The Determinants of Implementation Behavior Questionnaire in multiprofessional rehabilitation context (DIBQ-mp): A mixed methods tailoring study with Finnish cross-cultural adaptation

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Abstract

Background: The Determinants of Implementation Behavior Questionnaire (DIBQ) identifies factors that are facilitators of or barriers to professionals’ change of behavior after evidence-based training. The original English DIBQ consists of 93 items covering 18 domains. The DIBQ is built upon the Theoretical Domains Framework and the Behavioral Change Wheel. The purpose of the study is to tailor the DIBQ to the multiprofessional rehabilitation context as well as cross-culturally adapt it to the Finnish context.

Methods: Cross-cultural translation followed by a two round, Delphi method involving experts in rehabilitation with diversity of professions (physicians, physiotherapists, occupational therapists, psychologists, nursing scientists, social scientists and health care policymakers) was conducted, 25 experts participated in Round 1, and 21 in Round 2. Participants evaluated the importance of each DIBQ item in changing professionals’ implementation behavior. Consensus to include items was defined as a mean score of ≥4 on a Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, 5 = Strongly Agree) by ≥75% of Delphi participants. Items rated at agreement of ≤74% were either excluded or reviewed depending on qualitative judgements. The relevance of each item was indexed using content validity index (CVI). A second-round survey followed the same process. Comparison with tailored versions of Danish and Swedish (DIBQ-t) was also performed before reaching the consensus of the results.

Results: The final validated multiprofessional DIBQ (DIBQ-mp) consists of 23 questions. Twenty-nine percent (n = 27) of the Round 1 questions did not reach acceptable agreement. Second-round survey was developed based on the results of the first round. In all, 4% (n=2) of the Round 2 questions did not reach acceptable agreement. Agreement was achieved on all items after Round 2 in comparison with DIBQ-t, and the Delphi process was concluded. The final DIBQ-mp has evidence of excellent content validity with 0.93 average item-level CVI.

Conclusions: The study resulted in the Determinants of Implementation Behavior Questionnaire tailored to the multiprofessional rehabilitation context as well as a Finnish cross-culturally adapted version.

Background

In many fields of health care, there is a gap between what has been proven to be effective and what is practiced (1–7). Closing this gap through the successful implementation of evidence-based practices is dependent on changing the behavior of health care professionals (6, 8). Implementation research aims to generate knowledge of strategies helping to narrow the gap between evidence and practice and understand key factors associated with changing professionals’ implementation behavior (6, 9–13). This can be even more complex in the multiprofessional rehabilitation context where different health care disciplines work together in service delivery (14, 15).

The Theoretical Domains Framework (TDF) was initially developed for implementation research to identify influences on professional behavior related to implementation of evidence-based recommendations. TDF is an integrative framework synthesizing 33 theories of behavior and behavior change sorted originally into 14 domains with 4 additional domains later being added (16–19). According to the TDF, implementation barriers and facilitators may relate to characteristics of the innovation (e.g. compatibility, complexity), social setting (e.g. norms, support), the individual professionals (e.g. skills, attitudes), health care organization (e.g. capacity, resources), innovations strategies (e.g. training, reimbursement), patients or participants in treatment and rehabilitation (e.g. attitudes, compliance) - or health care system and society per se (6, 10, 20–26).

The Behaviour Change Wheel (BCW) is another framework used to inform the development of implementation strategies. It integrates the TDF and behavior change techniques (17) in characterising and designing behavior change
intervention functions targeted at a central behavioural target. At the centre of the BCW is the Capability - Opportunity - Motivation - Behaviour (COM-B) model (19) which describes change in a central source of behaviour.

The Determinants of Implementation Behavior Questionnaire (DIBQ) has been developed on the basis of TDF, also linking to the Behaviour Change Wheel framework (16, 18, 27). The questionnaire quantifies the role of TDF thematic areas in the implementation process, so that researchers can identify the most relevant factors influencing behavior change for the goals and target group of the research and implementation situation (28). The DIBQ was initially developed for evaluating physiotherapists’ implementation behavior in physical activity interventions. The original DIBQ is extensive and consists of 93 items, but it has been shown that it can be feasibly shortened and tailored to different research context (29).

Study Objectives

The purpose of the study is to tailor the Determinants of Implementation Behavior Questionnaire to the multiprofessional rehabilitation context and to cross-culturally adapt it to the Finnish. The multiprofessional version of the questionnaire, DIBQ-mp, is intended to be used to support the implementation of evidence-based interventions and procedures.

Methods

Design

This study applies a mixed-method design in two phases. Translation of the original English DIBQ and cross-cultural adaptation to Finnish (phase 1); and it’s tailoring through content validity assessment and adaptation as well as qualitative written judgements of items by an expert group into a multiprofessional rehabilitation context version of the DIBQ (DIBQ-mp) (phase 2).

The translation process was performed according to the stages 1–4 described in Beaton et al. (2000) protocol (30) and followed by Delphi procedure (31–34) as described in Fig. 1.

Phase 1. Translation of the English version and cross-cultural adaptation to Finnish


In this study, the term cross-cultural adaptation is used in the sense given by Beaton et al. (2000), i.e. “a process which looks at both language (translation) and cultural adaptation issues in the process of preparing a questionnaire for use in another setting” (30).

Stage I: Three forward translations were made of the instrument from English to Finnish to minimize variance in results due to language differences. Translations were done simultaneously and independently by two informed native Finnish (MP, JK) and one uninformed translator (HR) who was uninformed of the concepts being addressed. The translations were compared, and poorer wording choices were identified and resolved in a discussion between translators. Discrepancies and problematic issues were noted.
Stage II: Synthesis of the translations was done based on the original questionnaire resulting in one common translation. The synthesis was accomplished in a teleconference meeting with the three translators (MP, HR, JK) and two health care professionals (TS, RN) with academic knowledge and experience in translation of instruments. All issues were discussed and resolved by consensus.

Stage III: Back translation was performed for maximising the attainment of equivalence in different areas between the adapted instrument and its original version (30). Back translation was done by a professional translator (MF) who was not aware of the concepts explored and without medical background but who had a long career as a linguist and translator in health science research.

Stage IV: Expert Committee Consolidation of pre-final version for testing and Delphi procedure was performed by the multidisciplinary review committee composed of all translators and two health professionals. They commented the readability of the translated questionnaire, wording, phrasing and understandability. Decisions were made to achieve equivalence between the versions in semantic, idiomatic, experimental, and conceptual equivalence. Full written documentation was made of the issues and rationale for coming to decision about them.

Phase 2 – Delphi procedure

Research question, design and rationale for Delphi approach

The Delphi method was utilised to collect the judgments of experts in a group decision making setting to gain understanding of the items and for identification of critical factors to obtain a shorter version of the DIBQ. The research questions in the following Delphi process were "which factors are the most critical in multiprofessional rehabilitation implementation and which DIBQ domains and questions cannot be left out of the shorter version of the questionnaire?". The study was conducted following the principles of classical Delphi (35). Both qualitative and quantitative methods were used in the Delphi process. The Delphi process consisted of two iterative rounds of ratings using an online survey.

Recruitment and inclusion criteria

Research Sample

A minimum panel of 15–20 experts is recommended to ensure sufficient contributions in a Delphi study (36). Taking account of the commonly high drop-out rate in Delphi studies, for the purpose of this study the recruitment target for Round 1 was set at 30 participants. This number would allow the diversity in views while accounting for expected attrition rate.

A purposive sampling strategy was used to recruit a panel of experts from the authors’ networks covering all health care districts, private and public sector and research and education networks in universities of Finland. The following eligibility criteria and requirements for expertise for Delphi participants were used: 1) knowledge and experience with multiprofessional rehabilitation and/or evidence-based health care research implementation in the Finnish health care system; 2) capacity and willingness to participate; 3) sufficient time to participate in the Delphi (31). Research team identified an initial group of experts with a good geographical coverage and multiprofessional diversity (including specialists in rehabilitation medicine, occupational health care, general medicine, psychology, physiotherapy, nursing sciences occupational therapy and social sciences), and the "snowball" sampling technique was used to generate subsequent participants (37).

Delphi Pre-tests: Prior to administration, pre-tests were conducted two times with the goal of testing and adjusting the Delphi questionnaire to improve comprehension, and to work out procedural problems. The Delphi pre-test was also important regarding the scope of the estimated time it takes a research participant to fully respond to the Delphi survey.
In the first pre-test the research team answered the questionnaire. After adjustments, the pre-test was repeated with the research team and an expert (LA-M) who had not taken part in the development process. The survey and the cover letter were revised as a result of the pre-test.

The recruitment strategy used email invitations containing a short description of the study, participation requirements, expectations of the participants, a request for referral for additional participants and a link to the online survey. This study included no patients, but only non-identifiable health care professionals with voluntary participation.

Data Collection

The Delphi study was conducted online over a three-month period to provide sufficient time to gather data, aggregate group responses, and to build surveys step-wise as data were collected and analyzed. The surveys were developed and designed using Webropol, an online survey platform. A link to each survey was distributed via email to all participants with subsequent follow-up emails as necessary. Data collection took place in the period of April to June 2021: 1st round 27.4–8.5.2021; 2nd round 2.6–11.6.2021.

Delphi Round 1 Design

The initial broad question of the Delphi questionnaire was: Evaluate the importance of each item as a facilitator of or a barrier to changing professionals’ implementation behavior? The survey was comprised of 5-point Likert scale questions with comments and free-text sections. The purpose of this round was to invite participants to: 1) rate the importance of the content and structure of each DIBQ item; 2) recommend items to be included or excluded from the multiprofessional DIBQ (DIBQ-mp); and 3) to comment on the comprehensibility of the questionnaire. The descriptive comments were obtained within each domain: “Are the items regarding [the domain] understandable and clear? If no, would you comment briefly. Here you can also write your other comments about the items”. The DIBQ items were modified and refined based on the ratings and qualitative data. The first-round survey also collected the following demographic information: age; gender; education; educational level; primary role; years of experience; and field of expertise.

Delphi Round 2 Design

The second survey was designed to 1) determine agreement on items revised based on results of Round 1; and 2) determine preliminary agreement of the new items generated in Round 1; 3) elicit further comments and feedback. The participants were asked again to rate the questions using a 5-point Likert scale and use the free text sections to state the reasoning for their rating or provide additional comments. Participants were also asked again to comment the comprehensibility of the items. All domains provided the opportunity to provide comments or feedback. The participants were informed of the results of the round one Delphi, and they had an opportunity to clarify their views. Participants received a summary of the results including items, which reached or did not reach agreement.

Comparison with DIBQ-t

The results of the Delphi were compared with DIBQ-t tailored versions of Danish and Swedish before reaching the consensus and synthesis of the results (29). A comparison to previous tailored versions was done for benchmarking and comparison of the items chosen, reflecting on differences between the two versions, identifying the items that overlap in content and reflecting the DIBQ-t developers’ (BÖ, AA) experiences of the use of the questionnaire. DIBQ-mp version was developed for the multiprofessional rehabilitation context whereas DIBQ-t had focus on low back pain management.

Date Analysis
Quantitative

Descriptive statistics for each question were reported for Round 1 and Round 2 results.

Participants rated and commented on the importance of each DIBQ item as a facilitator of or a barrier to changing professionals’ implementation behavior. Consensus to include items was defined as a mean score of \( \geq 4 \) on a Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, 5 = Strongly Agree) by at least 75% of Delphi participants. Delphi questions with a group level of agreement of 75% or higher were included and 74% or lower were either excluded or reviewed depending on qualitative judgements. A second-round survey followed the same process as the first round. Results were tabulated at the completion of each round and entered into an Excel spreadsheet. Participants received the summary Round 1 results and were free to review and reflect on these results as they submit their responses and feedback in Round 2. The relevance of each item scored by experts was indexed using content validity index (CVI). An item was considered ‘relevant’ when scoring an item-level CVI (I-CVI) of 0.78 or more (38). The results of the Delphi were compared with DIBQ-t to reach the consensus and synthesis of the results.

Qualitative

The data from survey comments and free-text sections were analysed by using thematic analysis for identifying, analysing, and reporting patterns (themes) within domains (39). Initially the participants’ statements were read and re-read to gain familiarity. Subsequently, data-based phrases and sentences were coded inductively and organized into themes using qualitative data analysis program MAXQDA 2020 Analytics Pro. Then themes were reviewed in relation to coded sections and themes were refined (39). In order to draw conclusions, the data was quantified. Analysis was used to guide the modifications and to support the considerations of the importance and suitability of the questions for the multiprofessional context. An item could be included even it was quantitatively rated below threshold if qualitative assessment captured something important in relation to the overall research question (39, 40).

Results

Phase 1 - Translation of the English version and cross-cultural adaptation to Finnish

The Finnish translation of the DIBQ is presented in Appendix 1.

The multiprofessional rehabilitation context was considered from the beginning of the process. Therefore, the items relating to “physiotherapist” and “physical activity intervention” in the original DIBQ were modified to relate to “health care professional” and “X intervention/procedure”.

Phase 2 - Delphi procedure to identify factors of importance in multiprofessional rehabilitation program implementation

Participant characteristics

In all, 111 survey links were sent via email. Of the invited persons, 25 experts (22.5%) participated in the Round 1 survey. The characteristics of participants are shown in Table 1. Professions included physicians (specialized in rehabilitation medicine, occupational medicine and general medicine), physiotherapists (specialized in orthopaedic manual therapy, musculoskeletal physiotherapy and chronic pain), occupational therapists, psychologists, psychotherapists, social psychologists, educationists, health scientists, nursing scientists and social scientists.

The majority of participants were women (52%), aged from 51 to 60 years (32%). Most participants (64%) had a doctoral level of education or higher in medical sciences (44%) and expertism, for example, in fields of research and development of rehabilitation (48%); and education and training (48%) (Table 1). Majority of participants had 11 to 15
years of experience in clinical work (40%) and 16 to 20 years in academic work (32%). (Fig. 2). All experts use English regularly both spoken and written.

Round 1

In Round 1, participants reached agreement for 66 of the 93 content questions: 21 items reached consensus to include, and 45 items were excluded because of low ratings or qualitative assessments. The domains which reached agreement to include concerned ‘Knowledge’, ‘Skills’, ‘Intentions’, and ‘Innovation’. The domains which reached agreement to exclude were ‘Social/professional role and identity’, ‘Optimism’, and ‘Goals’. Mean scores ranged from 2.4 to 4.6, with the standard deviation ranging from 0.51 to 1.22. Table 2 provides the results for Round 1.

Amendments as a result of Round 1. 48 changes were made to the questionnaire based on the responses received in Round 1. Changes applied to wordings (n = 27), missing item from Round 1 (n = 1) and addition (n = 20) of new items. These changes were reported in a table of substantive changes made to the questionnaire and a refined version.

Thematic analysis of the recommendations and feedback provided in the Round 1 survey identified three key themes that describe the content of the statements. The total number of coded statements was 303. The statements were classified into three key themes: 1) ‘modifying’ (n = 67) that included recommendations to modify the content of an existing item or the content of the domain with a new item, 2) ‘supportive’ that included statements encouraging the use of an item or domain (n = 36) and 3) ‘critical’ (n = 200) including statements reflecting of how the items are worded, presented and understood and statements suggesting to exclude the item or domain (Fig. 3). Themes were conceptualized based on the data, based on the research question, and iteratively developed from the coding.

The results of thematic analysis are presented in the Supplementary file 1. Individual quotations were chosen as an example of most informative statements to describe the theme and understanding of the phenomenon in question. The distribution of the Delphi panel statements in each domain are presented in Fig. 4.

Key revisions and summary of most valuable statements from multiprofessional perspective identified in the Round 1 survey (Table 3, Table 4 and Supplementary file 1):

In the domain ‘Knowledge’ seven statements from Delphi participants were received. A Delphi member commented that information concerning the quality of the guideline in question is needed to understand the results when interpreting answers. All other statements criticized the word choices and overlapping of the questions. The quotations of the most informative statements can be found in Supplementary file 1. For example, a Delphi member statement that was classified to theme ‘critical’: ‘D1.1. does not take into account the fact that interventions are often produced in a multidisciplinary collaboration. The form of the question gives the impression that it can be done alone. In the case of single intervention, the question is a good one. The following three questions thus overlap so that one of them is sufficient to support it.” (Participant 16/P16)

In the domain ‘Skills’ eight statements were received. One new question was suggested by a panellist for the domain. Delphi participants considered whether the items are too general, not allowing identification of specific skills. Participants stated that the nature of the recommendation to be implemented is likely to affect the respondents: whether the recommendation addresses a singular procedure or a major policy change. The emphasis of a guideline recommendation to action was found dependent on the type of health care intervention in question and the nature and accuracy of the guideline.

In the domain ‘Social/professional role and identity’, 14 statements were received. A Delphi participant brought up a need to differentiate ethical and obligation perspectives and recommended three new questions to be formulated for the
domain. The suggested questions can be found in Table 3 and Supplementary file 1.

In the domain ´Beliefs about capabilities´ in total 24 statements were received from the experts. An example of ´critical´ statement that produced a new item suggestion for the domain: "D4.2 suggests that it would be possible for one person to be able to implement the intervention as intended, even if the others did not act in accordance with the objectives of the intervention. This is often impossible? Especially in the case of an intervention to be carried out in a multiprofessional collaboration. Perhaps the flaw is in the wording: "I am confident that I can deliver... following the guidelines even when other professionals with whom I deliver... do not do this". Another thing is to say that "I can follow the guidelines of the intervention in my own activities, even if others do not ...". It is a completely different matter from claiming that one alone would be able to implement an intervention properly while others act in a non-recommended way." (P25). In addition, the panellists required for more specific description on what the training program, the evaluation and referring professional relates to. To address these problems, three questions in the domain ´Beliefs about capabilities´ were refined. Seven new questions were formulated for this domain by the Delphi participants.

In the domain ´Optimism´ in total 10 statements were received. The panellists considered the items in the domain should assess attitude to life in general, not as a health care professional or at work. Delphi panellists suggested using a validated optimism scale.

In the domain ´Beliefs about consequences´ 24 statements were received. The item 6.2 was missing in the analysis due to data processing issue. Missing item was transferred to Round 2. Expert panel identified that the questions in the domain are very important but the perspective of the believed benefits should be clarified: for example, personal or client benefit. Delphi members argued that outcome expectancies were not extensive enough concerning beliefs about results, effects, and patient’s recovery. These were found to be important factors of meaningfulness of the work impacting the implementation success. Some critical statements considered the wording of item 6.5 suggesting that there are several interventions that are known to the respondent who is evaluating the differences between the interventions. Original item 6.9 includes that intervention helps participants to be more physically active. "Strange emphasis on physical activity. After all, there are many types of interventions, not all of them are "physical". For example, rehabilitation is a learning process." (P25) The item was refined for round 2 to cover activities in daily living. To address the issues with comprehensibility and coverage of the domain, 11 items were refined and reviewed.

In the domain ´Intentions´ eight statements were received. One Delphi member commented that the formulation of the items does not support the continuous use of the intervention. "The questions are formulated as if assuming that the intervention is a one-time operation that is performed and can then be considered performed (such as surgery of a single patient). I guess the intention should be for a professional to take intervention in a tool that is used constantly and repeatedly with several different clients." (P16) The feedback was discussed, and the translation of the item 7.3 was refined.

In the domain ´Goals´ in total six statements were received. The criticism considered the varying situations: "This depends too much on the unit and the job / workstation / shift." (P11).

In the domain ´Innovation´ the Delphi members gave in total three statements. Delphi members pointed out that interventions are very different: They can be working procedures that replace the previous ones: "The intervention takes up a lot of time but can still save time - or can be delivered with same time as previous methods." (P16).

Ten statements were received in the domain ´Socio-political context´. The expert panel stated that all statements should be clarified and the whole domain required further development and more detailed structuring to fit into the Nordic welfare model. To address the feedback received, the items 10.1 and 10.2 were refined for Round 2.
In the domain ‘Organization’ five statements were received from the Delphi participants. In general, Delphi participants valued the domain ‘Organization’ as very important in their statements. One Delphi participant commented that the domain is limited to paid work model. Item 11.4 was refined for Round 2 to address the feedback on the translation.

In the domain ‘Patient/Client’ four statements of Delphi panellists were received. The word “Client” was added to the title of the domain for better fit for multiprofessional purpose. Multiple respondents stated that it is necessary to specify the item 12.1. An example of statement classified into theme ‘modifying’: “Motivation questions should always be linked to what the participant should be motivated about.” (P17) Furthermore, motivation was seen to relate more to the situation being addressed than to the means used. Even though motivation of the participants was valued as an important facilitator, the question was seen potentially misleading. One Delphi participant also commented that patients/clients are not a homogeneous group. To address the feedback, the item 12.1 was refined and formulated for round 2.

In the domain ‘Innovation strategy’ in total of nine statements were received from the experts. A Delphi member underlined, that the capacity building strategies include more than training, for example mentoring, sparring, peer support and education. The issue with financial reimbursements was seen difficult for public sector where separate compensation is not calculated based on output. In turn, with regard of direct access-to-physiotherapist the economic incentives are known as important facilitators and use the item is therefore justified and current in that context. Some Delphi members had difficulties to understand the items in the domain ‘Innovation strategy’. For example, a request to clarify whether the evaluation considers an individual client, or the results of the whole intervention was demanded. Three items in the domain were refined because of lack of comprehensiveness for multiprofessional use (Finnish translation).

In the domain ‘Social influences’ in total ten statements were received. A statement that was classified to theme ‘supportive’ highlighted: “I think the important others are in this case the work community and colleagues (other professional with same occupation). Do colleagues see me as a pioneer? Is professional status rising?” (P24) Most of the critique focused on the word choices of the translation or the original design of the questions. To address the critique, one item was refined for Round 2.

The importance of the domain ‘Positive emotions’ divided opinions in the expert panel. Delphi members saw positive emotions to reflect success and being a professional in their area of comfort while working. Critical statements considered the relevance of professionals’ own emotions in delivering interventions. Two new questions were formulated to the domain for Round 2.

The domain ‘Negative emotions’ were seen important when reflecting fear of failure, lack of appreciation and experience of current competence not valued. Two new questions were suggested for the domain by the expert panel.

In total nine statements were received in the domain ‘Behavioral regulation’. Supportive statements regarded the importance of the domain. Two Delphi participants commented that it is not clear in the action planning who is responsible for the implementation plan: “Either: "I have a clear plan" (I support it) or "I am given a clear model, I follow". In other words, is the existence of a plan or a model of operation measured here? And whose plan or operating model?” (P24) Suggestions to clarify the questions were discussed and word choices of two items were refined for Round 2.

In the domain ‘Nature of the behaviors’ in total ten statement were received. Most of the criticism considered the word choices. The word ‘automatically’ was suggested to be replaced with ‘naturally’ expressing that the new practice has become a natural part of the work. Two items were refined for Round 2, one of which concerned the translation.

The suitability and expected usability after Round 1
The suitability and expected usability for the Finnish health care context was evaluated by the panellists after each round from the perspective of their own field of expertise. In the end of Round 1, 68% (n = 17) expected the questionnaire to be ‘suitable’ for Finnish environment, 4% (n = 1) ‘not suitable’ and 28% (n = 7) could not yet say. Delphi experts were also asked to rate their assessment of the suitability and usability of the questionnaire from the perspective of their own field of expertise. The Delphi experts that rated the questionnaire not suitable for the Finnish context commented on the length, the balance of the domains in the DIBQ and the questionnaire being not equally suitable for all occupational groups. The question categories were found to be useful in different situations, in which it is possible to choose the most appropriate questions for the purpose.

Round 2

For Round 2, 84% of Round 1 participants completed the survey (n = 21). The 48 amendments to the questionnaire were represented in 48 survey questions which were evaluated by the participants. Four items reached consensus to be included in the Round 2 survey, 42 questions were excluded, and 2 items did not reach consensus. Mean scores ranged from 2.9 to 4.6, with the standard deviation ranging from 0.49 to 1.22. Table 3 provides the results of Round 2. Table 4 provides all items of the original DIBQ tailored to multiprofessional rehabilitation context.

Synthesis and consensus of the results

Agreement of the items included in the shorter multiprofessional version of DIBQ, DIBQ-mp was achieved after Round 2 and comparison with DIBQ-t, and the Delphi process was concluded. Figure 5. illustrates the Delphi Process Summary.

The final DIBQ-mp covers 11 out of 18 TDF domains: ‘Knowledge’, ‘Skills’, ‘Beliefs about Capabilities’, ‘Beliefs about Consequences’, ‘Intentions’, ‘Innovation’, ‘Organisation’, ‘Client/Participant/Patient’, ‘Innovation strategy’, ‘Social influences’ and ‘Behavioral regulation’. Two new questions were included in the DIBQ-mp based on Delphi panel consensus: 1) “I believe that I am doing relevant work in delivering [X intervention/procedure]” and 2) “I believe that [X intervention/procedure] is achieving the targeted results”. The new items were placed in the domain ‘Beliefs about consequences’. Table 5. demonstrates the final multiprofessional DIBQ, DIBQ-mp. Appendix 2. provides the Finnish version of the final DIBQ-mp.

In the content validity assessment, all 23 of the DIBQ-mp items were indexed with CVI ≥ 0.78 (Table 5). The final DIBQ-mp has evidence of excellent content validity with 0.93 average I-CVI (38).

The suitability and expected usability after Round 2

The suitability and expected usability for the Finnish rehabilitation context was evaluated by the panellists in the end of Round 2. 76% (n = 16) expected the questionnaire to be ‘suitable’ for Finnish environment and 24% (n = 5) could not yet say. Delphi experts were also asked to rate their assessment of the suitability and usability of the survey from the perspective of their own field of expertise. Responses included:

“The questionnaire can be used to design, adjust and provide the right kind of training for professionals, and supervisors will also be informed about their own role in the success of the implementation.” (P13).

“The questionnaire would reveal the views of the professional delivering the intervention as well as it can explain the results of the intervention or whether it is not taking place actually in practice.” (P2)

“It could serve as a tool, for example, to improve the quality of teaching and clinical work.” (P6).

“The questionnaire will definitely help in planning the implementation and monitoring the implementation.” (P4)
“The categories are diverse, and it is possible to choose items for use in different situations, depending on whether you are starting the implementation by pointing out a contradiction in current practice or by clarifying issues related to the implementation problems.” (P20)

“This is a good universal questionnaire for evaluation of the implementation. If particularly interested in some aspect of the coreset, such as emotions or organizational support, you may add questions related to this topic to the questionnaire.” (P25)

Discussion

The aim of this study was to tailor the Determinants of Implementation Behavior Questionnaire to the multiprofessional rehabilitation context and to cross-culturally adapt it to the Finnish. The final validated multiprofessional DIBQ (DIBQ-mp) covers 11 out of 18 TDF domains: ´Knowledge´, ´Skills´, ´Beliefs about Capabilities´, ´Beliefs about Consequences´, ´Intentions´, ´Innovation´, ´Organisation´, ´Client/Participant/Patient´, ´Innovation strategy´, ´Social influences´ and ´Behavioral regulation´. The DIBQ-mp consists of 23 items; 21 are original questions and two new questions suggested by Delphi experts.

The process of translation of DIBQ involved cross-cultural translation process followed by Delphi procedure, which provided expert opinions on the comprehensiveness of the questionnaire. The cross-cultural translation included a backward translation by one professional translator. Beaton protocol considers a minimum use of two professional translators to assure consistent translation (30). However, there is controversy of the need and value of backward translation (41, 42). It has been proposed that the inclusion of an expert panel improves the quality of the instrument, especially the face validity and content validity (43). In addition, the qualitative assessment can maximise the attainment of semantic, idiomatic, experiential and conceptual equivalence (44, 45).

Tailoring of the DIBQ into the DIBQ-mp

The purpose of the Round one Delphi was to generate a list of DIBQ questions that experts´ valued as important in changing professionals´ implementation behavior and the purpose of the Round two was to condense the list. However, Delphi panellists suggested multiple new items in Round 1 for inclusion. Delphi participants raised up relevant themes missing from the original DIBQ questionnaire: 1) support of multiprofessional work in rehabilitation; 2) Beliefs about outcome-expectancies and meaningfulness of the work; 3) Patient perspective: expectations, values, satisfaction, recovery; 4) Whether the intervention fits to professional´s own values; 5) Perspective of continuous learning, learning organization and special features related to adult learning; 6) Compatibility from the client's point of view; and 7) Estimation of the professional´s own degree of commitment: the question of willingness to embrace, willingness to apply, and ability to monitor the implementation. From these themes, two new questions were prioritised to add value in terms of beliefs about outcome-expectancies and meaningfulness of work.

One aspect that was not raised by delphi panellists was what DIBQ items captures barriers and facilitators from a health care/societal economic point of view may be of importance to retain in the DIBQ-mp. For example, items (6.1, 6.2, 6.5) regarding beliefs about consequences, (9.3) regarding innovation, (10.2) regarding social-political context, (13.6) regarding innovation strategy capture certain economical aspects. However, the delphi group prioritized item 6.1 asking if the delivering [X intervention/procedure] following the guidelines is “useful”. This could be interpreted as capturing aspects of cost-utility from the professional perspective. For more robust coverage of cost utility from a health care and societal perspective researchers would need to include additional items to the DIBQ-mp for their specific research purpose.
In all, the focus of the research was directed by the opinions of the Delphi participants. Therefore, the results of the study reflect the consensus opinion. The Delphi study objective was to present the results as a core set of items important in multiprofessional rehabilitation implementation. As all the DIBQ items are tailored to multiprofessional rehabilitation context (Table 4), certain domains or individual items can be added to the DIBQ-mp according to singular research purpose.

Findings in relation to other studies

The objective of a health care clinical intervention trial is often to determine the effectiveness in real-life circumstances (46). However, implementations of the interventions and procedures in ordinary care of patients are not studied often enough, or only patient-reported outcomes or economic effects are examined. Therefore, it is important to have a tool for assessing facilitators of and barriers to professional’s behavior regarding implementation of theory-based interventions or procedures.

An improved understanding of the links between behavioral change theories and the processes through which the behavior change occurs can facilitate the development and implementation of effective interventions and improve the ability to explain how they bring about change (47–49). Kwasnicka et al. (2016) identified in a systematic review five key theories relevant to maintenance of behavior change: 1) Maintenance motives: People tend to maintain their behavior if they have at least one sustained maintenance motive, i.e., they are satisfied with behavioral outcomes, they enjoy engaging in the behavior, or behavior is congruent with their identity, beliefs and values, 2) Self-regulation: if they can monitor and regulate the newly adopted behavior and have effective strategies to overcome barriers to the new behavior, 3) Resources: if their mental and physical resources are sufficient, 4) Habit: People tend to maintain behaviors, which have become habitual and are supported by automatic responses to relevant cues, 5) Environmental and social influences: A supportive social environment is important for behavior change maintenance (50).

Implementation evaluation requires different types of information at different stages of the implementation process. For example, barriers and facilitators to implementation can differ in the initial stages of implementation compared to sustainability stages of implementation. The authors are not aware of other tools that are intended to be used for the research on implementation of multiprofessional rehabilitation interventions. The previous studies have applied the tailored version of DIBQ in evaluating the expectations of the implementation process (51, 52). In the Swedish study, facilitating role of most domains of DIBQ-t was reported (52). A Danish study investigated clinician-level factors related to implementing evidence-based care for LBP patients in primary care using DIBQ-t and qualitative assessments. Personal gain, practicalities, buying-in on the program, and clinicians’ attitudes toward the program were found important for implementation. Qualitative data was valuable in understanding why competence of knowledge and skills were reported both by clinicians that implemented and by those that did not implement the intervention after evidence-based training. The study indicated that training alone is insufficient for implementation (51).

Implementing and changing behavior in a multiprofessional operating environment can be even more challenging. The research on multiprofessional co-work or interprofessional collaboration is still developing (53, 54). The factors that facilitate multiprofessional collaboration are often specifically related to the operating environment (organizational and processual aspects) and relational and contextual factors of multiprofessionalism (15).

A recent Cochrane review suggests that mixed-methods studies with longer acclimatisation period before evaluation of newly implemented teamwork interventions, and longer follow-up, are needed when implementing interventions that require multiprofessional collaboration (14). For this, valid and reliable measurements are necessary. A scale has been developed to measure multiprofessional (nurse-physician) collaboration (55) but there are limitations with the validity, reliability, and the extent the measurement can be used with different professional groups.
Implications for policy and practice

DIBQ-mp can be used in examining the factors that facilitate or hinder behavior change after evidence-based training. The specific name of the training, intervention, model, or procedure is replaced for [X intervention /procedure] within each item. The questionnaire can address the issues professionals encounter with implementing the new model to clinical work. The DIBQ-mp is a shorter version, as intended, of DIBQ with 23 items. Expert statements denoted that a questionnaire aimed for health care professionals should be kept short: A long questionnaire is more difficult to use for the evaluation of interventions/procedures and for scientific research.

The DIBQ-mp would seem most suitable when theory-based education interventions are conducted. Moreover, DIBQ-mp can identify factors of importance at individual, work community and organization level. The ‘Socio-political context’ domain was excluded from the shorter version of the questionnaire. The society context was seen critical to success by Delphi experts, but the important actors are context- and system-related. When information at society level is needed, items considering operational environment can be added to the questionnaire.

The DIBQ-mp can facilitate the implementation of theory-based practices and guidelines, and target the training and support based on needs assessed through the questionnaire. An interactive online tool The Theory and Techniques Tool (47–49) can be used for choosing matching behavior change techniques to support intervention designers, researchers and theorists in the development and evaluation of theory-based interventions.

Strengths and limitations

The study presents a new tool, a tailored questionnaire for multiprofessional rehabilitation implementation use. We used well-established methods in the cross-cultural adaptation and Delphi process. The strength of the Delphi method was that we were able to gather participants with different professions in rehabilitation from all parts of Finland. Good geographical coverage also provided diversity in Delphi experts accents and wordings in different parts of the country. DIBQ-mp has relatively high suitability for Finnish health care context. Also, the use of both quantifiable and qualitative measures, and especially, inclusion of a qualitative assessment can be regarded as a strength of the study. However, the gathering of Finnish multiprofessional experts for the Delphi process can be regarded as a limitation too as the generalizability of DIBQ-mp to other European countries, and globally, needs to be evaluated. However, the authors of the study included a multiprofessional group of researchers from Sweden and Finland.

There are no validated quality indicators for Delphi studies. A set of four criteria has been proposed as quality indicators (56). Quality score components include 1) Were criteria for participants reproducible? 2) Was the number of rounds to be performed stated? 3) Were criteria for dropping items clear? 4) Stopping criteria other than rounds specified? In this study, the criteria for participants produced the desired number of professionals with diversity of professions and experience in implementation or rehabilitation system. Four Delphi participants did not attend Round 2 with a drop-out rate of 16%, which is quite low. Number of rounds to be performed was noted instructions to Delphi participants. The criteria for dropping items were based on consensus. In Delphi studies the definition of consensus based on percentage can range from 50–97% and definition of consensus is not always provided (56). In this study, consensus was defined as a proportion within a range (unrestricted), i.e. items rated at group level of agreement of 75% or higher were included and 74% or lower were either excluded or reviewed and revised depending on qualitative judgements. The termination of the Delphi was based on priori definition to run two rounds.

One of the limitations of a priori specification of criteria for dropping items, is that items believed to be important may fall just below the threshold. If sufficient justification is provided, the authors can consider including these items a posteriori (56) In our study, three original items with ≤ 74% agreement (2.1; 4.6; 12.1) were included in the final DIBQ-mp.
Another limitation is that validation and reliability testing is not performed in this study. Further tests should be conducted on the psychometric properties of the adapted questionnaire. In practice it is not only a translated and cross-culturally adapted questionnaire, but a whole new version of DIBQ. Testing of its measurement properties and the item-level characteristics such as item-to-scale correlations and internal consistency; and the score-level characteristics of reliability, construct validity, and responsiveness is essential.

In future studies, it would be interesting study the use of DIBQ-mp questionnaire combined with interview data on professional education in different fields of health care and in multiprofessional rehabilitation implementation.

**Conclusion**

The tailoring of the DIBQ resulted in a shorter multiprofessional version of the questionnaire, DIBQ-mp, with 23 items to assess facilitating or hindering determinants of professionals’ implementation behavior, representing 11 of the initially 18 DIBQ domains. The DIBQ and DIBQ-mp have also been cross-culturally adapted for use in the Finnish context.

**Abbreviations**

List of abbreviations

COM-B

Capability - Opportunity - Motivation -Behaviour Model

CVI

Content Validity Index

DIBQ

Determinants of Implementation Behavior Questionnaire

DIBQ-mp

Multiprofessional version of Determinants of Implementation Behavior Questionnaire

DIBQ-t

Tailored version of Determinants of Implementation Behavior Questionnaire

TDF

Theoretical Domains Framework

**Declarations**

Ethics approval: Not applicable.

Consent to participate: Written consent from Delphi experts were collected.

Consent for publication: Not applicable.
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References


Tables

Table 1 to 5 are available in the Supplementary Files section.

Appendices

Appendices 1 and 2 are not available with this version.

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Cross-cultural adaptation and Delphi process
**Figure 2**

Years of experience of participants

**Figure 3**

Number of statements in the key themes identified in the thematic analysis
Figure 4

Distribution of the expert statements at domain-level
Figure 5
The Delphi Process Summary

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Supplementaryfile1.Resultofthematicanalysis.xlsx
- Table1.Participantcharacteristics.docx
- Table2ResultsforRound1.docx
- Table3ResultsforRound2.docx
- Table4.DeterminantsofImplementationBehaviorQuestionnairetailoredtomultiprofessionalrehabilitationcontext..docx
- Table5.TheFinalDIBQmp.docx