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Original Article

Translation of the Breathing Vigilance Questionnaire for respiratory diseases

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ABSTRACT

INTRODUCTION. Breathing vigilance – a heightened focus on breathing, which is linked to anxiety – potentially exacerbates symptoms in people with respiratory conditions, e.g., chronic obstructive pulmonary disease, asthma and breathing pattern disorder. The Breathing Vigilance Questionnaire (Breathe-VQ) was developed in English but requires translation and cross-cultural adaptation for broader use. We aimed to translate and cross-culturally adapt the Breathe-VQ into Danish.

METHODS. Following established translation guidelines for patient-reported outcome measures, we conducted a six-stage adaptation process, including forward translation, backward translation, expert committee review and face validity testing. The validation process involved three interview rounds with 13 patients.

RESULTS. Patient feedback prompted iterative revisions in language and phrasing, particularly to address the semantics of temporal and intergenerational aspects. Patients found the Danish version easy to understand and reflective of their breathing experiences, confirming its face validity. The expert committee confirmed equivalence and cultural alignment with the original version.

CONCLUSIONS. The Danish Breathe-VQ demonstrates content equivalence and face validity, offering a suitable tool for measuring breathing vigilance in Danish-speaking populations.

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TRIAL REGISTRATION. Pre-registered at the Open Science Framework.

Breathing is typically a subconscious physiological process. However, individuals with respiratory diseases often experience anxiety and "breathing vigilance": persistent anxious monitoring of their breathing [1]. Next to respiratory diseases, such as COPD and asthma, breathing vigilance may also present in individuals with chronic cough or breathing-pattern disorder (BPD) without a clear underlying pathology [1, 2].

According to the Neural Respiratory Sensory Gating System Model [3], conscious awareness of breathing arises through neural integration of 1) respiratory input from muscles, lungs and airway receptors, 2) cognitive processes related to attention, thought and learning and 3) emotional processing. Breathing may thus become consciously monitored due to actual (e.g., shortness of breath, disease exacerbation) [4] as well as perceived increased respiratory demands (even if that perception is inaccurate). Interoception – the brain's ability to sense

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and interpret internal bodily signals [5, 6] – plays a central role in the perception of breathlessness and related anxiety. In respiratory conditions, changes in interoception may lead to excessive, anxiety-driven monitoring of breathing, where even minor changes are noticed and perceived as threatening [7]. This cycle of vigilant monitoring may disrupt natural breathing patterns, reinforcing breathlessness, BPD and anxiety [1, 8].

The Breathing Vigilance Questionnaire (Breathe-VQ) was developed to quantify breathing vigilance in respiratory diseases and BPD [1]. Initial data indicate that the Breathe-VQ is a valid instrument, demonstrating good test-retest reliability in the general population [1], but further investigation is needed to validate its use in clinical populations and to adapt it across languages and cultures. This is essential for testing its proposed influence on perceptions of respiratory symptoms and may help identify individuals with high breathing vigilance who could benefit from breathing retraining, cognitive-behavioural or meditation-based interventions targeting (maladaptive) interoceptive processes [9, 10].

We aimed to translate the Breathe-V1 into Danish and test its face validity in patients with diverse respiratory conditions.

METHODS

Breathing Vigilance Questionnaire

The Breathe-VQ is a six-item questionnaire using a five-point Likert scale (1 = ”never” to 5 = ”always”) [1]. Respondents select the response that best describes their typical perceptions of breathing. Higher scores indicate greater breathing vigilance. The original validation included 323 healthy individuals, 76 of whom scored > 22 on the Nijmegen Questionnaire [11], suggesting a high risk of BPD [1].

Ethics and approvals

The study was approved by the Committee on Health Research Ethics (EMN-2023-07484), approved in accordance with the Danish Act on Processing of Personal Data (REG-111-2023), pre-registered on the Open Science Framework and conducted in accordance with the Helsinki II Declaration.

Translation and cross-cultural adaptation

The process (Autumn 2023 to Winter 2024) followed established guidelines [12, 13] using a forward (FT)-backward (BT) translation framework and an iterative, in-depth interview approach centered on content validity. This involved six stages to ensure an equivalent and culturally relevant Danish version (**Figure 1**).

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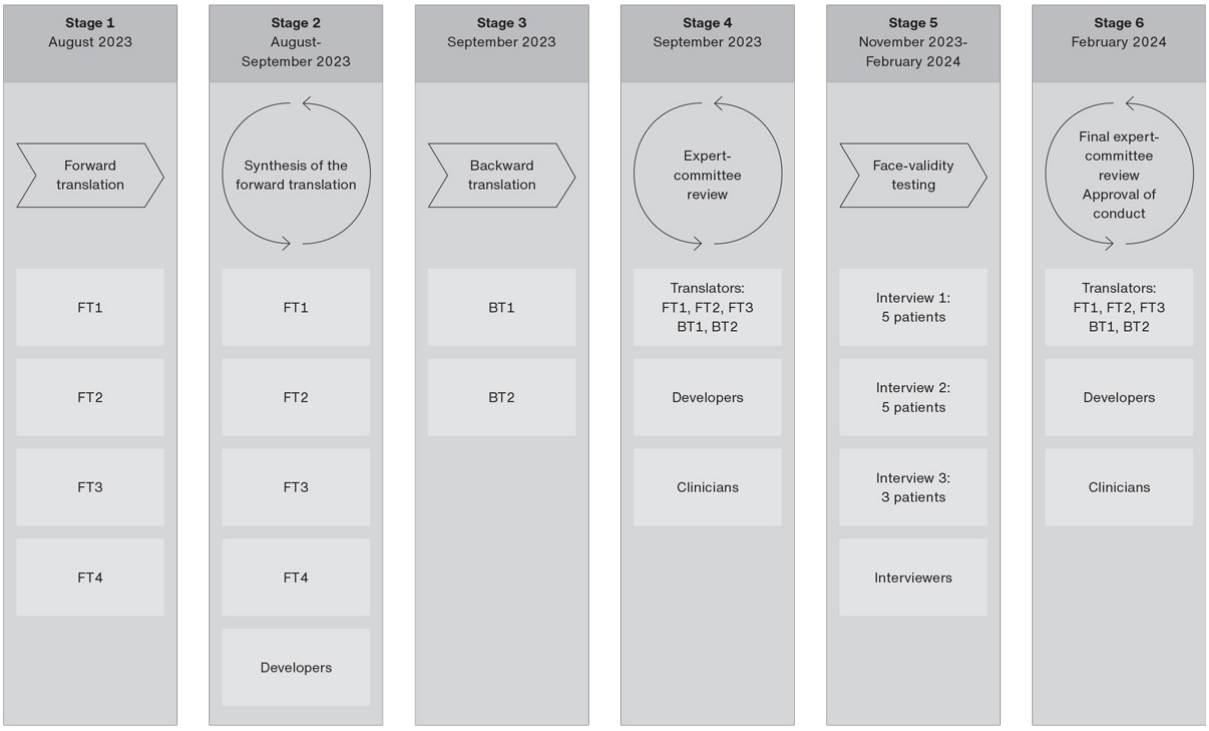
FIGURE 1 Stages in the translation and adaptation process.



BT = backward-translator; FT = forward-translator.

Stage 1 Forward translation

Four native Danish speakers independently translated the Breathe-VQ into Danish (FT1-FT4). Three were PhD-level professionals from diverse clinical backgrounds (MK: classical singer and singing pedagogue; IFV: psychologist; KHA: physiotherapist), ensuring clinical relevance. The fourth was a "field-naïve" translator (no clinical experience) (Marianne Godt Hansen: MA in International Business Communication). Each wrote detailed notes on the challenges and the reasoning behind their suggested wording.

Stage 2 Synthesis of forward translation

All forward translators discussed the four initial translations of the original version. Through consensus, translations were synthesised into a single FT version. Discrepancies were resolved collaboratively.

Stage 3 Backward translation

Two native English speakers (BT1, BT2) with no prior knowledge of the purpose and concept independently translated the FT version back into English. Both translators have over 12 years' residency in Denmark and extensive language expertise (Eileene Conelly (EC): MPH; Lorna Campbell (LC): MA and Postgraduate Certification in Education).

Stage 4 Expert-committee review

An expert committee comprising Breathe-VQ developers (EK, AL), a validation study author (Jennifer Steinmann, JC), three forward translators (MK, IFV, KHA) and two backwards translators (EC, LC) met twice online. The committee reviewed and discussed discrepancies among the versions (original, FT, BT), which directly informed the pre-test (PT) version.

Stage 5 Face-validity testing

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The PT version was administered to patients with COPD, asthma, and/or BPD symptoms.

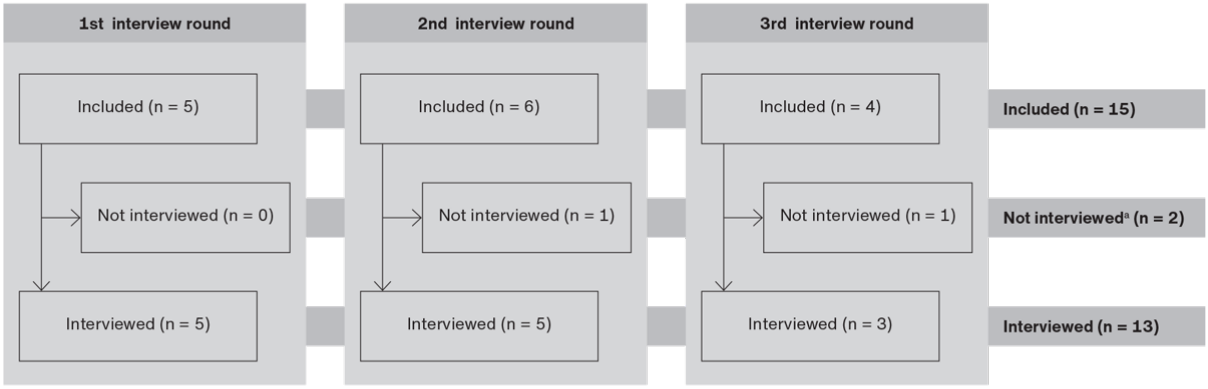
Recruitment: Participants were recruited (27 NOV 2023-19 JAN 2024) from respiratory or physiotherapy outpatient clinics at Naestved, Slagelse or Roskilde hospitals, Region Zealand, Denmark; all treating broad respiratory populations. Patients were excluded if they were unable to speak/understand Danish. All participants provided informed written consent.

Procedures: Participants completed the PT version, along with add-on respiratory health and physical activity questions, using REDCap (Supplementary file 1).

We conducted individual telephone interviews 1-3 days after completion of the PT version to assess face validity on comprehension, ease of responding and perceived relevance of questions. Participants were able to propose alternative terms. A semi-structured interview guide, informed by previous studies [14], was developed based on stages 1-4. The interview guide included minor revisions to capture emerging needs (Supplementary file 2).

The face validity test included three interview rounds, with adjustments upon participant feedback, focusing on content aspects (conceptual, item-specific, sematic and idiomatic) [12, 13]. In accordance with qualitative research practices regarding the content validity of questionnaires [13, 15], new participants were included (**Figure 2**) until no further significant changes were observed. This was achieved after 13 participants (**Table 1**). KHA interviewed (MK observed the first round) and documented feedback. Between rounds, KHA, MK and IFV analysed responses and adapted the PT. Remaining issues were reviewed by the expert committee.

FIGURE 2 Flow chart showing recruitment and inclusion of participants, per interview round and in total.



a) Did not complete the questionnaire.

TABLE 1 Characteristics of participants (N = 13).

Age, median (range), yrs	65 (24-79)
Sex, female, n (%)	9 (69)
Respiratory disease, n (%)	
COPD	4 (31)
Asthma	8 (62)
Breathing Pattern Disorder	1 (8)
Lung cancer	1 (8)
Other	2 (15)
None, under diagnostic investigation	3 (23)
Physical activity, n (%)	
< 30 min./wk	3 (23)
30-90 min./wk	0
90-15 min./wk	5 (38)
150-300 min./wk	3 (23)
> 300 min./wk	2 (15)
Location of recruiting hospital, n (%)	
Naestved[a]	10 (77)
Slagelse[a]	1 (8)
Roskilde[b]	2 (15)
Breathe-VQ score	
Median, IQR	21 (19-22)
Range	16-30

Breathe-VQ = The Breathing Vigilance Questionnaire.
a) Part of Naestved-Slagelse-Ringsted Hospital.
b) Part of Zealand University Hospital.

Stage 6 Appraisal of adaptation process

The expert committee reviewed a process summary of stages 1-5 and provided feedback for final adjustments.

Trial registration: pre-registered at Open Science Framework.

RESULTS

Table 2 presents the results of stage 1-6 (elaborated version: Supplementary file 3). During stages 1-4, we focused on equivalence between the original and translated versions. The expert committee evaluated key concepts and

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terms, e.g., regarding implicit temporality and specific words/phrases needing further exploration in the next stage.

TABLE 2 Overview of translation and adaptations, stages 1 to 5. For a more detailed version, see Supplementary file 3.

		Comments and adjustments		
	Original version	**stages 1-4**	**stage 5**	**Danish Breathe-VQ[a]**
Introduction				
Title	Breathing Vigilance Questionnaire	Discussed options for "vigilance" vs "awareness" Chose a neutral term in Danish	None	Questionnaire about breathing vigilance: Breathing Vigilance Questionnaire
Instruction	Please read the sentences below and choose a number between 1 (never) and 5 (always) that best describes how you typically feel in relation to your breathing	Discussion of "normally" vs "most often" to reflect time perspective Opted for "most often"	Participants requested information on questionnaire length and structure to help with understanding Added: "In the 6 sentences ..."	In the 6 sentences below, please choose a number between 1 (never) and 5 (always) to best describe how you most often feel about your breathing
Score: 1 = never 3 = sometimes 5 = always	Ranging 1-5	Considered having 3 vs 2 written options within the 5-point scale Settled on 2 written options for clarity	Instruction was clear to participants	Reply options for all questions on a scale ranging 1-5
Sentences				
Item 1	"I closely monitor how difficult my breathing feels"	Discussed alternatives for "monitor", e.g. "register", and grading language: "very" Decided to test participant understanding	Participant interviews resulted in edits to the item Final adjustment after considering intergenerational understanding	"I closely follow how difficult my breathing feels"
Item 2	"I become alarmed when I experience breathlessness or tightness in my chest"	Explored alternatives to "alarmed", e.g. "afraid" Opted for "become afraid Consulted on the term "chest tightness" with developers	Adjustments made based on clarity in collaboration with developers Final version chosen for simplicity and alignment with the original	"I become afraid when I experience breathlessness or tightness around my chest"
Item 3	"I am highly aware of small changes in how my breathing feels"	Discussed "aware" vs "conscious Discussed whether grading should be based on the scoring or included in the wording of the question, e.g. "very" Discussed "breathing" due to several alternatives in the Danish language	To avoid implicit grading, removal of "very", instead including "even" Participants noted that items 1 and 3 were similar	"I am aware of even the small changes in how my breathing feels"
Item 4	"I feel as if I am more aware of my breathing than other people"	Discussed the distinction between others being aware of their breathing vs them being aware of my breathing To specify, we included "than others are" in the end	Participants reported difficulty in contrasting their own experience with others' when it is unspoken Chose to maintain alignment with phrasing from stages 1-4	I feel that I am more aware of my breathing than others are"
Item 5	"When something happens that affects my breathing, I am anxious to work out how breathless I am"	Discussed "anxious to" vs "feel an urge to" Discussed the understanding of time factors Adjusted to reflect a simpler, clearer phrasing in Danish	Wording refined to clarify meaning Participants indicated it was relevant to their breathing experiences	"When something happens that affects my breathing, I become occupied with finding out the degree of breathlessness I get"
Item 6	"I worry about fluctuations in my breathing"	Discussed "worry" vs "anxious" Discussed "fluctuations" vs "changes" Discussed whether to include "even small" to indicate the ongoing awareness of breathing Discussed the time factor Chose to retain original phrasing for fidelity to the source	Participants understood "fluctuations" but some preferred "changes", "worry" was well understood	"I worry about fluctuations in my breathing"
Total score: higher score suggesting greater breathing vigilance	Note: Item scores are summed to yield a total score ranging 6-30 points	Discussed "vigilance" vs "awareness" Chose consistent terminology across sections	Not tested with participants	Note: Add the scores from the various replies in a total score ranging 6-30 points

Breathe-VQ = The Breathing Vigilance Questionnaire.
a) The Danish version in this column is directly translated into English for transparency (i.e., not a validated backward translation).

In stage 5, the three rounds led to item adjustments:

Round 1: Adjustments of items 1, 3 and 5.

Round 2: Modifications of item 1, 2 and 6, e.g., item 2: Addressing concerns about "chest tightness", which in Danish could be misinterpreted as indicative of cardiac distress.

Round 3: One minor adjustment of item 1. No further significant modifications were needed, and the expert committee agreed that a fourth round was not needed.

Throughout, participants provided valuable feedback and suggested refinements to the Danish language version. Overall, the Danish Breathe-VQ was found relevant, easy to understand and straightforward to complete. Indeed,

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items 2-5 encouraged reflection on awareness and experience of breathing.

In stage 6, the expert committee concluded that an equivalent Danish version had been achieved. The final version can be found in Supplementary file 4.

Item-specific findings

Generational language (item 1): This required the most extensive adjustments across all rounds. The key issue was ensuring suitable and clear language across age groups.

Time references (items 1, 5 and 6): Temporal aspects and how an individual feels in general or in specific situations. Participants interpreted these as referring to the present moment (i.e., at the time of completing Breathe-VQ) but also noted that questions could be understood to relate to general experiences.

Semantic and idiomatic challenges (across items): “Monitor” (item 1), “become alarmed” (item 2), “aware” (items 3 and 4), “than others are” (item 4), “anxious to work out” (item 5) and “fluctuations” (item 6). Danish terms for “breathing” [“åndedræt” and “vejrtrækning”] also varied.

DISCUSSION

This study translated and cross-culturally adapted the Breathe-VQ into Danish and demonstrated equivalence and face validity across patients with BPD, asthma, lung cancer and COPD. Participants found the questionnaire relevant, understandable and straightforward to complete, encouraging reflection on breathing vigilance. This underscores the questionnaire’s potential to probe breathing vigilance, highlighting its potential clinical utility. However, it may also potentially trigger vigilance and lead to response bias. This should be explored in future studies.

At least three considerations arise: the cultural shaping of experiences of breathlessness; the specific language used to describe breathlessness; and generational shifts in linguistic expression.

The adaptation process highlighted challenges related to cultural and linguistic definitions of breathlessness. Descriptions of breathlessness are often culturally influenced, and language is shaped by how people interpret and respond to respiratory sensations [16], e.g., affecting whether the origin of sensations is perceived as medical, environmental or emotional, and how breathlessness is articulated [17, 18]. In our study, participants often interpreted breathlessness as individual sensations and cognitive responses, reflecting an internalised perception. Terms used in the original Breathe-VQ, such as "monitoring" or "anxious to work out" were challenging to translate, likely due to different perceptions. E.g., the term “monitoring” refers to an ongoing interoceptive process, whereas Danish equivalents refer more to the present. These differences suggest that translating questionnaires assessing interoceptive awareness must consider not only linguistic accuracy but also cultural nuances in how breathlessness is contextualised and articulated.

Breathlessness is often described using metaphors or idioms. This complicates standardisation of assessments, as wording will influence how individuals rate their experience. Linguistic variation can also complicate communication in clinical settings, where healthcare professionals' wording of breathlessness may impact patients' beliefs and behaviours [17]. We encountered challenges in conveying terms like “chest tightness,” which carries different connotations depending on associations with, e.g., cardiac symptoms. Also, affective descriptors were found to be more highly associated with the severity of impairment than physical descriptors were. Altogether, this can result in mismatches between the language used by healthcare professionals and in questionnaires and the interpretations of patients with breathlessness [19]: Such ‘symptom discordance’ will make it difficult for a patient to map their lived experience to the questions being asked and answers available to

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them [20]. For instance, participants may separate the body's physical demands for air from a sense of self that is breathing, which, however, was not the case for other sensations, e.g., pain [20].

Language use evolves across generations and is influenced by historical contexts and social norms in particular age groups [20]. Older adults, who lived during periods when smoking and industrial exposure to toxic particles and chemicals were widespread, may describe breathing difficulties as more normative than youngsters, affecting the interpretation of breathlessness-related terms [20]. Additionally, a lifetime experience with breathlessness may influence an individual's perspective on their breathing and related assessment [20]. These intergenerational and biographical variations pose challenges for measurement tools. However, these differences in Breathe-VQ scores could also refer to actual differences in breathing vigilance. To address these aspects, future studies could investigate measurement group invariances based on, e.g., age, medical history and culture.

Limitations and strengths

Interviews were conducted by a single researcher, which may introduce a mono-professional bias, but ensured consistency across interviews. Only content equivalence and face validity were assessed, and further studies with larger samples and comparison with other instruments are warranted to formally test the scale's psychometric properties, construct validity and reliability. A gold standard framework for cultural adaptation has not yet been defined [13]. Still, while 30-40 participants has been recommended by some for this validation phase [13], our approach and sample aligned with established qualitative research practices [13, 15]. Given disease severity and vulnerability, recruitment was challenging, we therefore also opted not to include additional participants once sufficient data had been obtained.

Strengths include: 1) The overall methodological framework adhered to recognised guidelines [12, 13], providing a replicable framework for future translations within cross-cultural research. 2) The study is the first to demonstrate good face validity within specific patient populations, which is key for the development of the Breathe-VQ as a patient-reported outcome measure. 3) Inclusion of various respiratory diseases and multiple hospitals improves external validity. 4) The Breathe-VQ scores did not show a ceiling effect, even though patients would be expected to have more severe breathing symptoms than the original validation sample [1].

Conclusions

The Breathe-VQ has been successfully translated and culturally adapted into Danish, representing the first face-validated measure of breathing vigilance in a Nordic language. Further studies should validate its psychometric properties within clinical contexts and across various respiratory conditions.

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*) Contributed equally to the concept and design of this study.

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Conflicts of interest EK reports financial support from or interest in CPD courses, Society for Posture and Gait Research. AL reports financial support from or interest in Chartered Physiotherapists in Respiratory Care as a Research Champion. KHA reports financial support from or interest in the "Danish Foundation TrygFonden, Naestved, Slagelse and Ringsted Hospitals, the Association of Danish Physiotherapist's Research Fund, Region Zealand Health Scientific Research Foundation, Astma-Allergi Denmark, Astra Zeneca and Chiesi. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. These are available

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Supplementary materials a10250862-supplementary.pdf

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