Tailoring the Determinants of Implementation Behaviour Questionnaire (DIBQ) to best-practice low back pain primary care program implementation: a mixed-methods validity-testing in Sweden and Denmark

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Abstract

Background: Best-practice low back pain (LBP) primary care programs have been developed based on evidence-based clinical guidelines and are implemented in Sweden and Denmark. The Theoretical Domains Framework and its linkage to The Behavioural Change Wheel has been utilised in the design of the implementation object and its implementation strategy. Based on the Theoretical Domains Framework domains, the Determinants of Implementation Behaviour Questionnaire (DIBQ) has been developed to evaluate implementation determinants but its feasibility and validity needs to be tested and adapted to study specific contexts while maintaining its linkage to the Behavioural Change Wheel. The aim of this study was to tailor the DIBQ for evaluation of the implementation processes for best-practice LBP primary care programs in Sweden and Denmark. More specifically, the objectives were to i) Translate the DIBQ into Swedish and Danish, ii) Adapt the DIBQ into DIBQ-tailored (DIBQ-t) to study content validity, iii) Test the DIBQ-t for feasibility and iv) Perform initial validity testing of DIBQ-t.

Methods: A mixed methods design with a four-step process was used. First, forward translation of the DIBQ, then adaptation into DIBQ-t using qualitative face validity assessed by the project group followed by quantitative content validity assessment by an expert group. Finally, primary care clinicians completed the DIBQ-t directly after participation in a 2-day educational course prior to the implementation of the program to determine feasibility and construct validity using confirmatory factor analyses.

Results: In total 598 clinicians out of 609 responded, with only 2% of the items missing. The final DIBQ-t included 28 items describing 10 of the original 18 TDF domains and was considered feasible. The confirmatory factor analyses showed good fit after removing items 4 and 13 with the lowest domain loading. The DIBQ-t maintained linkage to all domains of the Capability–Opportunity-Motivation-Behaviour model within the Behavioural Change Wheel. The clinicians´ expectations according to the DIBQ-t indicate facilitating determinants outweighing barriers at the initiation of implementation processes.

Conclusions: The study resulted in a tailored version of the DIBQ, DIBQ-t, which is feasible and valid for evaluating clinicians' expectations regarding implementation determinants of best-practice LBP primary care programs.

Background

Evidence-based guidelines provide recommendations for clinical practice and have been developed in several countries to assist clinicians in managing patients presenting with low back pain (LBP) [1–3]. However, there is often a mismatch between recommendations and clinical practice [4–6] because barriers at the level of stakeholders such as patients, providers, organisations and health care systems can complicate the implementation of guidelines [7–10]. Although clinicians consider evidence-based guidelines important, they may not adopt and adhere to them in routine practice for several reasons [11]. Some clinicians consider guidelines as a threat to professional autonomy and inconsistency with clinical

reasoning [12], or they may have beliefs and traditions that are not in line with the guideline recommendations [12, 13]. Therefore, they may choose to rely upon experience and well-established habits using an intuitive, experiential approach [12, 14]. In an effort to rectify these barriers of guideline implementation identified in previous literature, best-practice LBP primary care programs have been developed in Sweden and Denmark aiming to facilitate the adoption of guideline consistent care in the management of people seeking care for LBP [15, 16].

The Theoretical Domains Framework (TDF) [17] and the Behavioural Change Wheel [18] are useful when developing implementation strategies. The TDF is a comprehensive behaviour change framework based on 128 constructs from 33 psychological theories categorized into 18 domains considered relevant to behaviours and cognitions involved in evidence-based practice implementation [17, 19]. The TDF has also previously been linked to the Behavioural Change Wheel, which aids in interpreting how potential determinants of behavioural change could influence the effects of behavioural change interventions (i.e. the implementation strategy) on the central source of behaviour (i.e. use of a best- practice LBP primary care program) [20]. The Behavioural Change Wheel incorporates the Capability - Opportunity - Motivation - Behaviour (COM-B) model [21] to describe the central source of behavior (Fig. 1).

Figure 1.

The TDF has also been utilised in the development of a survey instrument, the Determinants of Implementation Behaviour Questionnaire (DIBQ) [17, 19, 22], which quantitatively evaluates the 18 TDF domains role in implementation processes through 93 items. From these domains, researchers can identify the most relevant ones in relation to the aims and target population of a specific research and implementation context. However, feasibility and validity of tailoring the DIBQ to a specific context, here best-practice low back pain primary care program implementation, needs to be tested while maintaining its linkage to the Behavioural Change Wheel.

Methods

The aim of this study was thus to tailor the DIBQ for valid and feasible evaluation of the clinician expectations regarding implementation processes of best-practice LBP primary care programs in Sweden and Denmark. More specifically, the objectives were to i) Translate the DIBQ into Swedish and Danish, ii) Adapt the version into DIBQ tailored (DIBQ-t) to study best-practice low back pain primary care program implementation for content validity, iii) Test the DIBQ-t for feasibility and iv) Perform initial validity testing of DIBQ-t.

Setting

The BetterBackJ model of care in Sweden [15] and the GLA:D® Back programme in Denmark [16] are best-practice programs for LBP in primary care. They have been developed in collaboration between researchers in the two countries to support the implementation of guideline consistent care. A comparable multifaceted implementation strategy, including a 2-days course with lectures, workshops

and access to the supporting material, were used in both countries to enable clinicians to deliver the programs to patients with LBP.

Design

This study applies a mixed-method design in 4 phases. Translation of the DIBQ (phase 1); content validity assessment by an expert group (phase 2); adaptation into DIBQ-t and determining feasibility (phase 3); construct validity of DIBQ-t (phase 4) (Figure 2). The GRRAS [23] checklist (see Additional file 1) was used to guide our reporting of the study.

Figure 2.

Phase 1 – Translation of Swedish and Danish version of DIBQ

The translation of DIBQ into Swedish and Danish was based upon the English version of the questionnaire [22]. The original English version consists of 93 items assessing 18 domains [24]: Knowledge, skills, social/professional role, beliefs about capability, beliefs about consequences, optimism, intentions, goals, innovation, socio-political context, organisation, patients, innovation strategy, social influences, positive emotions, negative emotions, behavioural regulation and nature of behaviour. The English version has good construct validity, and most domains show high internal consistency reliability and discriminant validity [22]. The translation process was performed using the guidelines by Beaton [25]. Two people knowledgeable in English/Danish and English/Swedish, one with a clinical background and one with a native or academic knowledge for each language translated from English into Danish and Swedish. The translated versions were discussed by the authors to obtain consensus on the correct wording of the questions in Swedish and Danish languages. Subsequently, these versions were commented upon by linguistic (Swedish and Danish) experts to improve the readability of the translated questionnaire. Instead of backward translation, a panel of experts in musculoskeletal health and implementation research were used in the final stage of selecting questions [26]. They commented on the translation, wording, phrasing, and understandability.

Phase 2 – Adaptation of the DIBQ into the DIBQ-tailored version and content validity assessment

The process of tailoring the translated DIBQ into DIBQ-t involved selection of the most relevant of the original 18 domains and 93 items based on their suitability for evaluation of the implementation of BetterBack and GLA:D Back. First, qualitative content validity was tested by members of the project team (IR, AA, BÖ, and PN) representing both countries, by selecting domains of the original DIBQ for the DIBQ-t. The project team, consisting of two males, two females, representing musculoskeletal and implementation research and also a clinical background, aimed to include a realistic number of items to achieve a high response rate [27] while simultaneously covering evaluation of the implementation process at an individual, social, organisational and contextual level. Second, quantitative content validity was tested by experts with a professional or methodological research background in the musculoskeletal and/or implementation fields (Table 1).

Table 1

The experts were asked to rate each item of the DIBQ on a 1-4 Likert scale from ‘not relevant’ to ‘very relevant’ regarding evaluation of the implementation process of the best-practice LBP primary care programs in Sweden and Denmark. The ratings of the experts were indexed using Content Validity Index (CVI) [28]. An item was considered ‘relevant’ when scoring a CVI of 0.80 or more, i.e. 80% or more of the experts rated the questions ‘relevant’ or ‘very relevant’. Inclusion of items in the DIBQ-t, was based upon three criteria: 1) Swedish and Danish project leaders selected the items related to domains relevant to the project, and experts rated the item with a CVI ≥0.80, or 2) an expert rated relevance score with a CVI = 1.00, regardless of the item being selected by the project leaders, and 3) the project leaders of each country added items included by the project team and with 80% CVI of either the Swedish or Danish experts to anticipate differences in contexts between the countries. The main differences in contexts were that Danish clinicians to a larger degree worked in private clinics and chose to self-fund their participation in the best-practice LBP primary care program. The Swedish clinicians worked in public clinics, and the decision to participate was made by their clinic managers and participation was mandatory and without costs for the participants. The project team considered it of importance that DIBQ-t content validity be relevant for both private and public health care system settings.

Phase 3 and 4 - Feasibility and Construct validity

All clinicians from public physiotherapy clinics in the Östergötland health care region in Sweden (n=110) involved in a Hybrid type 2 implementation-cluster randomised effectiveness trial (BetterBackJ ClinicalTrials.gov NCT03147300) [15] and clinicians from private primary care clinics (physiotherapists and chiropractors) in Denmark (n=488) involved in a Hybrid type 3 implementation-observational clinical intervention cohort (GLA:D Back) [16, 29] were asked to complete the DIBQ-t after a 2-day educational course. During the course, the clinicians were trained in delivering the programs to patients through lectures and workshops [15]. The items (statements about implementation) in DIBQ-t were scored on a 5-point Likert Scale anchored ‘strongly agree’, agree’, ‘neither agree nor disagree’, ‘disagree’, and ‘strongly disagree’ and for items 5-9 similarly anchored ‘very easy’, ‘easy’, ‘neither easy nor difficult’, ‘difficult’, and ‘very difficult’. Answers for the DIBQ-t were obtained directly after course participation, thereby representing the expectations of the implementation of the programs shortly after the clinicians had gained detailed theoretical knowledge about the content and execution of the program but had not yet delivered it in practice. Data were collected via a digital platform in Denmark (OPEN REDCap, Vanderbilt University) via a link to the questionnaire emailed to the participants within 24 hours after they had attended a course in 2018. In Sweden, the data was collected using paper-based questionnaires completed immediately upon finishing the course in the period 27th of March 2017 to 30th of January 2018.

Data analyses

Descriptive statistics were used to present qualitative content validity results by the project group, as well as the results of the quantitative content validity testing using CVI scores.

The joint data from the Swedish and Danish clinicians on the DIBQ-t was tested for feasibility, missing data, and construct validity, the latter using a confirmatory factor analysis. Domain and item-level data of the DIBQ-t were analysed as categorical data based upon the results of the 5-point Likert scale. The proportion of clinicians responding 'agree' or 'strongly agree' to each domain, as well as the results for the items in each domain is reported. Ratings of 'agree' or 'strongly agree' indicate that the domain is a facilitating determinant of implementation behaviour, whereas 'disagree' or 'strongly disagree' indicate that the domain is a hindering determinant of implementation behaviour. Data was analysed for missing data and reported descriptively with the proportion of missing data used to judge feasibility.

A confirmatory factor analysis [30] assessed the internal construct validity using the Laavan package in the R version 3.5.1. Cut off values according to current recommendations reported by Perry et al [31] were applied. Root mean square of approximation (RMSEA), root mean square residual (SRMR) (both with cut-off < 0.05), comparative fit index (CFI) and Tucker-Lewis Index (TLI) (both with cut-off score > 0.9) were used to evaluate the model-fit. Adequate estimates of loading of the items on the domains was defined at 0.4 or more [32].

Results

Phase 1 - Translation of DIBQ in Swedish and Danish

The Swedish and Danish versions of the DIBQ are presented in Appendix 1 and Appendix 2. There were no important disagreements between the translators. Experts' comments on the translation were incorporated into the questionnaire. Comments involved specific phrasing (questions 2, 18, 86) that could be misunderstood by respondents and concerned questions that were phrased as if the response options were 'yes/no' instead of rated on a Likert-scale (questions 34, 65).

Phase 2 - Adaptation of the DIBQ into the DIBQ-tailored version and content validity assessment.

The project team selected 53 items in 10 domains. The selection of items from the DIBQ to DIBQ-t by the project team and experts is described in Table 2.

A total of 28 items in the final Swedish/Danish version of the DIBQ, DIBQ-t were considered feasible to evaluate the implementation process of the programmes. Eighteen items were included as they met criteria 1: selected by the project leaders plus having 80% or 100% CVI of both Danish and Swedish experts. Additional 10 items were included, based upon criteria 3: being selected by the project leaders and had 80% or 100% CVI by either the Danish (DIBQ-t question 8, 9, 21, 23, 24) or Swedish (DIBQ-t question 13, 14, 20, 27, 28) experts, anticipating the differences in context for the countries. No item met the criteria 2 (expert rated relevance score with a CVI = 1.00, regardless of the item being selected by the project leaders).

Table 2

DIBQ-t covers 10 out of 18 TDF domains: Knowledge, Skills, Beliefs about Capabilities, Beliefs about Consequences, Intentions, Innovation, Organisation, Patients, Social influences, Behavioural regulation. The items and related domains included in DIBQ-t are described in detail in Table 3.

Table 3

The DIBQ-t maintains linked to all domains of the Capability – Opportunity - Motivation - Behaviour (COM-B) model within the Behavioural Change Wheel, which is reported in Table 4.

Table 4

Phase 3 – Feasibility of the DIBQ-t Sweden, Denmark combined

From 609 invited clinicians, 598 (98%) answered the DIBQ-t, 110 in Sweden and 488 in Denmark including 368 men and 226 women. Mean age was 39 years (SD 11; range 22 to 70). Almost 33% had less than 6 years' experience and 20% over 20 years. Of a total of 16,744 possible answers (598 participants answering 28 questions), 39 were missing (2%).

In general, responses to most domain items indicated positive expectations to implement the program (Figure 3). The domains with the highest frequency of agreed or strongly agreed item responses was 'Skills' (94%) and the lowest frequency of agreed or strongly agreed item responses was 'Behavioural Regulation' (55%).

Figure 3.

Analysing each item independently provided a more detailed presentation of the results (Figure 4). In 21 items, 75% of clinicians scored '*agree*' or '*agree strongly*'. In seven items, 25% or more clinicians scored '*neither, nor*': item 13 - recognition from work (52%), item 28 – planning of the program when patients are not motivated (47%), item 23 and 24 - opinions and support from colleagues (46%, 37%), item 26, 27 – planning how and when to deliver the program (25%, 28%) and item 16 – adapt the program to clinician's need (25%). Items with highest score on '*disagree*' were item 27 and 28 (10% and 14% of clinicians) both related to planning the delivery of the program.

Figure 4.

Phase 4 – Construct validity, confirmatory factor analysis

The initial assessment of construct validity included 28 items, however this model did not reach the pre-defined cut-off values for model fit. Based on domains with most items and their items with the lowest domain loadings and lowest content validity, items were sequentially removed to attain adequate model fit. As a result, Item 4 ('*I am confident that I can deliver Better Back/GLA:D Back*') and 13 ('*I expect that, when I deliver Better Back/GLA:D Back, I get recognition from the work context*') were removed to obtain an adequate fit of the model. Further removal of 2 more items (item 25: '*I can count on support from professionals with whom I deliver Better Back/GLA:D Back when things get tough around delivering Better*

Back/GLA:D Back, and 28: '*I have a clear plan with regard to delivering Better Back/GLA:D Back when participants are not motivated*') did not strengthen the model further. The final analyses are therefore reported for 26 items (Table 5).

Table 5

The estimated factor loadings of the items in relation to the domains are between 0.365 and 0.819 where 3 items (items 12, 15 and 16) were below 0.4, but all items had p-values < 0.001.

The correlation between the domains are between 0.11 (patient and intention) and 0.74 (innovation and consequences) (Table 6), therefore not highly correlated, suggesting the domains are separated domains [33].

Table 6

Discussion

Key findings

DIBQ-t is a feasible and valid version of the DIBQ developed to evaluate the expectations of the implementation process regarding best-practice LBP primary care programs. The DIBQ-t includes 28 items, representing 10 of the initially suggested 18 domains in the TDF framework. The included TDF domains, and their linkage to the COM-B model within the Behavioural Change Wheel were: 'Skills', 'Knowledge', 'Behavioural Regulation', and 'Innovation' (Capability), 'Social Influences', 'Patients', and 'Organisation' (Opportunity), and 'Beliefs of Capabilities', 'Beliefs of Consequences', and 'Intentions' (Motivation).

The piloting of the DIBQ-t in the Swedish and Danish primary care context demonstrated the initial implementation strategy has resulted in a positive facilitation of clinicians´ expectations regarding all TDF related determinants of best-practice LBP primary care program implementation. In other words, clinicians expected no determinants to hinder the initiation of implementation processes. This suggests that sustainability aspects of the implementation strategy should continue to aim at facilitating all determinants longitudinally. This will be investigated in a future step, allowing evaluation of the construct validity of the DIBQ-t in a longitudinal data collection on this cohort. The response rate of the DIBQ was high, with only 2% missing data demonstrating its feasible use.

Translation DIBQ and tailoring into DIBQ-t

The process of translation of DIBQ involved expert opinions on the questionnaire but did not include a backward translation. However, robust evidence is lacking for the need and value of backward translation [34, 35]. Epstein et al studied different translation methods and concluded that the inclusion of an expert panel improved the quality of the instrument, especially the face validity and content validity. This means

that backward translation is not necessary when the expert panel is skilled in the original language [26]. In this study, this criterion was fulfilled as all experts use English regularly both spoken and written.

The tailoring of the DIBQ into DIBQ-t was done at two levels. Both the project team and the expert panel selected relevant questions of the original DIBQ to evaluate the implementation process of a best-practice LBP primary care program. This approach reduced the risk of either overlooking relevant items or adding superfluous items. Some questions were added to the DIBQ-t, even though the inclusion criteria (selected by project leaders plus CVI 80% by experts) were met with only the Danish or Swedish experts. This selection enabled comparison of different contexts and cultures. The implementation process in Denmark has mainly taken place in private health clinics whereas implementation in Sweden has occurred in public health clinics. The course in Denmark had a fee for the participants, and participants must actively signup for the course. In contrast, the Swedish course was free of charge and participants were enrolled automatically. This difference between the countries may impose different financial and motivational aspects on the implementation process, which were important to account for in the DIBQ-t.

Interpreting the DIBQ-t through linkage to COM-B within the Behavioural Change Wheel

Within the Capability category of the COM-B model, the TDF domain ‘Behavioural Regulation’ had the lowest frequency of ‘agree’ or ‘strongly agree’ item responses, whereas the TDF domains ‘Knowledge’ and ‘Skills’ had over 90% of clinicians that strongly agreed or agreed with the items. This suggests that even though the clinicians expect to be capable by having the skills and knowledge to implement, they are less certain on a clear plan on how to operate the program. When analysing the ´behavioural regulation´ TDF domain on an item-level, planning management of unmotivated patients had a low expectancy by the clinicians. This highlights the importance to include tools for patient motivation in implementation sustainability strategies.

Regarding the COM-B category of Opportunity, in the TDF domain ‘Social Influences’ the item 23 ‘influences of important others’ had lowest frequency of ‘agree’ or ‘strongly agree’ responses. One can therefore consider that providing opportunity for positive influence of important others such as clinical champions is an important aspect to include in implementation sustainability strategies to improve their facilitation longitudinally.

Regarding the COM-B category Motivation, overall, TDF domains had over 80% scoring ‘agree’ or ‘strongly agree’. This implies that, overall, clinicians’ intentions, beliefs of capabilities and beliefs of consequences towards implementing the programs were perceived as a highly facilitative for implementation of the best-practice LBP primary care program. However, the TDF domain ‘beliefs of consequences’, item 13: ‘to receive recognition from the work context’ had the lowest frequency (40%) of ‘agree’ or ‘strongly agree’ responses. This may imply that recognition from work does not have a high importance for motivation the implement the program.

Strengths and limitations

This study was conducted in two different countries with different contexts. The total item-bank of DIBQ-t therefore covers a wide spectrum to evaluate implementation processes generalisable to private and public LBP primary care internationally.

This current study focuses on clinicians´ expectations on best-practice LBP primary care program implementation and confirms a stable construct of the DIBQ-t for monitoring barrier and facilitator qualities of the determinants. Considering that the construct validity applies to the clinicians´ expectations of the implementation process, further analyses are planned after a longitudinal period of volition. Also, studies on changes in different TDF domains over time and their potential mediational role on clinician confidence, beliefs and intervention behaviour will be performed.

Conclusions

DIBQ was tailored for use in the evaluation of implementation of best-practice low back pain primary care programs resulting in an English, Swedish and Danish version, the DIBQ-t. The DIBQ-t was feasible to use and had adequate content and construct validity. The clinicians´ expectations to implementation according to the DIBQ-t indicate facilitating determinants outweighing barriers for implementation of LBP programs in Sweden and Denmark. There is a need for further testing of DIBQ-t after the volition phase of the implementation object and for evaluating to what extent high expectations on the DIBQ-t is reflected in a high degree on implementation.

Abbreviations

LBP
low back pain
TDF
Theoretical Domains Framework
COM-B
Capability - Opportunity - Motivation - Behaviour
DIBQ
Determinants of Implementation Behaviour Questionnaire
DIBQ-t
DIBQ tailored to study best-practice low back pain primary care program implementation

Declarations

Ethics approval and consent to participate: Ethical clearance in Sweden for the study (Dnr: 2017-35/31) has been attained through the Regional Ethics Committee in Linköping. After obtaining a written and verbal explanatory statement regarding participation in the study, participants provided implied consent by returning a completed questionnaire for the study. The Regional Committees on Health Research Ethics for Southern Denmark decided that the study did not need ethical approval (file number S-

20172000-93). The Danish data collection has obtained authorisation from the Danish Data Protection Agency (DPA) as part of the University of Southern Denmark's institutional authorisation (DPA no. 2015-57-0008 SDU no. 17/30591). According to Danish regulations, an observational study implementing a nonexperimental treatment that was offered to patients on the decision of the clinicians does not undergo research ethics evaluation (The National Committee on Health Research Ethics. Act on Research Ethics Review of Health Research Projects 2019 (updated 2019-02-21), accessed 02-12-2019). Digital informed consent was obtained from the Danish participants when they signed up online for the course, following normal procedures of the Danish Data Protection Agency for the collection of non-sensitive personal data. At signing up for the course the clinicians have explicitly consented to the terms of participation, among these the transmission of relevant personal data for project use.

Consent for publication: not applicable

Availability of data and material: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests: AK's position at the University of Southern Denmark is financially supported by the Foundation for Chiropractic Research and Postgraduate Education, and IR's position is supported by income from the GLA:D Back clinician courses. GLA:D® is a non-profit initiative hosted at the University of Southern Denmark and the GLA:D® trademark is property of the University of Southern Denmark. The GLA:D initiative is developed in close collaboration with the SDU Research & Innovation Organisation, including legal reviews. The researchers do not have any personal financial benefits from working with the project.

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Authors' contributions: IR, AK, BÖ, KS, AA, JH, and PN were involved in the design of the study. IR, AK, BÖ, KS, AA were involved in data collection and are responsible for data analyses. IR, AK, BÖ, KS, AA, JH, and PN were involved in the development of the manuscript and have approved the final manuscript.

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Tables

Table 1. Demographics Experts panel

Variables	Sweden	Denmark	Total
male / female	1/6	3 / 6	4/12
physiotherapist /chiropractor/other	3 / 0 / 4	4 / 5 / 0	7 / 5 / 4
age: mean (SD)	55.4 (7.6)	44.9 (11.5)	49.5 (11.1)
years clinical experience: mean (SD)	14.7 (10.6)	15.6 (12.5)	15.2 (11.3)
years research experience: mean (SD)	12.1 (6.3)	8.8 (7.6)	10.3 (7.1)

SD=Standard Deviation

Table 2. Selection of DIBQ domains/items to DIBQ-LBP by project team, and Swedish and Danish experts

Domains	Items	Selected by project team	Danish experts (n=CVI 80%)	Swedish experts (n=CVI 80%)	Danish experts (n=CVI 100%)	Swedish experts (n=CVI 100%)	Selected in SWE/DK, only SWE or DK
1. Knowledge	1. I know how to deliver Better Back/GLA:D Back following the programme.	x	x	x		x	SWE/DK
	2. Objectives of Better Back/GLA:D Back and my role in this are clearly defined for me.	x	x	x			SWE/DK
	3. With regard to Better Back/GLA:D Back, I know what my responsibilities are.	x		x			SWE
	4. In my work with Better Back/GLA:D Back, I know exactly what is expected from me.	x		x			SWE
2. Skills	5. I have been trained in delivering Better Back/GLA:D Back following the programme.			x			SWE
	6. I have the skills to deliver Better Back/GLA:D Back following the programme.	x	x	x	x	x	SWE/DK

	7. I am practiced, to deliver Better Back/GLA:D Back following the programme.			x		x	SWE
3. Social / professional role	8. Delivering Better Back/GLA:D Back following the programme is part of my work as a PT.			x			
	9. As a PT, it is my job to deliver Better Back/GLA:D Back following the programme.						
	10. It is my responsibility as a PT to deliver Better Back/GLA:D Back following the programme.						
4. Beliefs about capability	11. I am confident that I can deliver Better Back/GLA:D Back following the programme.	x	x	x	x	x	SWE/DK
	12. I am confident that I can deliver Better Back/GLA:D Back following the programme even when other professionals with whom I deliver Better Back/GLA:D Back do not do this.	x		x			SWE
	13. I am confident that I can deliver Better Back/GLA:D Back following the programme even when there is little time.	x					
	14. I am confident that I can deliver Better Back/GLA:D Back following the programme even when participants are not motivated.	x					
	15. I have control over delivering Better Back/GLA:D Back following the programme.	x					

	16. For me, delivering Better Back/GLA:D Back following the programme is (very difficult – very easy).	x	x	x	x	SWE/DK
	17. For me, performing the intake is (very difficult – very easy).	x	x	x		SWE/DK
	18. For me, delivering the training program is (very difficult – very easy).	x	x	x		SWE/DK
	19. For me, performing the evaluation is (very difficult – very easy).	x				
	20. For me, giving attention to participant's maintenance of physical activity behavior outside Better Back/GLA:D Back is (very difficult – very easy).	x	x			SWE/DK
	21. For me, reporting about the Better Back/GLA:D Back to the referring professional is (very difficult – very easy).	x	x			SWE/DK
5. Optimism	22. In my work as a PT, in uncertain times, I usually expect the best.					

	23. In my work as a PT, I'm always optimistic about the future.						
	24. In my work as a PT, overall, I expect more good things to happen than bad.						
6. Beliefs about consequences	25. For me, delivering Better Back/GLA:D Back following the programme is (not useful at all – very useful).	x	x	x	x	x	SWE/DK
	26. For me, delivering Better Back/GLA:D Back following the programme is (not worthwhile at all – very worthwhile).	x		x			SWE
	27. For me, delivering Better Back/GLA:D Back following the programme is (not pleasurable at all – very pleasurable).	x					
	28. For me, delivering Better Back/GLA:D Back following the programme is (not interesting at all – very interesting).	x					

29. If I deliver Better Back/GLA:D Back following the programme, Better Back/GLA:D Back will be most effective.	x	x	x	x	SWE/DK
30. If I deliver Better Back/GLA:D Back following the programme, participants will appreciate this.	x				
31. If I Better Back/GLA:D Back following the programme, this will strengthen the collaboration with professionals with whom I deliver Better Back/GLA:D Back.	x				
32. If I deliver Better Back/GLA:D Back following the Programme, I will feel satisfied.	x				
33. If I deliver Better Back/GLA:D Back following the Programme, it will help participants to be able to coop better with their back problems.	x	x	x		SWE/DK

	34. When I deliver Better Back/GLA:D Back following the programme, I get financial reimbursement.					
	35. When I deliver Better Back/GLA:D Back following the programme, I get recognition from the work context.	x		x	x	SWE/DK
	36. When I deliver Better Back/GLA:D Back following the programme, I get recognition from participants.			x		
7. Intentions	37. I intend to deliver Better Back/GLA:D Back following the programme in the next three months.	x		x	x	SWE/DK
	38. I will definitely deliver Better Back/GLA:D Back following the programme in the next three months.	x				
	39. How strong is your intention to deliver Better Back/GLA:D Back following the programme in the next three months?	x	x			
8. Goals	40. How often is working on something else on your			x	x	SWE *

	agenda a higher priority than delivering Better Back/GLA:D Back following the programme?						
	41. How often is working on something else on your agenda more urgent than delivering Better Back/GLA:D Back following the programme?						
9. Innovation	42. It is possible to tailor Better Back/GLA:D Back to participants' needs.	x	x	x	x	x	SWE/DK
	43. It is possible to tailor Better Back/GLA:D Back to professionals' needs.	x	x	x		x	SWE/DK
	44. Better Back/GLA:D Back costs little time to deliver.	x					
	45. Better Back/GLA:D Back is compatible with daily practice.	x	x	x	x	x	SWE/DK
	46. Better Back/GLA:D Back is simple to deliver.	x	x	x		x	SWE/DK
10. Socio-political context	47. Government and local authorities provide sufficient support to interventions such as Better Back/GLA:D Back.		x				

	48. Insurance companies provide sufficient support to interventions such as Better Back/GLA:D Back.		x				
	49. Primary Health Care is sufficiently oriented towards delivery of Better Back/GLA:D Back.		x		x		DK
11. Organisation	50. In the organization I work, all necessary resources are available to deliver Better Back/GLA:D Back.	x	x	x		x	SWE/DK
	51. I can count on support from the management of the organization I work in, when things get tough programme.	x		x		x	SWE/DK
	52. The management of the organization I work in is willing to listen to my problems with delivering Better Back/GLA:D Back following the programme.	x		x			SWE

	53. The management of the organization I work in is helpful with delivering Better Back/GLA:D Back following the programme.	x		x	x	SWE
12. Patients	54. Participants of Better Back/GLA:D Back are motivated.	x	x			SWE/DK
	55. Participants of Better Back/GLA:D Back are positive about Better Back/GLA:D Back.	x	x	x	x	SWE/DK
13. Innovation strategy	56. [Implementing organization] provides professionals with training to deliver Better Back/GLA:D Back.		x	x		
	57. [Implementing organization] provides the possibility to experience delivering Better Back/GLA:D Back before professionals need to commit to it.		x	x		
	58. [Implementing organization] provides sufficient intervention materials.		x	x		

	59. [Implementing organization] provides assistance to professionals with delivering Better Back/GLA:D Back.		x	x		x	DK*
	60. [Implementing organization] organizes peer support meetings for professionals.			x		x	DK*
	61. [Implementing organization] provides sufficient financial reimbursement to professionals for Better Back/GLA:D Back delivery.						
	62. [Implementing organization] provides insights into results of Better Back/GLA:D Back.		x	x		x	DK*
14. Social influences	63. Most people who are important to me think that I should deliver Better Back/GLA:D Back following the programme.	x			x		SWE/DK

64. Professionals with whom I deliver Better Back/GLA:D Back think I should deliver Better Back/GLA:D Back following the programme.	x			x	SWE/DK
65. Professionals with whom I deliver Better Back/GLA:D Back deliver Better Back/GLA:D Back following the programme.	x				
66. Other professionals who work with Better Back/GLA:D Back deliver Better Back/GLA:D Back following the programme.	x	x			DK*
67. I can count on support from professionals with whom I deliver Better Back/GLA:D Back when things get tough around delivering Better Back/GLA:D Back following the programme.	x	x	x	x	DK/SWE
68. Professionals with whom I deliver Better Back/GLA:D Back are willing to listen to my problems with delivering Better Back/GLA:D Back following the programme.	x				

	69. Professionals with whom I deliver Better Back/GLA:D Back are helpful with delivering Better Back/GLA:D Back following the guideline.	x				
15. Positive emotions	70. When I work with Better Back/GLA:D Back I feel optimistic.					
	71. When I work with Better Back/GLA:D Back I feel comfortable.		x	x	x	*
	72. When I work with Better Back/GLA:D Back I feel calm.					
	73. When I work with Better Back/GLA:D Back I feel relaxed.					
	74. When I work with Better Back/GLA:D Back I feel cheerful.					
	75. When I work with Better Back/GLA:D Back I feel elated.					

16. Negative emotions	76. When I work with Better Back/GLA:D Back I feel nervous.		x				
	77. When I work with Better Back/GLA:D Back I feel pessimistic.						
	78. When I work with Better Back/GLA:D Back I feel depressed.						
	79. When I work with Better Back/GLA:D Back I feel agitated.						
	80. When I work with Better Back/GLA:D Back I feel sad.						
	81. When I work with Better Back/GLA:D Back I feel uncomfortable						
17. Behavioral regulation	82. I have a clear plan of how I will deliver Better Back/GLA:D Back following the programme.	x	x	x	x	x	SWE/DK
	83. I have a clear plan under what circumstances I will	x		x			SWE

deliver Better Back/GLA:D Back following the programme.					
84. I have a clear plan when I will deliver Better Back/GLA:D Back following the programme.	x		x	x	SWE/DK
85. I have a clear plan with regard to delivering Better Back/GLA:D Back following the programme when participants are not motivated.	x	x			SWE/DK
86. I have a clear plan with regard to delivering Better Back/GLA:D Back following the programme when there is little time.	x		x		SWE
87. I have a clear plan with regard to delivering Better Back/GLA:D Back following the programme when other professionals with whom I deliver Better Back/GLA:D Back do not do this.	x				

18. Nature of behavior	88. Delivering Better Back/GLA:D Back following the programme is something I do automatically.		
	89. Delivering Better Back/GLA:D Back following the programme is something I do without having to consciously remember.	x	
	90. Delivering Better Back/GLA:D Back following the programme is something I do without thinking.		
	91. Delivering Better Back/GLA:D Back following the programme is something I start doing before I realize I am doing it.		
	92. Delivering Better Back/GLA:D Back following the programme is something I seldom forget.	x	x

93. Delivering Better Back/GLA:D Back following the programme is something I often forget.	x	x	SWE*

*** 40, 49, 59, 60, 62, 66, 71, 93: questions used only at follow-up – results are not reported in this study**

DK: Denmark, SWE: Sweden, CVI: Validity Index

Table 3 DIBQ-t: Expectations to implementation: domains and items.

DIBQ-t item - domain	Items
DIBQ-t 1 – knowledge	I know how to deliver Better Back/GLA:D Back following the programme.
DIBQ-t 2 – knowledge	Objectives of Better Back/GLA:D Back and my role in this are clearly defined for me.
DIBQ-t 3 – skills	I have the skills to deliver Better Back/GLA:D Back.
DIBQ-t 4 – beliefs of capability	I am confident that I can deliver Better Back/GLA:D Back.
DIBQ-t 5 – beliefs of capability	I expect that, delivering Better Back/GLA:D Back is (very easy - very difficult).
DIBQ-t 6 – beliefs of capability	I expect that, performing the intake is (very easy - very difficult).
DIBQ-t 7 – beliefs of capability	I expect that, delivering the training program is (very easy - very difficult).
DIBQ-t 8 – beliefs of capability	I expect that, giving attention to participant's maintenance of physical activity behaviour outside Better Back/GLA:D Back is (very easy - very difficult).
DIBQ-t 9 – beliefs of capability	I expect that, reporting about the Better Back/GLA:D Back to the referring professional is (very easy - very difficult).
DIBQ-t 10 – beliefs of consequences	I expect that, delivering Better Back/GLA:D Back is (not worthwhile at all – very worthwhile).
DIBQ-t 11 – beliefs of consequences	If I deliver Better Back/GLA:D Back, Better Back/GLA:D Back will be most effective.
DIBQ-t 12 – beliefs of consequences	If I deliver Better Back/GLA:D Back, it will help participants to be able to cope better with their back problems.
DIBQ-t 13 – beliefs of consequences	I expect that, when I deliver Better Back/GLA:D Back, I get recognition from the work context.
DIBQ-t 14 - intentions	I intend to deliver Better Back/GLA:D Back in the next three months.
DIBQ-t 15 - innovation	It will be possible to tailor Better Back/GLA:D Back to participants' needs.
DIBQ-t 16 - innovation	It will be possible to tailor Better Back/GLA:D Back to professionals' needs.
DIBQ-t 17 - innovation	Better Back/GLA:D Back will be compatible with daily practice.
DIBQ-t 18 - innovation	Better Back/GLA:D Back will be simple to deliver.
DIBQ-t 19 - organisation	I expect that, in the organization I work, all necessary resources are available to deliver Better Back/GLA:D Back.
DIBQ-t 20 - organisation	I expect that, I can count on support from the management of the organization I work in, when things get tough with the program.
DIBQ-t 21 - patient	I expect that, participants of Better Back/GLA:D Back are motivated.
DIBQ-t 22 - patient	I expect that, participants of Better Back/GLA:D Back are positive about Better Back/GLA:D Back.
DIBQ-t 23 – social influences	Most people who are important to me think that I should deliver Better Back/GLA:D Back.
DIBQ-t 24 – social influences	Professionals with whom I deliver Better Back/GLA:D Back think I should deliver Better Back/GLA:D Back.
DIBQ-t 25 – social influences	I can count on support from professionals with whom I deliver Better Back/GLA:D Back when things get tough around delivering Better Back/GLA:D Back.
DIBQ-t 26 – behavioral regulation	I have a clear plan of how I will deliver Better Back/GLA:D Back.
DIBQ-t 27 – behavioral regulation	I have a clear plan when I will deliver Better Back/GLA:D Back.
DIBQ-t 28 – behavioral regulation	I have a clear plan with regard to delivering Better Back/GLA:D Back when participants are not motivated.

Table 4. Results of the selected TDF domains for the DIBQ-t in relation to COM-B model categories.

Categories of COM-B	TDF domains (number of items in DIBQ-t)
Capability	· Skills (1) · Knowledge (2) · Behavioral regulation (3) · Innovation (4)
Opportunity	· Organisation (2) · Social influences (3) · Patients (2)
Motivation	· Intentions (1) · Beliefs about capabilities (6) · Beliefs about consequences (4)

Table 5. Results from the construct validity testing after removal of 2 items

	x^2	Df	p-value	CFI	TLI	RMSEA (90% C.I.)	SRMR
Total model fit	635.844	256	0,00	0.933	0.916	0.050 (0.045-0.055)	0.047

CFI: Comparative Fit Index; TLI: Tucker-Lewis Index; RMSEA: Root Mean Square Error of Approximation; SRMR: Standardized Root Mean Square Residual

Table 6. Correlation between the domains of the DIBQ-t

	Knowledge	Skills	Capability	Consequences	Intention	Innovation	Organisation	Patient	Social	Behavioural
Knowledge	1.00	0.69	0.52	0.55	0.22	0.51	0.39	0.35	0.26	0.35
Skills	0.69	1.00	0.42	0.41	0.21	0.41	0.33	0.20	0.25	0.25
Capability	0.52	0.42	1.00	0.38	0.19	0.64	0.41	0.41	0.22	0.50
Consequences	0.41	0.41	0.38	1.00	0.38	0.74	0.48	0.51	0.59	0.36
Intention	0.22	0.21	0.19	0.38	1.00	0.39	0.38	0.12	0.36	0.38
Innovation	0.51	0.41	0.64	0.74	0.39	1.00	0.56	0.41	0.60	0.55
Organisation	0.39	0.33	0.41	0.48	0.38	0.56	1.00	0.31	0.52	0.56
Patient	0.35	0.20	0.41	0.51	0.12	0.31	0.24	1.00	0.26	0.26
Social	0.26	0.25	0.22	0.59	0.36	0.60	0.52	0.26	1.00	0.36
Behavioural	0.35	0.25	0.50	0.36	0.38	0.55	0.56	0.26	0.36	1.00

Figures

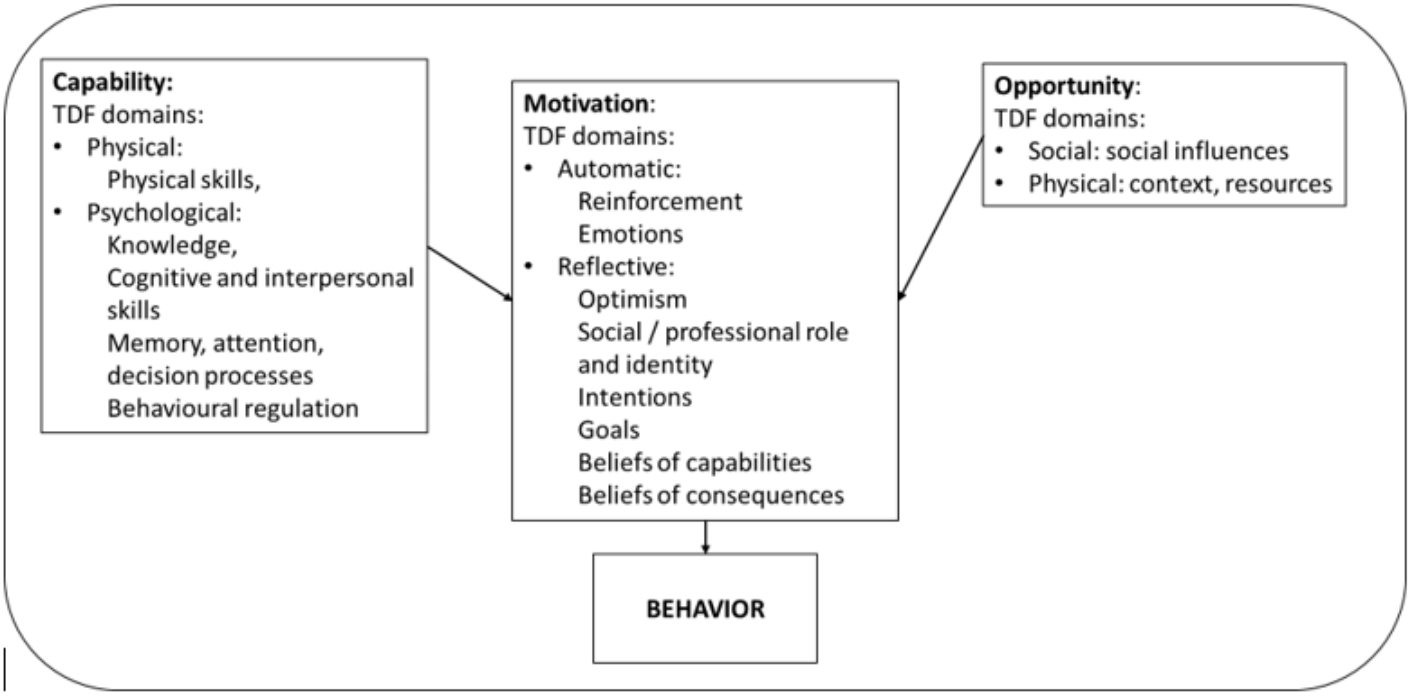

Figure 1

Linkage of the Theoretical Domains Framework domains to the COM-B model

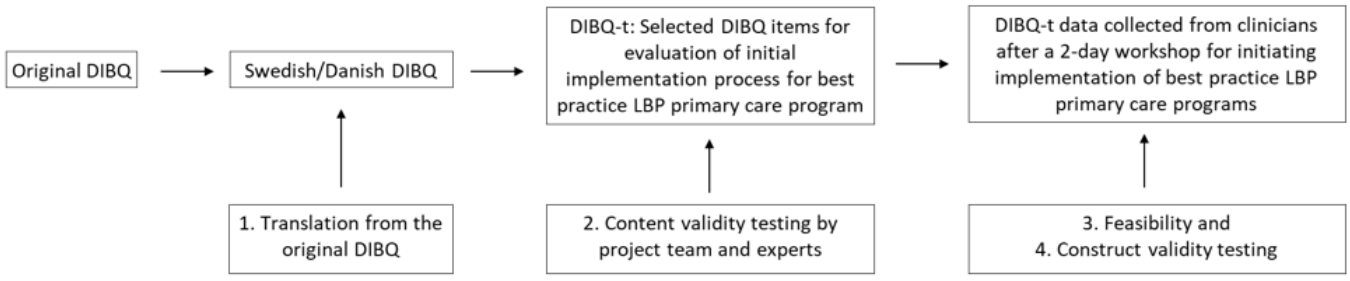

Figure 2

Process of development of a Swedish/Danish version into DIBQ-t.

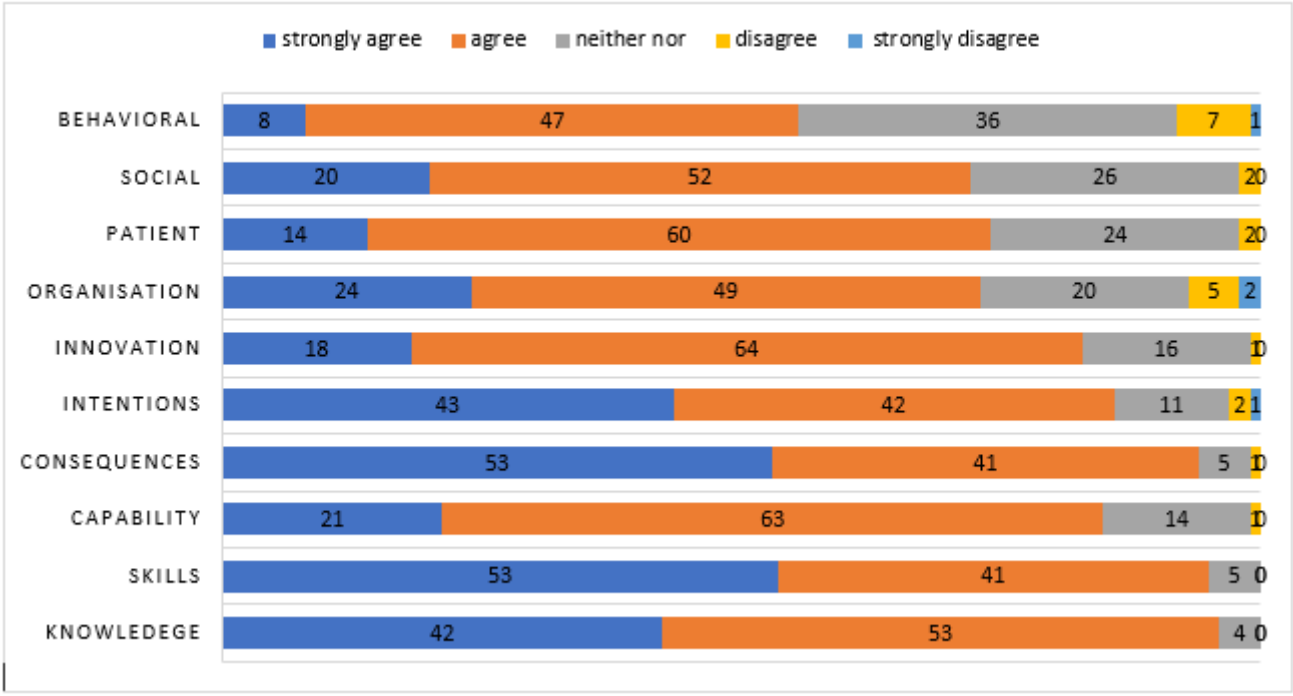

Figure 3

Distribution of responses of the DIBQ-t at domain-level for Sweden and Denmark combined in percentage on a 5-point Likert-scale.

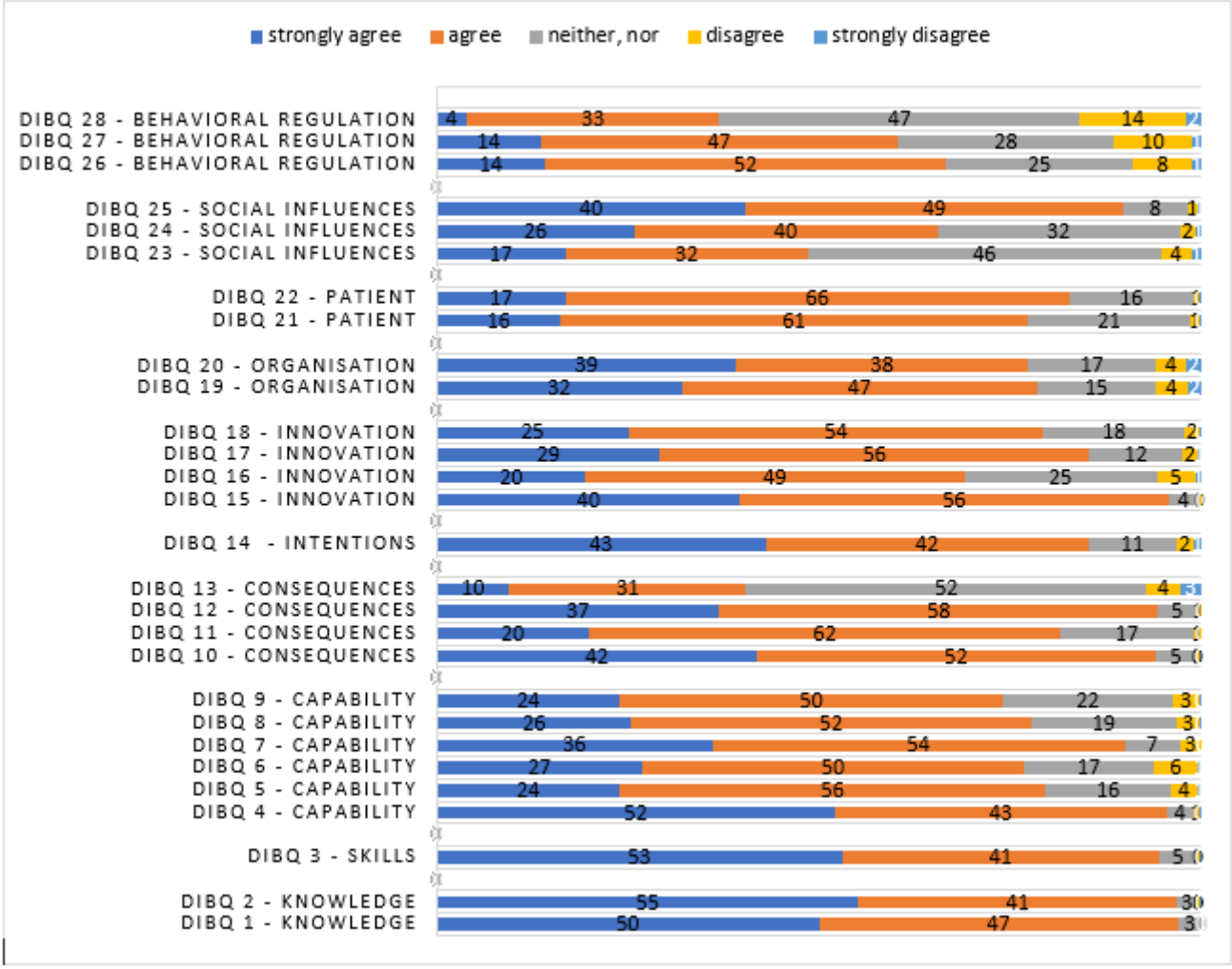

Figure 4

Distribution of responses to each item in the domains of DIBQ-t on a 5-point Likert-scale

Supplementary Files

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

- Additionalfilechecklist.docx
- Appendix1DIBQSwedish.docx
- Appendix2DIBQDanish.docx