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TITLE

Development and psychometric assessment of a questionnaire to study protection, promotion, and support of breastfeeding.

ABSTRACT

Objective: To develop an instrument to measure variables that influence health care professionals' behavior with regard to the protection, promotion, and support of breastfeeding, especially that related to the Baby-Friendly Initiative (BFI), and to conduct a psychometric assessment.

Design: Cross-sectional study.

Setting: Two public health departments in eastern Spain.

Participants: A convenience sample of 201 maternity and primary care professionals.

Methods: The Questionnaire of Professional Breastfeeding Support of the EMCA Program (QPBS-EMCA) was developed using the theory of reasoned action as a conceptual framework and the global criteria for evaluating implementation of the Baby-Friendly Initiative (BFI). It comprises 4 scales on beliefs, attitudes, subjective norms, and behavioral intention. The development process included item assessment and selection based on expert judgment and statistical criteria. The QPBS-EMCA scales were assessed for reliability and validity, including internal consistency, principal components factor analysis, criterion-related validity, and comparison of contrasted groups.

Results: The Beliefs, Attitudes, and Subjective Norms Scales were multidimensional, whereas the Behavioral Intention Scale was uni-dimensional. Cronbach's alpha coefficients ranged from 0.65 to 0.81. Total scores for the Beliefs, Attitudes, and Subjective Norms Scales predicted scores for the Behavioral Intention Scale. Scores for the different QPBS-EMCA scales were related to professionals' previous breastfeeding training, interest in new training, and appraisal of breastfeeding policy in the workplace.

Conclusion: The psychometric characteristics of the QPBS-EMCA questionnaire render it suitable for evaluation of professionals' beliefs, attitudes, subjective norms, and behavioral intention in relation to breastfeeding and could be useful in health care facilities implementing quality improvement processes based on the BFI.

Keywords: Questionnaires, breast feeding, Baby-friendly Initiative, Health Care Providers, Behavior and Behavior Mechanisms, Staff Attitudes, Psychometrics.

PRÉCIS

The QPBS-EMCA questionnaire is a suitable tool to measure variables influencing professionals' behavior related to breastfeeding and could be useful for implementation of the BFI.

CALLOUTS

Callout 1: Health care providers' beliefs and attitudes concerning breastfeeding and the Baby-Friendly Initiative are the most frequently mentioned obstacles when an implementation process is described.

Callout 2: The QPBS-EMCA questionnaire incorporates valid and reliable tools for assessing different health care providers' beliefs, attitudes, subjective norms and behavioral intention related to breastfeeding support.

Callout 3: The QPBS-EMCA scales could be useful for facilities implementing the Baby-friendly Initiative, to assess staff adherence, specific training effects, and the prevailing norms related to breastfeeding.

INTRODUCTION

Given its short and long term health implications for mothers and infants, breastfeeding is considered to provide the best nutrition during the first years of life due to its substantial short and long term health benefits for mothers, infants and young children (Johnston, Landers, Noble, Szucs, & Viehmann, *2012). The* World Health Organization recommends exclusive breastfeeding for the first 6 months, and breastfeeding with complementary foods up to at least 2 years of age (Saadeh, 2003). In Spain, as in the majority of European countries (Cattaneo et al., 2010), breastfeeding rates are far below these recommendations, and only 46.9% of Spanish children receive breast milk at the age of 6 months (Spanish Ministry of Health and Social Policies, 2013). Consequently, the protection, promotion, and support of breastfeeding are regarded as a public health priority in Europe and in Spain, the National Health System Quality Plan urges the use of efficient breastfeeding support practices (Spanish Ministry of Health and Social Policies, 2009).

Early breastfeeding cessation is usually the result of a combination of various factors at individual, group, and society levels (Oliver-Roig, 2013). However, the health system is one of the factors that most negatively *affects* low breastfeeding rates because of the influence that professional interventions during the first days of life have on the establishment of breastfeeding. Practices such as the separation of mothers and infants after birth, the recommendation of restricted breastfeeding, the use of pacifiers before breastfeeding is well stablished, giving water or formula supplements without medical indication, inappropriate recommendations for discontinuing breastfeeding, the distribution of free formula samples, the

professionals' lack of clinical training and skills for managing breastfeeding problems, as well as the conflicting or inadequate information on breastfeeding are related negatively with breastfeeding duration (DiGirolamo, Grummer-Strawn, & Fein, 2008; Oliver-Roig, 2013; Benoit & Semenic, 2014).

Improving hospital practices through implementation of the Baby-friendly Initiative (BFI) is one of the most effective interventions to affect subsequent overall improvement in breastfeeding rates (García-de-león-gonzález et al., 2010; Lillehoj & Dobson, 2012; Patel et al., 2014). The BFI program defines the quality standards that are meant to replace health facility practices that hinder the establishment and continuation of breastfeeding. The accreditation criteria of the BFI include having a written breastfeeding policy, training all health care staff in the skills necessary to implement this policy, informing all pregnant women about the benefits and management of breastfeeding, implementing evidence-based practices proven to increase breastfeeding, avoiding health facility-based marketing of infant formula, and fostering the establishment of breastfeeding support groups (UNICEF, World Health Organization, & Wellstart International, 2009).

Industrialized countries have few accredited baby-friendly hospitals in comparison with the rest of the world (Semenic et al., 2012), and, in Spain, only 16 hospitals attending not more than 5% of Spanish births have BFI accreditation (Spanish BFI Association, 2015), illustrating the gap between evidence-based care recommendations and current care practices. The study of contextual features that act as barriers or facilitators to the adoption of evidence-based practices in health care is a key priority in the field of implementation science (Eccles et al., 2009).

Several types of obstacles to BFI implementation have been identified (Semenic et al., 2012). On the one hand, sociopolitical obstacles include aspects related to the

broader contexts such the aggressive marketing practices of infant formula companies, lax government adherence to the International Code of Marketing of Breast Milk Substitutes (subsequently referred to as the “Code”) (World Health Organization, 1981), and sociocultural infant feeding norms that favor formula feeding. On the other hand, organizational obstacles refer to the structures and processes within health care facilities. These include barriers such as insufficient funding, difficulties of the staff to provide breastfeeding support or to attend training sessions, and hospital routines that interfere with breastfeeding. Finally, individual obstacles are related to the knowledge, attitudes, and practices of health care workers or health care users *related to breastfeeding*.

(CALLOUT 1)

Health care professionals play a critical role in quality improvement interventions based on the BFI because substantial changes in patterns of care are involved (Schmied et al., 2014; Taylor, Gribble, Sheehan, Schmied, & Dykes, 2010; Weddig, Baker, & Auld, 2011). A low level of knowledge and neutral or negative attitudes about breastfeeding or the BFI, reluctance to promote breastfeeding out of concern about making mothers feel guilty, overuse of infant formula, and adherence to outdated practices supporting breastfeeding have been identified as barriers to implementation of the BFI at the individual level of health care providers (Bartick, Stuebe, Shealy, Walker, & Grummer-Strawn, 2009; Benoit & Semenic, 2014; Semenic et al., 2012).

Existing BFI assessment tools (UNICEF et al., 2009) and indicators proposed to assess the quality gaps regarding breastfeeding care (Bartick et al., 2009; de Bruin-Kooistra, Amelink-Verburg, Buitendijk, & Westert, 2012; Groene, Klazinga, Kazandjian, Lombrail, & Bartels, 2008) are useful for determining the degree of

implementation of quality standards in a health facility, but they provide little information on staff adherence to the change process.

In addition, although previous *researchers* have developed attitude measurements related to the professionals' support of breastfeeding, with or without other variables related to professional behavior, none of them provides sufficient evidences of content and construct validity, together with appropriate reliability data, and can be applied to all health professionals linked to breastfeeding attention (See Table SD1). For example, defining the construct for assessment is essential for developing representative items (Terwee et al., 2007). Only three tools on professionals' attitudes towards breastfeeding have adequately *defined frameworks on which they were based* (Bernaix, 2000; Kang, Song, & Im, 2005, Dodgson & Tarrant, 2007). *Furthermore,* only two of these *research groups* (Bernaix, 2000; Kang et al, 2005) assessed the degree to which the items were representative of the attitudes of the professionals, using expert judgment during the selection process of the items, as is recommended (Terwee et al., 2007). *However, the substantive* or statistical features that were used as the basis for selecting items from the initial version of the tools and data on their factor structure were not available, limiting the quality of the content evidences and not allowing *proper* interpretation of the reliability results. Finally, other tools on attitudes of health professionals towards *breastfeeding do not have sufficient evidence on content validity or construct validity characteristics* (Martens, 2000; Dodgson & Tarrant, 2007; Brodribb, Fallon, Jackson, & Hegney, 2008) or reliability (Siddell, Marinelli, Froman, & Burke, 2003; Ekström, Matthiesen, Widström, & Nissen, 2005), and because the tools were not developed targeting different health professionals.

The development of valid and reliable tools to assess barriers to the provision of adequate protection, promotion, and support of breastfeeding, and specifically to implementation of the BFI, encountered by health care providers in hospital or community settings, could contribute to the design and assessment of targeted interventions in a quality improvement process. *Our project,* promoted by the Healthcare Quality Management Program of the Spanish Region of Murcia (EMCA Program), was therefore initiated to develop and validate a questionnaire to measure the variables that influence the behavior of health care professionals in terms of the protection, promotion, and support of breastfeeding. Here, we describe the development and psychometric properties of this questionnaire.

METHODS

Theoretical *framework*

Supportive behavior of staff related to the BFI can be explained using the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980). According to the TRA, the most important determinant of behavior is behavioral intention. Factors that affect intentions include beliefs about the implications of an action, attitudes toward behavior, and subjective norms or perception of others' attitudes toward behavior (Ajzen & Fishbein, 1980).

Development of the *Questionnaire*

The Questionnaire on Professional Breastfeeding Support of the EMCA Program (QPBS-EMCA) comprises four scales that were generated to evaluate beliefs, attitudes, subjective norms, and behavioral intention, respectively. Questionnaire items were generated for each scale by a multidisciplinary working group composed of two preventive medicine and public health care physicians, a pediatrician, a midwife, a nurse, and two psychologists, all of whom had previous experience in

breastfeeding support and research and were collaborating with the program for the Protection, Promotion and Support of Breastfeeding in the Region of Murcia.

With the theoretical framework established, the content of the QPBS-EMCA questionnaire was based on the global criteria for evaluating the implementation of the BFI (UNICEF et al., 2009), information on quality improvement interventions to achieve BFI compliance in Spain (García-de-león-gonzález et al., 2010), and the Code. Additionally, relevant aspects identified in previous studies on professional support for breastfeeding, such as continuity of care, conflicting advice, and practical help offered (Mcinnes & Chambers, 2008), were taken into account when developing the items.

For item construction, the working group classified these *items* attending 4 content domains (Figure 1): breastfeeding practice, information on breastfeeding and professionals' support style, interventions related to instauration and continuation of breastfeeding, and the Code. The first domain, breastfeeding practice, included items *related to* 3 topic areas: relevance and benefits of breastfeeding, recommendations on exclusivity and duration, and professional training. The second domain, information on breastfeeding and professionals' support style, included items related to the information and professional support, as well as respect for the mother's decisions. The instauration and continuation of breastfeeding domain included items on 5 topic areas: Early mother-infant skin to skin contact and separation during breastfeeding, problems management and the use of formula supplements, recommendations on breastfeeding patterns, use of teats and dummies, and support groups. Items on the Code accomplishment were included in the last domain. Since the tool was addressed not to the management team, but to health care providers, we excluded those topic areas related to health facilities management, such as the

existence of a written breastfeeding policy or the provision of resources. In developing the items, at least one item in each of the topic areas for each of the four scales of the QPBS-EMCA was generated.

Initially, a total of 139 items were formulated for the four scales comprising the instrument. Replies were scored on a Likert scale from 1 (“strongly disagree”) to 5 (“strongly agree”).

These items were sent to two expert groups via e-mail for review: One group was formed by 20 clinical professionals, each with more than 5 years of experience in perinatal care and who had participated in the program for the Protection, Promotion and Support of Breastfeeding in the Region of Murcia. All were Spanish researchers working in the field of breastfeeding, or people who had participated as teachers in training programs on breastfeeding in Spain. The second group was formed by 8 psychologists with expertise in the field of health and who had used TRA in a previous research project. Finally, two groups, one composed of five pediatricians, three midwives, six nurses, and two general practitioners and another consisting of four psychologists, responded to the e-mail and assessed the items of the QPBS-EMCA scales. Their task was to assess the grade of representativeness, relevance, and clarity of each item considering its location within a scale (e.g. whether an item located within the attitudes scale did indeed refer to an attitude) in the case of the psychologists, or, in the case of the clinical professionals, its relationship to the topic areas cited above. Evaluation was performed using a 5-point Likert scale where 1 *indicated* “extremely poor” and 5 *indicated* “very good”. Experts also had the option of adding specific comments regarding the items or the whole subscale.

The working group revised the information provided by the expert groups and reached a consensus in order to produce the first version of the QPBS-EMCA

questionnaire, modifying items to improve comprehensibility and legibility where necessary, or deleting poor quality items. The item elimination or modification process was undertaken considering both quantitative and qualitative aspects.

In order to delete items that were poorly rated, the quantitative analysis was based on median and percentage of agreement (PA). The PA was calculated as the percentage of experts who agreed that the item was representative, relevant, or clear (those who scored the item with 3, 4 or 5 points). Two quantitative criteria were *used to* eliminate items: 1) Median ≤ 3 (for representativeness and relevance) or 2) PA≤ 80% (for representativeness and relevance). For example, the item " Mothers breastfeeding in public is frowned upon in my place of work" included in the Subjective Norms Scale, had low scores of representativeness and was deleted and the item " I feel satisfied when I reassure a concerned mother about whether she produces enough milk to feed her child", in the Attitudes Scale was deleted *because of* low relevance. When the representativeness and the relevance of an item were adequate but its clarity score was poor, the wording of the item was changed based on the experts' comments and suggestions. For example, there were added examples of difficulties in the item "We recommend bottle-feeding when mothers encounter difficulties with breastfeeding (the infant cries a lot or is not sated, the mother is very tired)" in the Subjective Norms Scale.

Quantitative and qualitative analyses were complementary. *Qualitative analyses identified pairs of items with* very similar content or which differed only in the degree of specification or generality with respect *to a topic.* In these cases the worst-rated items were eliminated. For example, in the Attitudes Scale, "I like talking to mothers about breastfeeding problems" was chosen over "I like to have the chance to solve problems of breastfeeding mothers". Finally, according to the suggestions made by

the group of psychologists, the item "I would not mind working with support groups" was changed from Behavior Intention Scale to Attitudes Scale.

Finally, the first version of the questionnaire comprised 78 statements, 21 of which belonged to the beliefs scale, 20 to the attitudes scale, 19 to the subjective norms scale, and 18 to the behavioral intention scale. Of these items, 31 were worded in a manner in favor of the protection, promotion, and support of breastfeeding activities. The remaining unfavorable items were given negative scores. The average time for completion of all scales of the QPBS-EMCA questionnaire was approximately 15 minutes.

Sample and Procedure

The research study took place in the Spanish province of Alicante in 2011, using a convenience sample of health care professionals. In order to determine the preliminary psychometric characteristics of each QPBS-EMCA scale, questionnaires were distributed at two hospitals that were not BFI-accredited at the time of the survey and five primary care centers within the catchment area of one of the hospitals. These questionnaires were to be completed by maternity and infant health care professionals. Since it was not possible to know, a priori, the number of professionals who could be *given a questionnaire*, 300 questionnaires were distributed to obtain a sample of at least 140 cases over the period of one week, *satisfying* the criteria of 7 cases per item to perform a factor analysis of a scale (Terwee et al., 2007).

Questionnaires were completed voluntarily and anonymously by nursing assistants, nurses, midwives, and physicians and submitted to the research team. Through additional items, questionnaires also gathered demographic information to compare sample characteristics with characteristics of samples in future studies (sex, age, and

number of children) as well as details concerning any breastfeeding promotion policy in the workplace and specific breastfeeding training to obtain evidence of external validity. The study received approval from the Ethical Committee of the University of Murcia. Written consent to participate was obtained from all participants.

Data Analysis

Descriptive characteristics of the sample were obtained from the sociodemographic data. A psychometric assessment of the QPBS-EMCA scales was carried out. As a first step in assessing construct validity, an exploratory factor analysis was conducted using the iterative principal axis method with varimax rotation (Terwee et al., 2007). In order to evaluate the appropriateness of this analysis, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were calculated for each scale. The factor solution was determined using the scree-plot method. In addition, mean, standard deviation, and corrected item-total correlations were calculated. Cronbach's internal consistency coefficient was used to estimate reliability. Floor and ceiling effects were calculated using proportion of respondents with lowest or highest total possible scale and subscale scores.

Statistical and substantive criteria were employed to determine which items should remain in the final version of the questionnaire. We rejected items with factor loadings or corrected item-total correlations less than 0.3, a high percentage of "no replies", or ceiling or floor effects > 80%. A limit of 20 items for each of the scales was established to control questionnaire size and reduce respondent burden. However, we felt that the questionnaire should maintain items from all of the topics that were considered a priority by the research group.

After item reduction, we used the "known-groups" method in order to obtain evidence of external validity. The total scores from the Beliefs Scale were expected to relate to

specific training received in breastfeeding, *assuming that* professionals that had received some formal training on breastfeeding should have higher level of knowledge about breastfeeding than those who had not, as shown in previous studies (Siddell et al., 2003; Dodgson & Tarrant, 2007). Likewise, the professionals with higher total scores for the Behavioral Intention and Attitudes Scales were expected to be more interested in receiving new training in breastfeeding than the rest of professionals, due to their greater willingness to receive a course on breastfeeding in the context of other competing educational priorities (Benoit & Semenic, 2014). Finally, total scores for the Subjective Norms Scale were expected to relate to a global measurement of the institutional norms about breastfeeding, obtained by an item on appraisal of breastfeeding policy in the workplace. Hypotheses were compared using the Student's t test for independent samples and ANOVAs. In addition, according to TRA assumptions, it was hypothesized that total scores of the beliefs, attitudes, and subjective norms scales would be predictors of total scores of the Behavioral Intention Scale; thus, a multiple regression analysis was carried out.

RESULTS

Participants

A total of 201 questionnaires were *collected of which* 12 (6%) were excluded from the psychometric analysis because the QPBS-EMCA questionnaire had only been partially completed. Of the study participants, 166 (82.6%) were women; age ranged from 22 to 65 years with a mean of 41.8±10.7 years. Overall, 134 (66.7%) of the respondents had children and 124 (61.7%) of those children had been breastfed for at least 4 months. See Table 1 for response details on breastfeeding policy in the workplace and specific breastfeeding training.

Psychometric Properties

In a dimensionality analysis of all scales, the sample adequacy rates of the KMO (from 0.79 to 0.88) and Bartlett's test (p<.01) showed that the use of factor analysis was appropriate. Tables 2 through 5 list items in the final version of the beliefs, attitudes, subjective norms, and behavioral intention scales, together with the factor loading, mean, standard deviation, and corrected item-subscale correlation for each item. Table 6 shows the distribution of scores and reliability coefficients for the QPBS-EMCA scales and subscales.

Beliefs Scale

A total of five items were eliminated, leaving 16 items in the final version of the Beliefs Scale. Factor analysis with a three-factor solution accounted for 39.4% of the total variance; the rotated Factors I, II, and III explained 15%, 13.8% and 10.6%, respectively.

Factor I of the Beliefs Scale contained items concerning *how to maintain breastfeeding over time*, Factor II regarded *limitation of the frequency or duration of feeds,* and Factor III items were about *professional advice related to breastfeeding*. Those professionals who had received specific training in breastfeeding obtained significantly higher scores for Factor I (t=2.27, df=187, p=.02), Factor II (t=2.72, df=187, p<.01), and Factor III (t=3.50, df=187, p<.01) compared with those who had not received training.

Attitudes Scale

A total of 13 items remained in the final version of the Attitudes Scale. A two-factor solution explained 33.8% of the total variance; the rotated Factors I and II explained 19.1% and 14.7%.

Factor I was composed of items regarding attitudes toward practices facilitating the establishment and continuation of breastfeeding, while Factor II concerned attitudes toward the Code. For both factors, the group of professionals who showed interest in breastfeeding training was compared with those who did not. Statistically significant differences were only found for Factor I (t=2.76, df=159, p<.01), where the group of professionals who showed interest in breastfeeding training had higher scores than the group who did not.

Subjective Norms Scale

Seven items were excluded from the first version of the Subjective Norms Scale, leaving 12 items in the final version. A two-factor solution accounted for 37.6% of the total variance. Factor I, regarding *norms related to breastfeeding support,* explained 20.4% of the total variance and Factor II, regarding *norms related to practices limiting breastfeeding*, explained 17.2%.

One ANOVA was performed for each factor, where the independent variable was "appraisal of breastfeeding policy in the workplace" with three levels (unsuitable and somewhat suitable, suitable, and very suitable). For Factor I ($F(2,157)=5.6$, $p<.01$), those who assessed center breastfeeding policy as poor or inadequate obtained lower mean scores than those whose assessment was more positive, and the same trend was observed for Factor II ($F(2,159)=3.4$, $p=.04$).

Behavioral Intention Scale

After eliminating 10 items for statistical and substantive reasons, a unifactorial solution accounted for 43.5% of the total variance, with eight items remaining in the final version of the Behavioral Intention Scale. Behavioral intention differences in terms of interest in receiving breastfeeding training were analyzed, revealing statistically significant differences (t=3.48, df =67, p<.01) between those who were

interested in receiving new training, with higher scores, and those not interested, who received lower scores.

Prediction of Behavioral Intention

A multiple regression analysis showed that the model which used total scores of the Behavioral Intention Scale as the criterion variable and total scores for the beliefs, attitudes, and subjective norms scales as predictor variables was statistically significant (*adjusted* R^2=.49, $F(3, 189)=61.69$, $p<.01$). The components with the highest standardized beta coefficients were beliefs (β=.38, t=5.08, p<.001) and attitudes (β=0.258, t=3.56, p<.001).

DISCUSSION

In order to improve breastfeeding rates, the BFI has become a national health care priority in many countries and numerous hospitals are attempting to implement this initiative. Health care providers' beliefs and attitudes concerning breastfeeding and the BFI are the most frequently mentioned obstacles when an implementation process is described (Bartick et al., 2009; Benoit & Semenic, 2014; Semenic et al., 2012). Here, we *presented* comprehensive, valid, and reliable tools for assessing the beliefs, attitudes, subjective norms, and behavioral intention of health care providers in hospital or community settings, related to the protection, promotion, and support of breastfeeding, especially those based on the BFI.

(CALLOUT 2)

When a questionnaire is used to obtain scores for prediction, classification, or assessment, it is important to determine properties related to its content and measurement, validity, and reliability (Terwee et al., 2007). Differences in content with previous questionnaires are related to the measurement aim of the

questionnaire, the target population, the concepts it is intended to measure, and the methods for item selection and reduction.

Global criteria for the BFI, the Code, and the TRA provided a clear framework during item definition and assured the suitability of the QPBS-EMCA questionnaire for assessing different health care professionals' adherence to quality improvement processes aimed at protecting, promoting, and supporting breastfeeding. None of the previous tools had included Global Criteria and the Code in order to specifically guide the item development process and most had not considered a multi-professional team as a target population. In addition, use of the TRA framework permitted the inclusion not only of personal but also social factors to explain behavioral intention, an aspect of particular importance when changes in the care provided are required at both individual and group levels (Semenic et al., 2012). Professional behavior related to changes in practice does not depend solely on personal decision (Nickel, Taylor, Labbok, Weiner, & Williamson, 2013). For instance, trained and motivated professionals could encounter difficulties in gaining the necessary support from their colleagues or institutions, rendering the implementation of any program impossible. Only one previous study had included the TRA as a framework (Bernaix, 2000), but it was developed including only nurses and it had other methodological limitations, *as previously explained.*

In line with previous recommendations (Terwee et al., 2007), the QPBS-EMCA *questionnaire's* content validity was maximized by employing separate scales to measure the different TRA outcome levels, using an over inclusive initial item pool, and basing item assessment and selection on the expert judgment of a multidisciplinary team that included psychologists and clinical professionals, besides the reported statistical criteria. In the present study, the process of obtaining

evidence of content validity was more comprehensive than that reported in previous studies on variables that influence the behavior of health care professionals related to breastfeeding, *that* started from a limited number of items and did not refer to any assessment or selection process (Martens, 2000; Siddell et al., 2003; Kang et al., 2005; Dodgson & Tarrant, 2007) or, *moreover, did* not specify statistical or other features that were used as the basis for selecting items previous to the psychometric analysis (Bernaix, 2000; Ekström et al., 2005; Brodribb et al., 2008).

In general, the QPBS-EMCA questionnaire scores demonstrated good psychometric properties. There was no prior hypothesis regarding scale dimensionality; however, the dimensions identified in the multidimensional scales confirmed that items were grouped in relevant areas of barriers to BFI implementation encountered by health care providers, as identified in literature searches (Semenic et al., 2012). Factors I and II of the Beliefs Scale, factor I of the Attitudes Scale, and factor II of the Subjective Norms Scale are related to the overuse of infant formula and adherence to outdated practices supporting breastfeeding. Factor III of the Beliefs Scale, factor II of the Attitudes Scale, and factor I of the Subjective Norms Scale coincide with the main problems related to professional advice and support offered to breastfeeding mothers, including communication styles and adherence to the Code.

Furthermore, the total QPBS-EMCA scale scores obtained in the present study showed sufficient criterion-related validity when assessed with behavioral intention. Knowledge and/or beliefs were more influential in the intention to promote breastfeeding than emotional aspects denoted by attitudes and subjective norms. These results are consistent with those reported by Bernaix (Bernaix, 2000), illustrating the importance of knowledge. Nevertheless, the results of the present study support the need to consider all the variables of the TRA model. Meanwhile,

external validity was supported by the results of the comparison of scores obtained by known-groups, which were consistent with most previous hypotheses. Higher scores on the Beliefs Scale were related to specific previous breastfeeding training; professionals who were interested in receiving new training obtained higher scores for the Behavioral Intention Scale; and a higher score for the Subjective Norms Scale was related to more positive appraisal of breastfeeding policy in the workplace. While professionals with higher scores in factor I of the Attitudes Scale, related to practices facilitating establishment and continuation of breastfeeding, were more likely to be interested in new breastfeeding training, these differences were not observed in factor II scores for the scale, related to compliance with the Code. One explanation for this might be that in a non-BFI accredited context such as the study hospitals, professionals could consider practices that contravene the Code as normal and necessary to inform and support partially breastfeeding or bottle-feeding mothers (McInnes, Wright, Haq, & McGranachan, 2007). Therefore there would be fewer differences between groups with different levels of interest in breastfeeding training. Regarding reliability, Cronbach's alpha coefficients were satisfactory for the total scale and subscale scores, ranging from 0.65 to 0.81. In most previous studies (Martens, 2000; Bernaix, 2000; Kang et al, 2005; Dodgson & Tarrant, 2007; Brodribb et al., 2008) there is no data available on the factor structure of the scale in order to determine whether the items form only one overall scale or more than one, not enabling of the results on internal consistency reliability to be interpreted correctly (Terwee et al., 2007). Only two studies, assessing nurses' and midwives' support *attitudes, included* an exploratory factor analysis, reporting lower (Ekström et al., 2005) or similar (Siddell et al., 2003) reliability results.

(CALLOUT 3)

Implications

The QPBS-EMCA could be useful for health care facilities initiating or implementing quality improvement processes based on the BFI. For example, the scales of the QPBS-EMCA questionnaire could be used to determine the magnitude of the effect of a training course on the level of knowledge, attitudes, subjective norms, and behavioral intention of the professionals of a given health facility by comparing the scores of the dimensions of each scale before and after the course. Moreover, all the QPBS-EMCA scales, and specifically those scales assessing beliefs, attitudes, and behavioral intention, constitute good tools to assess health professionals' adherence to a quality implementation program related to breastfeeding. These scales could *identify professionals who could assume a leadership role in the implementation process.* Furthermore, the Subjective Norms Scale yields information on professionals' perceptions of the breastfeeding norms prevailing in an institution. These scores can be good indicators of the cultural change that *occurs* after the implementation of an improvement process. Finally, and according to their content, the dimensions scores in the QPBS-EMCA scales could be used in isolation. For example, and in order to design better training interventions tailored to each group, the total scores in Factor II of the Attitudes scale may facilitate the comparison of the level of attitudes related to the Code between different professional groups. Whether the professionals included in the sample were more in favor of breastfeeding protection, promotion, and support compared to non-respondents, is unknown; this represents a possible limitation of the study. Although initial support for the validity and reliability of the QPBS-EMCA was provided, the instrument must be tested in more diverse contexts. Furthermore, future research regarding the capacity

of the QPBS-EMCA questionnaire to detect significant *changes over time should* be conducted to provide further information about attributes and criteria.

CONCLUSIONS

The results of *our study* indicate that the four scales included in the QPBS-EMCA questionnaire can be considered valid and reliable measures to evaluate health care professionals' beliefs, attitudes, subjective norms, and behavioral intention related to the protection, promotion, and support of breastfeeding. Total scores for the Beliefs, Attitudes, and Subjective Norms Scales *predicted* scores for the Behavioral Intention *Scale.*

Scores for the different QPBS-EMCA questionnaire scales *were* related to relevant variables in quality improvement processes based on the BFI, such as professionals' specific previous breastfeeding training and interest in new training or appraisal of breastfeeding policy in the workplace. The QPBS-EMCA could be useful to evaluate variables related to the breastfeeding support behavior of different professionals in health care facilities implementing quality improvement processes based on the BFI.

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649 **Table 1. Participant Characteristics (n=201).**

Characteristicics	n (%)
Profession	
Nursing assistant	41 (20.4)
Nurse/midwife	73 (36.3)
Physician/specialist[a]	68 (33.8)
Other	7 (3.5)
No response	12 (6.0)
Work place	
Elche Hospital	57 (28.4)
Elda Hospital	85 (42.3)
Primary care centers in Elda Health Department	59 (29.3)
Existence of a breastfeeding policy in work place	
Yes	166 (82.6)
No	15 (7.5)
Don´t know	17 (8.4)
No response	3 (1.5)
Appraisal of breastfeeding policy	
Unsuitable	7 (3.5)
Someting suitable	21 (10.4)
Suitable	87 (43.3)
Very suitable	52 (25.9)
Unknown	15 (7.5)
No response	19 (9.4)

Breastfeeding policy required in work place	
Yes	98 (48.8)
No	31 (15.4)
Don´t know	7 (3.5)
No response	65 (32.3)
Work place with BFI[b] accreditation	
Yes	15 (7.4)
No	94 (46.8)
Don't know	85 (42.3)
No response	7 (3.5)
Breastfeeding training	
Yes	109 (54.2)
No	87 (43.3)
No response	5 (2.5)
Evaluation of own breastfeeding training	
Insufficient	23 (11. 4)
Appropriate	90 (44. 8)
Very good	31 (15.4)
No previous training	1 (0.5)
No response	56 (27.9)
Breastfeeding training interest	
Yes	116 (57.7)
No	41 (20.4)
Don´t know	11 (5.5)

No response	33 (16.4)

[a]Obstetricians, pediatricians.

[b]The Baby-Friendly Hospital Initiative.

652 **Table 2. Classical Item-Test Analysis and factor loadings of the Beliefs scale of**
653 **the QPBS-EMCA Questionnaire[a]. (n=189).**

Items[a]	Item-subscale correlation	Mean ± SD	Factor Loading
Beliefs Scale			
Factor I - How to maintain breastfeeding over time			
Exclusive breastfeeding is recommended up to 6 months.	.49	4.1 ± 1.1	.47
Efforts should be made to maintain breastfeeding even when infants are separated from their mothers.	.66	4.5 ± 0.8	.72
Expressed breast milk can be frozen.	.58	4.6 ± 0.9	.69
Information on how to express milk is necessary when breastfeeding mothers are separated from their infants.	.61	4.6 ± 0.7	.74
Breastfeding support groups play an important role in maintaining breastfeeding.	.50	4.3 ± 0.9	.56
Factor II - Limiting breastfeeding			
Bottle-feeding is the best way to administer formula supplements to infants that need them.	.56	3.2 ± 1.4	.67
Exclusively breastfed infants should also drink water.	.38	4.0 ± 1.2	.40

As a general rule, every three hours is a good breastfeeding schedule.	.65	3.3 ± 1.5	.76
Scheduled breastfeeding limits breast milk production.	.43	3.3 ± 1.4	.46
Infants should not feed for more than 10 minutes on each breast per session.	.54	3.4 ± 1.4	.66
Factor III - Professional advice related to breastfeeding			
Breastfeeding is beneficial to maternal health.	.38	4.4 ± 0.9	.49
Breastfed infants tend to enjoy better health than those fed formula.	.34	4.0 ± 1.1	.56
Mother and infant skin-to-skin contact immediately after birth is important to establish breastfeeding.	.39	4.5 ± 0.9	.55
Breastfeeding should be maintained until at least two years of age.	.35	3.1 ± 1.2	.41
The presence of infant formula advertising in health care centers does not influence a mother's decision to breastfeed.	.39	3.2 ± 1.3	.41
Health care professionals should avoid giving mothers gift packs containing pacifiers or infant formula.	.42	3.4 ± 1.3	.44

[a]An English translation of the items of the QPBS-EMCA Questionnaire is shown. Email the corresponding author for a copy of the original Spanish version.

657 **Table 3. Classical Item-Test Analysis and factor loadings of the Attitudes-scale**
658 **of the QPBS-EMCA Questionnaire[a]. (n=189).**

Items[a]	Item-subscale correlation	Mean ± SD	Factor Loading
Attitudes Scale			
Factor I- Attitudes toward practices facilitating establishment and continuation of breastfeeding			
I think it is unnecessary to discuss the benefits of breastfeeding with pregnant women.	.46	4.7± 0.8	.54
I think it is over the top for a mother to initiate breastfeeding immediately after birth.	.52	4.7 ± 0.9	.64
I think that mother and infant skin-to-skin contact is unnecessary in first half hour after caesarean section.	.52	4.4 ± 1.1	.60
I feel uncomfortable seeing a woman breastfeeding a child more than one year old.	.41	4.4 ± 0.9	.47
I think it is unrealistic to recommend that a mother breastfeed on demand.	.55	4.3 ± 1.1	.66
I am not convinced by expressed milk.	.51	4.6 ± 0.7	.68
I like talking to mothers about breastfeeding problems.	.26	4.0 ± 1.1	.30
I would not mind working with support groups.	.40	3.7 ± 1.1	.37
Factor II - Attitudes toward the Code of			

Marketing of Breast Milk Substitutes			
I think it is over the top to use a cup or glass to give formula supplements to breastfeeding infants.	.31	3.2 ± 1.4	.35
I think it is excessive to prohibit infant formula advertising in health care centers.	.53	3.3 ± 1.4	.60
I think it is acceptable to give mothers gift packs containing pacifiers.	.62	3.3 ± 1.3	.73
I do not like seeing infant formula advertising in my health center.	.37	2.8 ± 1.3	.49
I think it is excessive to prohibit professionals from giving free samples of infant formula to breastfeeding mothers.	.56	3.1 ± 1.3	.67

[a]An English translation of the items of the QPBS-EMCA Questionnaire is shown. Email the corresponding author for a copy of the original Spanish version.

662 **Table 4. Classical Item-Test Analysis and factor loadings of the Subjective**

663 **Norms Scale of the QPBS-EMCA Questionnaire[a]. (n=189).**

Items[a]	Item-subscale correlation	Mean ± SD	Factor Loading
Subjective Norms Scale			
Factor I - Norms related to breastfeeding support			
We are all expected to give similar information on breastfeeding.	.59	4.1 ± 1.1	.65
A mother's informed choice about child care is respected.	.58	4.0 ± 1.0	.64
The work of mothers' support groups is appreciated.	.51	3.9 ± 1.0	.63
Formula samples are given to breastfeeding mothers.	.32	4.0 ± 1.1	.35
Breastfeeding training is considered important.	.62	4.3 ± 0.9	.74
Besides information, mothers are given practical help with breastfeeding.	.58	4.0 ± 1.1	.64
Factor II - Limiting breastfeeding			
Pacifiers are recommended to calm babies.	.58	3.5 ± 1.3	.68
We recommend supplementing breastfeeding with formula or other foods from 4 months.	.44	3.7 ± 1.5	.49
We recommend adhering to an infant feeding schedule.	.54	3.5 ± 1.3	.60

We recommend bottle-feeding when mothers encounter difficulties with breastfeeding (the infant cries a lot or is not sated, the mother is very tired).	.46	3.0 ± 1.3	.63
In the case of mastitis, we recommend suspending breastfeeding until the infection has gone.	.47	3.7 ± 1.3	.57
Infant formula advertising (calendars, stationery, stadiometers, etc.) is permitted.	.32	3.0 ± 1.3	.38

[a]An English translation of the items of the QPBS-EMCA Questionnaire is shown. Email the corresponding author for a copy of the original Spanish version.

667 **Table 5. Classical Item-Test Analysis and factor loadings of the Behavior**

668 **Intention Scale of the QPBS-EMCA Questionnaire[a]. (n=189).**

Items[a]	Item-subscale correlation	Mean ± SD	Factor Loading
Behavior Intention Scale			
Inform mothers about the benefits of breast milk.	.67	4.7 ± 0.6	.77
Encourage mothers to breastfeed their babies for as long as possible.	.58	4.5 ± 0.8	.64
Show mothers how to recognize and respond to signs of hunger in an infant.	.60	4.5 ± 0.7	.72
Inform mothers how to continue breastfeeding when they return to paid work.	.69	4.5 ± 0.7	.80
Participate in training activities to update my knowledge on breastfeeding.	.51	4.3 ± 0.9	.55
Support mothers' decisions about breastfeeding.	.56	4.5 ± 0.7	.64
Facilitate contact between mothers and peer support groups.	.67	4.4 ± 0.8	.71
Avoid the presence of formula advertisements in my workplace.	.31	3.3 ± 1.3	.32

669 [a]An English translation of the items of the QPBS-EMCA Questionnaire is shown.

670 Email the corresponding author for a copy of the original Spanish version.

671

672 **Table 6. Distribution of scores and reliability coefficients for the QPBS-EMCA**

673 **Scales and Subscales.**

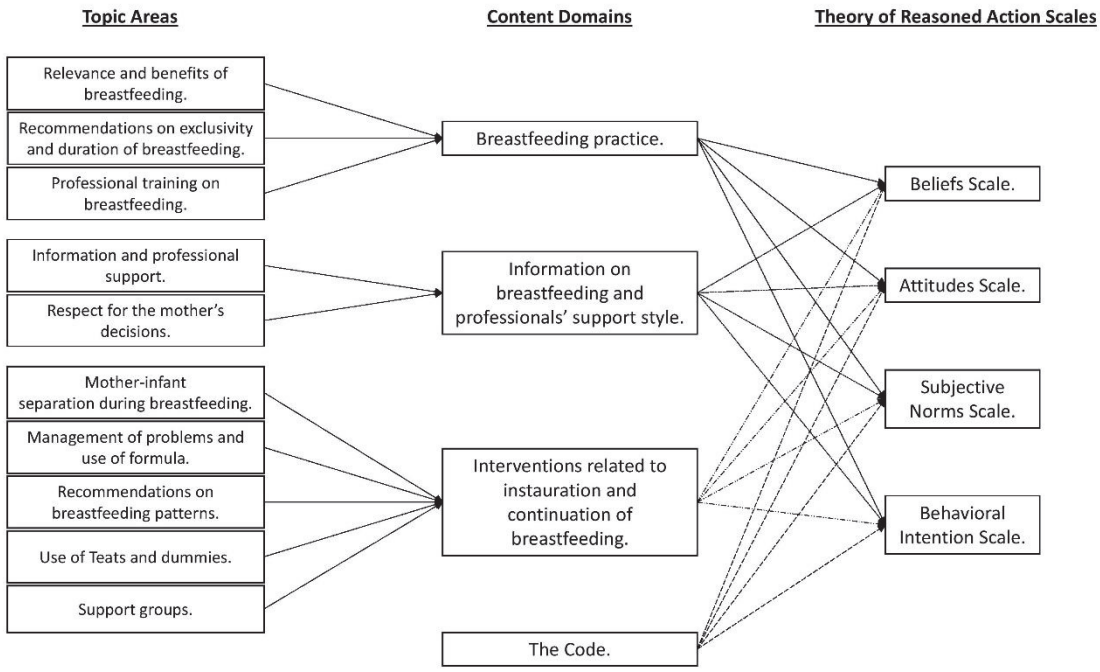
Scales and subscales	Number of items	Mean ± SD	Range	Floor (%)	Ceiling (%)	Cronbach's alpha
Beliefs Scale	16	61.6 ± 9.3	16-80			.80
How to maintain breastfeeding over time	5	22.1 ± 3.2	5-25	1	27.4	.78
Limiting breastfeeding	5	17.0 ± 4.9	5-25	0	8	.75
Professional advice related to breastfeeding	6	22.5 ± 4.1	5-25	0	4	.65
Attitudes Scale	13	50.5 ± 7.7	13-65			.79
Attitudes toward practices facilitating establishment and continuation of breastfeeding	8	34.7 ± 4.7	8-40	0	11.4	.75
Attitudes toward the Code of Marketing of Breast Milk Substitutes	5	15.8 ± 4.7	5-25	1.5	4	.71
Norms Scale	12	44.7 ± 7.8	12-60			.79
Norms related to breastfeeding support	6	24.3 ± 4.2	6-30	0	10.4	.78

Limiting breastfeeding	6	20.4 ± 5.1	6-30	0	4	.73
Behavior Intention Scale	8	34.8 ± 4.5	8-40	0.5	13.9	.81

674

675 **Figure 1. Theoretical framework, content domains, and topic areas considered**

676 **for item construction of the four scales of the QPBS-EMCA questionnaire.**



677

Supplemental Data. Table SD1: Attributes and deficiencies of the existing questionnaires measuring attitudes to the support of breastfeeding of the professionals.

Original Study	Instrument	Sample	Items (Attitude Scale)	Theoretical Conceptualization	Content validity evidences	Construct Validity	Reliability
Martens, 2000.	"Breastfeeding Attitude".	Nurses. N=10 (Pilot study). N=31 (Final study).	11 items.	Without conceptualization	Experts' opinion.	No.	Test-retest: Pearson correlation, r=.9 (Pilot study). Internal consistency: α=.95 (Pilot study); α=.89 (Final study).
Bernaix, 2000.	"Nurses Support for Breastfeeding" NSBQ.	Maternity nurses. N=48 (attitude scale).	8 items.	Theory of Reasoned Action (TRA)	Expert opinion.	No.	Internal consistency: α=.75 (attitude scale).
Siddell et al., 2003.	Unnamed.	NICU nurses and pediatricians. N=78 (pretest). N=51 (post-test).	12 items: F.1 (4 items); F.2 (5 items); F.3 (3 items).	Without conceptualization	No.	Exploratory Factor Analysis.	Internal consistency pretest and posttest: F1, α=.62 and .60; F2, α=.69 and .70; F3, α=.58 and .64.
Ekström et al., 2005.	Unnamed.	Midwives and Nurses. N=50 (Pilot Study). N=168 (Final Study).	60 items (1st version). 35 items (2nd version): F.1 (10 items); F.2 (9 items); F.3 (7 items); F.4 (9 items).	Without conceptualization	Expert opinion.	Exploratory Factor Analysis.	Internal consistency: Complete scale, α=.51; F1, α=.80; F2, α=.60; F3, α=.62; F4, α=.29
Kang et al, 2005.	"The Breastfeeding Attitude Questionnaire".	Nursing and Medicine students. N=85 (Pilot Study). N=341 (Final Study).	20 items: F.1 (7 items); F.2 (6 items); F.3 (7 items).	Three-dimensional theory of attitudes	Expert opinion.	No.	Internal consistency: α=.75 (Pilot Study).
Dodgson & Tarrant, 2007.	"Attitudes about breastfeeding and formula-feeding".	Nursing students. N=273.	6 items.	Theory of Planned Action (TPA)	No.	No.	Internal consistency: Attitudes about breastfeeding, α=.87; Attitudes about formula-feeding, α=.74.
Brodribb et al., 2008.	Unnamed.	Medicine residents last year. N=10 (Pilot study). N=161 (Final study).	20 items (1st version). 18 items (2nd version).	Without conceptualization	Expert opinion.	No.	Internal consistency: α=.84.