 intention that students and faculty use the document in university level projects and research.
232 Ultimately, the purpose of these guidelines was to ensure diversity in participation in projects especially

233 in terms of meaningful engagement and decision making. This document was available in PDF format
234 and accessible through the university's website.

235 In terms of IKT content, the document described knowledge users as any individual that may be
236 affected by the project and/or decisions made during the project/research. In applying the IAP2 (21)
237 framework to data extraction, this document described the need to involve knowledge users on a
238 continuum, depending on the needs of the project (26). This recommendation is unlike the previous two
239 resources analyzed in the Google search (24,25), as they both emphasized the importance of
240 collaboration with all knowledge users despite the nature of the project. This document (26) emphasizes
241 the importance of meeting the 'involve level' in the IAP2 framework; however, it does not necessarily
242 emphasize that each project must meet the collaborate or empowerment levels of engagement (21).

243 Furthermore, the steps to engage in an IKT approach were outlined with an emphasis on the
244 planning stage to establish clarity of the knowledge users needed to be involved, and degree of
245 involvement required. Additionally, there was an emphasis on planning for communication between
246 researchers and knowledge users, ensuring there was a plan to establish and maintain effective
247 communication throughout the project (26). There were no specified outcomes reported in using this
248 document in IKT research.

249 **Part Three: Consultation with Administrators**

250 Nine university administrators responded to our email. Only one administrator provided a
251 document in response to our request; however, it was guidelines for researchers and not for graduate
252 students so was not relevant to our review. Other responses included (1) automatic responses with no
253 follow up (N=4); (2) responses indicating that the recipient of the email was unable to provide guidance
254 (N=2); and (3) responses indicating an alternate contact to follow up with (N=3). Follow up emails were
255 sent to the alternate contacts identified and no responses were received with the follow up emails. No
256 documents from this search strategy were included in data extraction.

Table 1.0 Results of three documents retrieved from the individual searches including 1) customized google search; 2) targeted university search; and 3) consultation with administrators.

Included Document	General Characteristics	IAP2 Level of Engagement [22]	Engagement in Research Process [23]	Summary of IKT Guideline Content
Involving Consumers in Health and Medical Research (24)	Publication Year: 2021 Located: Customized Google Search Format: PDF format	Collaborate	Engagement from project inception; throughout entire research process.	<ul style="list-style-type: none"> • Guidelines were created in partnership with a health organization and knowledge translation service • Knowledge users were defined as anyone who may be affected by research • Encouraged a detailed plan for IKT • Encouraged an agreement document be signed by all parties involved • Identified the concept of a “research mentor” • Reported Outcomes: improved relevancy and effectiveness of proposed research
A Manual for Community Based Participatory Research (25)	Publication Year: 2013 Located: Customized Google Search Format: PDF format	Collaborate	Engagement from project inception; throughout entire research process	<ul style="list-style-type: none"> • Guidelines were created in partnership with a health organization and a university • Knowledge users were defined as anyone who may be affected by research • Defined IKT engagement planning as a cyclical process • Reported Outcomes:

University of Alberta Student Participation Process Handbook (26)	Publication Year: 2015 Located: Targeted University Website Format: PDF format	Engagement	Variable depending on the purpose of the engagement of the knowledge user	<p>improved relevancy and effectiveness of proposed research</p> <ul style="list-style-type: none"> • Knowledge users are defined based on the impact the decision/project has on an individual • An emphasis on including an engagement plan • No cited outcomes to using the resource
--	---	------------	---	--

257

258 **Response to minimal results: Thematic analysis of excluded records**

259 Due to the minimal results included based on the a priori eligibility criteria, we returned to the
260 excluded records (N=183) to further review the current state of the environment on trainee support for
261 IKT research. We felt there may be important insights to gather from the excluded records that were
262 relevant but did not meet all three criteria. We followed the six phases of inductive thematic analysis by
263 Braun & Clarke (27). Resources were first analyzed for patterning. Next, we developed themes to
264 describe the current state resources for trainee's engaged in IKT research.

265 Five themes were identified through inductive thematic analysis (27) highlighted in **Table 2.0**.
266 The first theme relates to *strategic plans and annual research reports with the goal of collaborative*
267 *research*. Many universities emphasized the goal of partnerships and collaboration in research (N=15).
268 Some universities went as far as outlining goals for IKT research approaches for their faculty and
269 students, however, did not include any guidelines or recommendations for graduate students.

270 The second theme identified was *Grant funding applications and resources supporting and/or*
271 *requiring IKT approach in application*. In the screening process, we found that many grant and funding
272 applications required or emphasized the importance of using an IKT approach in research (N=14).

273 The third theme identified was *courses, events, and education sessions for graduate student*
274 *engagement in an IKT research approach*. We found that many courses, events, and education sessions
275 for students emphasized the importance of using an IKT approach in research (N=19); however, none of
276 these results were noted to be guidelines for trainees on how to engage in IKT research.

277 The fourth theme identified was *Information or education materials emphasizing importance of*
278 *using an IKT approach in research*. This theme was the most prominent (N=48). While many of the
279 documents had valuable IKT content and discussion, most were not tailored to graduate students
280 (N=20), and as such, were not deemed eligible for inclusion in the environmental scan. Many of the
281 results included resources and education sessions on IKT and the importance of including this approach
282 to improve research outcomes (N=10); however, none of these results were specific guidelines for
283 trainees.

284 Finally, the fifth theme identified was *IKT Toolkits specific to researchers, but not inclusive of*
285 *graduate students/trainees*. Many resources outlined specific tool kits to be used by researchers to
286 ensure seamless engagement in an IKT approach to their research (N=6). These toolkits were not,
287 however, tailored to graduate students.

Table 2.0: Demonstrates five themes identified through inductive thematic analysis of excluded resources

Theme	Frequency of Documents Demonstrating Theme	Example from included documents
1. Strategic plans and annual research reports with the goal of collaborative research (using IKT approaches)	Customized Google Search [N=0]	Concordia University <ul style="list-style-type: none"> • Outlined goal of engagement in collaborative research • Outlined goal of collaborative research approach since 2015 • Specifically in <u>2019/2020 Annual Report</u> contained a priority initiative to engage in research partnerships abroad [engage in collaborative research project]
	Targeted University Search [N=15]	
2. Grant funding applications and resources supporting and/or requiring IKT approach in application	Customized Google Search [N=1]	University of Alberta; IKT and Grant Application Workshop (28) <ul style="list-style-type: none"> • Workshop intended for graduate students • Support in applying for a CIHR Grant • Detailed discussion on KT engagement plans and requirement for applications • Emphasis on KT engagement plans
	Targeted University Search [N=13]	
3. Courses, events and education sessions for graduate student engagement in an ikt research approach	Customized Google Search [N= 10]	University of Calgary (29) <ul style="list-style-type: none"> • In 2019, the University of Calgary held a Symposium of mobilizing knowledge on Newcomers • Event encouraged collaboration and networking amongst knowledge users and researchers • Encouraged discussion on priority topics to be addressed through research
	Targeted University Search [N=9]	
4. Information or education materials emphasizing importance of using an IKT approach in research	Customized Google Search (N=20)	Canadian Institute of Health Research (30) <ul style="list-style-type: none"> • PDF document found online • Overview of Integrated Knowledge translation including definitions, examples and worksheets • Inclusion of a proposal worksheet for incorporating an IKT approach to health research • Emphasis on the importance of engaging in IKT to improve patient outcomes
	Targeted University Search [N=28]	
5. IKT Toolkits specific to researchers, but	Customized Google Search [N=4]	Social Sciences and Humanities Research Council of Canada (31)

not inclusive of graduate students/trainees	Targeted University Search [N=2]	<ul style="list-style-type: none"> • One page infographic • Multistep process to successfully engage in an Integrated Knowledge Translation approach • Purpose of the infographic is to guide partnerships
--	----------------------------------	---

288

289

Discussion

290

291

292

293

294

295

296

297

298

299

We conducted an environmental scan to identify publicly available documents for graduate students and trainees in health to use an IKT approach to research. We completed three separate searches following Godin (2015)'s methodology (20). In search one, we conducted a customized Google search and identified two resources for inclusion. In search two, we searched Canadian university websites and identified one resource for inclusion. Finally, in search three, we emailed university administrators from Canadian universities and did not identify any additional items for inclusion. Although there was a lack of documents for graduate students and trainees, we identified several important insights to support future work and guideline development for trainees using an IKT approach to research.

Summary of Findings

300

301

302

303

304

305

306

307

308

309

We identified two important findings from the three included documents. These findings will be instrumental in guiding future resource development, implementation, and evaluation for graduate students in health. First, all three documents emphasized the importance of engaging knowledge users in the research process (24–26). More specifically, it was noted that engagement is critical to consider at the beginning of the project/research conception, urging graduate students/trainees to reflect on the involvement of their prospective knowledge users from project outset. Two out of the three documents suggested using a collaborative approach in all research situations (21), with an emphasis on shared decision making amongst knowledge users and researchers as being key to successful collaborative research (24,25). These findings are echoed in the literature, that highlight improved relevancy in results and translation of findings occurs with collaboration, empowerment and early engagement with key

310 stakeholders (30,32). Early engagement of key stakeholders supports researchers to design research
311 methods accessible and appropriate for their target population, and ultimately, improving richness and
312 relevancy of results to improve health outcomes (32). These findings further highlight the need to co-
313 develop guidelines to support graduate students/trainees in health to engage in early reflection of
314 knowledge user involvement in their research.

315 Second, in all three resources, there was an emphasis on including an IKT plan separate from the
316 research proposal to ensure an IKT approach to research was implemented and sustained over the
317 duration of the project (24–26). When IKT engagement plans are thoughtfully developed, reviewed and
318 evaluated throughout the research process, there is greater likelihood of improvements in research
319 relevancy and uptake (33). The use of an IKT plan alongside the research plan ensures engagement is
320 sustained throughout the project(33). We found similar findings in our environmental scan. The
321 resources described steps related to the process of engaging and sustaining an integrated knowledge
322 translation approach, partnering with knowledge users, and empowering them throughout the entire
323 research process. Our previous scoping review identified that trainees reported feeling like outsiders to
324 organizations, and cited this as a barrier in engaging in an IKT approach (15). An IKT plan is a potential
325 way to mitigate the feeling of being an outsider, as partnerships are created at the inception of the
326 project to build stronger collaborative research partnerships (34).

327 The included documents detailed communication plans on how to engage with knowledge users
328 throughout the duration of the research project. The communication plan was made alongside the
329 research protocol, ensuring that knowledge users would be properly engaged and empowered at every
330 step of the research process. This included a range of activities, such as detailing monthly meetings to
331 ensure feedback was received in a timely manner and developing a involvement agreement document
332 to ensure all parties were aware of their respective responsibilities (24). These activities were
333 particularly important to ensure seamless engagement throughout the entire research process.

334 Furthermore, one document suggested the designation of a research mentor, responsible for ensuring
335 the inclusion and support for the knowledge user throughout the process (24). Having a research
336 mentor could potentially enhance the relationship between the research team and knowledge users,
337 ensuring that the most effective outcomes can be achieved (24).

338 **Insights from Excluded Documents**

339 Our previous scoping review on trainee experiences with IKT (15) revealed important barriers in
340 using an IKT approach for trainees at the individual, interpersonal, and organizational level. Our scoping
341 review proposed the need for a culture shift in improving infrastructure supports for IKT in trainee led
342 research(15). Our environmental scan highlighted how this culture shift is happening through the
343 identification of two important observations at the interpersonal and organizational level.

344 First, we found that collaborative research is a strategic goal for many Canadian universities.
345 This finding demonstrates how universities are starting to value an IKT approach to research by engaging
346 with key stakeholders in the community as a means of supporting research partnerships. Several
347 documents from the targeted university search included strategic planning and annual reports that
348 outlined goals for IKT research in their university programs (N=16). For instance, Concordia University
349 outlined the goal of engaging in collaborative research approaches since 2015 (35). Similarly, the
350 University of Calgary stated a goal of integrated and collaborative research in their strategic research
351 plan since 2012 (36).

352 There has been a shift in educational opportunities and events offered at universities in recent
353 years to improve education and knowledge in IKT. In 2019, the University of Calgary held a Symposium
354 of mobilizing knowledge on Newcomers (29). This event was designed with four main goals in mind, one
355 being that stakeholders and researchers (including graduate students) would have a space to
356 collaborate and discuss priority concerns from a stakeholder point of view, to be addressed in research
357 (29). Providing the space for discussion and partnership between stakeholders and researchers,

358 followed by education sessions from experts on collaborative research, is an example of how change is
359 happening to educate graduate students in IKT.

360 Second, our previous scoping review revealed that lack of funding was a barrier in using an IKT
361 approach in trainee-led research (15). Interestingly, we found throughout our environmental scan
362 several documents emphasizing the need for an IKT approach in research funding applications (N=14).
363 This finding has also been noted in recent literature (1,3). Globally, some funding agencies have started
364 to require the use of an IKT approach for grant applications and recognize the impact that an IKT
365 approach has on research outcomes and uptake of research knowledge in practice (1,3). In our
366 environmental scan, many documents (N=14) described funding application requirements as having a
367 plan for engaging in IKT in the proposed research plan. For instance, during the targeted university
368 search, Strategy for Patient Orientated Research [SPOR] support units across Canada were highlighted
369 on university websites due to their funding opportunities for graduate students. Maritime SPOR Support
370 Unit [MSSU], for instance, offers the *MSSU Trainee Support Program*. This application requires students
371 to share a knowledge user engagement plan as a critical component of their research proposal. The
372 knowledge user and patient engagement plans constitute one third of the points allotted for the award
373 (37).

374 Despite these strategic goals, education events, and IKT-related funding calls, no resources were
375 offered by the university to guide graduate students/trainees in health research to meet this goal. We
376 recommend addressing this gap in the IKT literature by co-designing guidelines for engaging in an IKT
377 approach to research. In using a co-design approach, end users (i.e., researchers, stakeholders, and
378 graduate students/trainees) are engaged creatively throughout the entire design process to ultimately,
379 improve the uptake of change in practice (38). Furthermore, sustainability and maintenance of health
380 care innovation and change can be improved through engagement in a co-design process (38).
381 Stakeholder engagement in a co-design process can address any equity concerns, along with any specific

382 barriers to the individual (39). Through engagement in a co-design event, guidelines for engaging in an
383 IKT approach to research could be developed encompassing steps reflective of equity concerns and
384 barriers found at an individual level for graduate students (15).

385 **Limitations**

386 This environmental scan has several limitations. First, we developed the search strategy based
387 on previous research completed on terminology for partnership research (40); however, partnership
388 research approaches vary and it is possible that we may have overlooked guidelines using different
389 terminology. Second, the term integrated knowledge translation is a predominantly Canadian term, and
390 therefore there is potential we may have missed resources describing research partnership guidelines in
391 other languages or terminologies. Lastly, due to resource constraints, we were only able to conduct a
392 targeted hand search and email survey of Canadian universities. We may have missed relevant records
393 from other international universities or colleges; however, the advanced Google search should have
394 identified those items.

395 **Conclusion**

396 This environmental scan aimed to identify the current state of guidelines for trainees to engage
397 in an IKT approach in Canadian universities. We completed three customized searches using Godin
398 (2015)'s environmental scan methodology. There was an absence of documents found to support
399 graduate students and trainees in using an IKT approach to health research (n=3). All three documents
400 outlined the importance of early engagement with stakeholders, including how to properly engage and
401 maintain relationships throughout the research process. The documents also outlined the importance of
402 establishing an IKT plan separate from the research plan, ensuring that engagement of knowledge users
403 was planned and evaluated throughout the research process. Although minimal documents were
404 included, two important findings were noted in the thematic analysis of the excluded records. At an
405 organizational level, universities across Canada and funding agencies are starting to recognize the

406 importance of using an IKT approach in trainee-led research. Universities are hosting educational events
407 and funding agencies are offering support to graduate students engaging in an IKT approach in their
408 research. Further efforts are now needed to build on this momentum and address barriers at an
409 individual level supporting trainees to gain the required knowledge and skills to use an IKT approach to
410 health research.

411 **List of Abbreviations:**

412 Integrated knowledge translation (IKT)

413 International Association of Public Participation (IAP2)

414 **Declarations:**

415

416 **Ethics approval and consent to participate:** Not applicable

417 **Consent for publication:** Not applicable

418

419 **Acknowledgements:** Author 1 is a PhD in Nursing Student at Dalhousie University School of Nursing and
420 has had the support of the Master of Science in Nursing Entrance Scholarship, the Margaret Inglis
421 Hagerman Graduate Scholarship, the School of Nursing PhD Scholarship, the Helen Watson Memorial
422 Scholarship, the CIHR- Canada Graduate Scholarship – Master’s Program Award and the BRIC NS Student
423 Research Award while writing this environmental scan.

424

425 **Funding:** This project was funded by the Nursing Research and Development Fund [Award: 2403-001]
426 through Dalhousie University, Halifax, Nova Scotia.

427

428 **Authors Contributions:** Author 7, Author 1, Author 3, Author 4, Author 6 and Author 5 conceptualized
429 and designed the environmental scan. Author 7, Author 1 and Author 2 co-developed the
430 comprehensive search strategy with a Librarian scientist. Author 1 and Author 2 screened the records
431 and synthesized the data. Author 7, Author 1 and Author 2 completed the first draft of manuscript.
432 Author 3, Author 4, Author 5, and Author 6 provided feedback and edits on the draft for publication. All
433 authors approved the final version for publication

434

435 **Competing Interests:** Authors have no conflict of interest to disclose

436

437 **Data Statement:** The datasets used and/or analysed during the current study are available from the
438 corresponding author on reasonable request.

439

440

441

References

- 442
443 1. Nguyen T, Graham ID, Mrklas KJ, Bowen S, Cargo M, Estabrooks CA, et al. How does integrated
444 knowledge translation (IKT) compare to other collaborative research approaches to generating and
445 translating knowledge? Learning from experts in the field. *Health Research Policy and Systems*. 2020
446 Mar 30;18(1):35.
- 447 2. Kothari A, McCutcheon C, Graham ID. Defining Integrated Knowledge Translation and Moving
448 Forward: A Response to Recent Commentaries. *International journal of health policy and
449 management*. 2017;6(5):299–300.
- 450 3. Oliver K, Kothari A, Mays N. The dark side of coproduction: do the costs outweigh the benefits for
451 health research? *Health Research Policy and Systems*. 2019 Mar 28;17(1):33.
- 452 4. Gagliardi AR, Berta W, Kothari A, Boyko J, Urquhart R. Integrated knowledge translation (IKT) in
453 health care: a scoping review. *Implementation Science*. 2016 Mar 17;11(1):38.
- 454 5. Jagosh J, Macaulay AC, Pluye P, Salsberg J, Bush PL, Henderson J, et al. Uncovering the Benefits of
455 Participatory Research: Implications of a Realist Review for Health Research and Practice. *The
456 Milbank Quarterly*. 2012;90(2):311–46.
- 457 6. Jessani NS, Valmeekanathan A, Babcock C, Ling B, Davey-Rothwell MA, Holtgrave DR. Exploring the
458 evolution of engagement between academic public health researchers and decision-makers: from
459 initiation to dissolution. *Health Research Policy and Systems*. 2020 Feb 10;18(1):15.
- 460 7. Walter I, Davies H, Nutley S. Increasing research impact through partnerships: Evidence from
461 outside health care. *J Health Serv Res Policy*. 2003 Oct 1;8(2_suppl):58–61.
- 462 8. Hofmeyer A, Scott C, Lagendyk L. Researcher-decision-maker partnerships in health services
463 research: Practical challenges, guiding principles. *BMC Health Services Research*. 2012 Aug
464 28;12(1):280.
- 465 9. Lamontagne F, Rowan KM, Guyatt G. Integrating research into clinical practice: challenges and
466 solutions for Canada. *CMAJ*. 2021 Jan 25;193(4):E127.
- 467 10. Nyström ME, Karlton J, Keller C, Andersson Gäre B. Collaborative and partnership research for
468 improvement of health and social services: researcher’s experiences from 20 projects. *Health Res
469 Policy Syst [Internet]*. 2018 May 30 [cited 2019 Jul 10];16. Available from:
470 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5975592/>
- 471 11. Barratt H, Shaw J, Simpson L, Bhatia S, Fulop N. Health services research: building capacity to meet
472 the needs of the health care system. *Journal of Health Services Research & Policy*. 2017;22(4):243–
473 9.
- 474 12. Kyvik S, Olsen TB. The relevance of doctoral training in different labour markets. *Journal of
475 education and work*. 2012;25(2):205–24.
- 476 13. Bornstein S, Heritage M, Chudak A, Tamblyn R, McMahon M, Brown AD. Development of Enriched
477 Core Competencies for Health Services and Policy Research. *Health services research*.
478 2018;53(5):4004–23.

- 479 14. McMahon M, Bornstein S, Brown A, Tamblyn R. Training for Impact: PhD Modernization as a Key
480 Resource for Learning Health Systems. *Healthcare Policy | Politiques de Santé*. 2019;15(SP):10–5.
- 481 15. Cassidy CE, Shin HD, Ramage E, Conway A, Mrklas K, Laur C, et al. Trainee-led research using an
482 integrated knowledge translation or other research partnership approaches: a scoping review.
483 *Health Research Policy and Systems*. 2021 Nov 2;19(1):135.
- 484 16. Cassidy CE, Bowen S, Fontaine G, Côté-Boileau É, Botting I. How to Work Collaboratively Within the
485 Health System: Workshop Summary and Facilitator Reflection. *International journal of health policy
486 and management*. 2020;9(6):233–9.
- 487 17. Antes AL, Kuykendall A, DuBois JM. Leading for research excellence and integrity: A qualitative
488 investigation of the relationship-building practices of exemplary principal investigators.
489 *Accountability in research*. 2019;26(3):198–226.
- 490 18. Bowen S, Botting I, Graham ID, MacLeod M, Moissac D de, Harlos K, et al. Experience of Health
491 Leadership in Partnering With University-Based Researchers in Canada - A Call to “Re-imagine”
492 Research. *International Journal of Health Policy and Management*. 2019;8(12):684–99.
- 493 19. Graham P, Evitts T, Thomas-MacLean R. Environmental scans. *Can Fam Physician*. 2008
494 Jul;54(7):1022–3.
- 495 20. Godin K, Stapleton J, Kirkpatrick SI, Hanning RM, Leatherdale ST. Applying systematic review search
496 methods to the grey literature: a case study examining guidelines for school-based breakfast
497 programs in Canada. *Systematic Reviews*. 2015 Oct 22;4(1):138.
- 498 21. International Association for Public Participation. Public Participation Pillars [Internet]. [cited 2022
499 Aug 2]. Available from:
500 [https://cdn.ymaws.com/www.iap2.org/resource/resmgr/communications/11x17_p2_pillars_broch
501 ure_20.pdf](https://cdn.ymaws.com/www.iap2.org/resource/resmgr/communications/11x17_p2_pillars_brochure_20.pdf)
- 502 22. Hsieh HF, Shannon SE. Three Approaches to Qualitative Content Analysis. *Qualitative health
503 research*. 2005;15(9):1277–88.
- 504 23. Greenlee R, Olden H, Tuzzio L, Dillon EC, Madrid S. Measuring the Impact of Patient-Engaged
505 Research: How a Methods Workshop Identified Critical Outcomes of Research Engagement. *Journal
506 of Patient-Centered Research and Reviews*. 2017;4(4):237–46.
- 507 24. Australian Health Research Alliance WAHTN. Involving Consumers in Health and Medical Research
508 [Internet]. 2021. Available from: [https://wahtn.org/wp-content/uploads/2021/09/WAHTN-CCI-
509 Handbook_29092021.pdf](https://wahtn.org/wp-content/uploads/2021/09/WAHTN-CCI-Handbook_29092021.pdf)
- 510 25. CEAL-UNC Collaborative. A Manual for Community-Based Participatory Research [Internet]. 2013.
511 Available from: [https://www.shepscenter.unc.edu/wp-content/uploads/2013/05/CEAL-UNC-
512 Manual-for-Community-Based-Participatory-Research-1.pdf](https://www.shepscenter.unc.edu/wp-content/uploads/2013/05/CEAL-UNC-Manual-for-Community-Based-Participatory-Research-1.pdf)
- 513 26. University of Alberta, University of Alberta Student Union, The Graduate Students’ Association of
514 the University of Alberta. UNIVERSITY OF ALBERTA STUDENT PARTICIPATION PROCESS HANDBOOK
515 [Internet]. 2015. Available from: <https://www.ualberta.ca/governance/media->

- 516 library/documents/resources/guides-and-handbooks/ua-studentparticipationprocess-
517 handbooksummary.pdf
- 518 27. Braun V, Clarke V. Using thematic analysis in psychology. *null*. 2006 Jan 1;3(2):77–101.
- 519 28. University of Alberta. How to Incorporate Patient Engagement and Integrated Knowledge
520 Translation (iKT) GAP CIHR Project Grant Workshop [Internet]. 2020. Available from:
521 <https://era.library.ualberta.ca/items/05defd25-b846-43ac-a01b-6304bc834078/view/6612a827-3991-4f5d-8fca-d1f66e8ab407/2020-02-04%20-%20Patient%20Engagement%20&%20iKT%20Workshop%20-%20Powerpoint.pdf>
522
523
- 524 29. Newcomer Research Network, University of Calgary. Mobilizing Knowledge on Newcomers
525 Symposium [Internet]. 2019. Available from:
526 [https://www.ucalgary.ca/sites/default/files/teams/445/NRN%20Symposium%20Program%20\(4\).pdf](https://www.ucalgary.ca/sites/default/files/teams/445/NRN%20Symposium%20Program%20(4).pdf)
- 527 30. Canadian Institutes of Health Research. Guide to Knowledge Translation Planning at CIHR:
528 Integrated and End-of-Grant Approaches [Internet]. 2015. Available from: [https://cihr-](https://cihr-irsc.gc.ca/e/documents/kt_lm_ktplan-en.pdf)
529 [irsc.gc.ca/e/documents/kt_lm_ktplan-en.pdf](https://cihr-irsc.gc.ca/e/documents/kt_lm_ktplan-en.pdf)
- 530 31. Social Sciences and Humanities Research Council of Canada. A RESEARCHER GUIDE TO KNOWLEDGE
531 TRANSLATION [Internet]. Available from:
532 https://cdpp.ca/sites/default/files/Guide%20to%20Knowledge%20Translation_%20Infographic.pdf
- 533 32. International Alliance of Patients' Organizations. Empowered Patients in Research: moving beyond
534 participation [Internet]. 2017. Available from:
535 [https://www.iapo.org.uk/sites/default/files/files/Empowered%20Patients%20in%20Research\(2\).pdf](https://www.iapo.org.uk/sites/default/files/files/Empowered%20Patients%20in%20Research(2).pdf)
- 536 33. Elliott MJ, Allu S, Beaucage M, McKenzie S, Kappel J, Harvey R, et al. Defining the Scope of
537 Knowledge Translation Within a National, Patient-Oriented Kidney Research Network. *Canadian*
538 *journal of kidney health and disease*. 2021;8:20543581211004804–20543581211004804.
- 539 34. Stamatakis KA, Norton WE, Stirman SW, Melvin C, Brownson RC. Developing the next generation of
540 dissemination and implementation researchers: insights from initial trainees. *Implementation*
541 *Science*. 2013 Mar 12;8(1):29.
- 542 35. University of Alberta. Comprehensive Institutional Plan 2015-2018 [Internet]. 2015. Available from:
543 [https://concordia.ab.ca/wp-content/uploads/2017/03/2015-2018-Comprehensive-Institutional-](https://concordia.ab.ca/wp-content/uploads/2017/03/2015-2018-Comprehensive-Institutional-Plan.pdf?x42547)
544 [Plan.pdf?x42547](https://concordia.ab.ca/wp-content/uploads/2017/03/2015-2018-Comprehensive-Institutional-Plan.pdf?x42547)
- 545 36. University of Calgary. 2012 Strategic Research Plan [Internet]. 2012. Available from:
546 <https://www.ucalgary.ca/research/files/research/strategicresearchplan2012.pdf>
- 547 37. Maritime SPOR SUPPORT unit. MSSU Trainee Support Program [Internet]. 2022. Available from:
548 <https://mssu.ca/get-support/mssu-student-awards/>
- 549 38. Bird M, McGillion M, Chambers EM, Dix J, Fajardo CJ, Gilmour M, et al. A generative co-design
550 framework for healthcare innovation: development and application of an end-user engagement
551 framework. *Research Involvement and Engagement*. 2021 Mar 1;7(1):12.

- 552 39. Kerkhoff AD, Farrand E, Marquez C, Cattamanchi A, Handley MA. Addressing health disparities
553 through implementation science—a need to integrate an equity lens from the outset.
554 Implementation Science. 2022 Jan 31;17(1):13.
- 555 40. Hoekstra F, Mrklas KJ, Sibley KM, Nguyen T, Vis-Dunbar M, Neilson CJ, et al. A review protocol on
556 research partnerships: a Coordinated Multicenter Team approach. Systematic Reviews. 2018 Nov
557 30;7(1):217.
- 558
- 559

Table 3.0: Inclusion criteria template and associated inclusion definitions

Population [Graduate students/trainees]	<p>Documents must include:</p> <p>a. Acknowledgement that the document can be used by “trainees” including graduate students or postdoctoral researcher trainees</p> <p>b. Can include documents that note the resource is for “researchers” if there is a definition including trainees defined in that title</p>
Concept [a Guide for graduate students/trainees to engage in IKT research]	<p>Type of “documents” to include:</p> <p>a. The document must provide guidance specific to trainees in engaging in an IKT approach [or any other collaborative research approach] to research</p> <p>b. Documents can be in any format such as (i) a paper; (ii) a resource; (iii) a guideline, if the source is providing a guide</p> <p>c. Guide is defined as providing steps, knowledge, or instruction on how to engage in an IKT approach to research</p>
Context [Health Research Program]	Document must be designed for supporting IKT in a health research program