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Reliability, Validity and reduced Spanish version of the Iowa Infant Feeding Attitude Scale (IIFAS)

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“Spanish version of the Iowa Infant Feeding Scale (IIFAS-S)”

“Reliability, Validity and reduced Spanish version of the Iowa Infant Feeding Attitude Scale (IIFAS)”

Abstract

Objective: To translate the Iowa Infant Feeding Scale (IIFAS) into Spanish, to test its psychometric properties and to explore item reduction for the Spanish version.

Design: Instrumental study.

Settings: Six hospitals in eastern Spain.

Participants: A convenience sample of 1354 pregnant women was recruited and data on sociodemographic variables, breastfeeding experience and intention, as well as the Spanish version of the IIFAS was obtained. Also, data on breastfeeding types during the first year was obtained.

Methods: The IIFAS was translated using forward and back translation. Dimensional structure, internal consistency, and construct validity of the Spanish IIFAS version were assessed. Criteria of improving the reliability of the scale and the predictive power of the items were used to reduce the scale.

Results: Statistics on the psychometric properties suggested the need for item reduction. Cronbach’s alpha coefficient of the 9-item final version of the Spanish IIFAS (IIFAS-S) was 0.792. The confirmatory factor analysis showed a unidimensional structure. Demographic response patterns and correlations with IIFAS-S scale provided further evidence of construct validity. Pregnancy IIFAS-S scores significantly predicted breastfeeding rates and exclusivity.

Conclusion: The results of this study indicated that the Spanish translation of the IIFAS is a valid and reliable measure of maternal attitudes toward breastfeeding.

Précis: IIFAS-S can be used to assess the attitudes of the Spanish women towards breastfeeding and is a good predictor of initiation, exclusiveness, and duration of breastfeeding.

Keywords: Breastfeeding, Iowa Infant Feeding Attitude Scale, psychometrics properties, breastfeeding attitudes, validity, reliability.

Callouts

Callout 1. Maternal breastfeeding attitudes are better predictors of infant feeding method during the postpartum period than the mother's socio-demographic characteristics.

Callout 2. Our study suggested a Spanish adaptation of the Iowa Infant Feeding Attitude Scale (IIFAS-S) is unidimensional with very good reliability and validity data.

Callout 3. Iowa Infant Feeding Attitude Scale-Spain showed good relationship with maternal breastfeeding intention during pregnancy, previous experience, and initiation, exclusiveness, and duration of breastfeeding after delivery.

Introduction

Breastfeeding is promoted as the optimal form of infant feeding due to its unique short and long-term health benefits for both the mother and the infant (Section of Breastfeeding, 2012). Published studies have confirmed and quantified the risks of bottle-feeding, and breastfeeding should not be considered as just another way of feeding the newborn, but rather as a basic health issue, with important implications for the health, both in countries with high or low income (Section of Breastfeeding, 2012; Victora et al., 2016). The WHO recommends that children be exclusively breastfed for 6 months and that breastfeeding should be continued with appropriate complementary food for at least 2 years (World Health Organization, 2013).

Despite these recommendations, only a minority of European infants is breastfed (Callen & Pinelli, 2004). In Spain, the rate of initiation of breastfeeding is high, above 80% (Rio et al., 2012). However, only 28% of Spanish women exclusively breastfeed their child, without offering other liquids or foods, at 6 months postpartum, and the median of duration of breastfeeding is 6 months (Directorate General of Public Health, 2011/12). The Spanish National Health System's Quality Plan urges health professionals to incorporate breastfeeding support intervention into their practices (Spanish Ministry of Health and Social Policy, 2009).

Premature cessation of breastfeeding is usually the result of the combination of various factors on different levels (Hector, King, Webb, & Heywood, 2005). First, factors such as the so-called bottle-feeding culture, with cultural values that have made formula feeding the norm, or cultural norms against breastfeeding in public are linked to the structure of society, and influence the acceptability and expectations of

a woman about breastfeeding (Hector et al., 2005; Oliver-Roig, 2003). Secondly, factors such as the lack of support from significant others, hospital practices that make breastfeeding difficult after delivery, or difficulties after returning to work are linked to the environment in which women and their children relate to others, and affect the amount of energy, time, and ability of the mother to solve breastfeeding problems (Oliver-Roig, 2003; Thulier & Mercer, 2009). Finally, factors such as clinical, psychological, and personal history are linked to the mother-child dyad and directly associated with maternal decisions and breastfeeding practices (Meedya, Fahy, & Kable, 2010; Thulier & Mercer, 2009).

Our study focused on the mother's attributes that affect breastfeeding decisions in the mother-child dyad level. Self-efficacy, postnatal depression, anxiety, maternal intention to breastfeed, attitudes toward breastfeeding and social support are factors that have been implicated in breastfeeding initiation and duration (de Jager, Skouteris, Broadbent, Amir, & Mellor, 2013; Meedya et al., 2010). One important variable at this individual level is maternal attitude toward breastfeeding, since women's attitudes are one of the possible modifiable variables related to breastfeeding outcomes. Attitudes are associations between attitudinal objects (practically any aspect of the social world) and evaluations of these objects, and constitute durable assessments of various aspects of the social world that are stored in memory. They are important because they strongly influence social thinking or how we think about and process social information. Attitudes function as schemas, or cognitive frameworks, possessing and organizing information about specific concepts, situations or events. Attitudes have been the focus of research because it is assumed that they always influence behavior; therefore, knowing something about them can help us to predict people's behavior in many contexts (Baron & Byrne,

1998). Maternal breastfeeding attitudes are better predictors of infant feeding method during the postpartum period than the mother's socio-demographic characteristics (Dungy, Losch, & Russell, 1994; Scott, Binns, Oddy, & Graham, 2006). Women with positive attitudes are more likely to breastfeed and tend to do so for longer than those with less positive attitudes (Thulier & Mercer, 2009) (de La Mora, Russell, Dungy, & et al., 1999; Scott et al., 2006).

(CALLOUT 1.)

De La Mora and Russell, from the Iowa State University, originally designed in 1999 the Iowa Infant Feeding Attitude Scale (IIFAS), (de La Mora et al., 1999) to assess ten aspects related to women's attitudes toward breastfeeding, five related to the characteristics of breast milk and formula milk (i.e., cost, mother's physical shape, sexual pleasure, mental-physical comfort, and nutritional product) and five related to the process of feeding the baby (i.e., parental role, physical closeness, infant food intake, ease of feeding, and nighttime feeding). The scale was developed to predict the choice of infant feeding method as well as duration of breastfeeding; higher scores indicate that women are more likely to breastfeed. The IIFAS included 17 items selected from an initial pool of 26 items to optimize reliability. In the original study, which consists in three substudies conducted at a community hospital in a medium-sized Midwestern city of USA, the reliability of the IIFAS ranged from 0.68 to 0.96. The IIFAS discriminated between women who intended to breastfeed and those who decided to use artificial feeding.

The IIFAS has been tested in various populations (Ho & McGrath, 2010), including prenatal and postpartum women, low-income women (Dungy, McInnes, Tappin, Wallis, & Oprescu, 2008), social networkers (Dungy et al., 2008), fathers (Karande &

Perkar, 2012), and students (Kavanagh, Lou, Nicklas, Habibi, & Murphy, 2012). The IIFAS has been used in the USA (de La Mora et al., 1999), Australia, (Scott et al., 2006) Northern Ireland (Sittlington, Stewart-Knox, Wright, Bradbury, & Scott, 2007), Scotland (Dungy et al., 2008), Croatia (Zakarija-Grkovic & Burmaz, 2010), Syria (Al-Akour, Khassawneh, Khader, Ababneh, & Haddad, 2010), India (Karande & Perkar, 2012), and Singapore (Lau, Htun, Lim, Ho-Lim, & Klainin-Yobas, 2015). Besides being used in English, it has been translated into Romanian (Wallis et al., 2008), Chinese (Ho & McGrath, 2011a), Arabic (Charafeddine, Tamim, Soubra, de la Mora, & Nabulsi, 2015; Saied, Mohamed, Suliman, & Al Anazi, 2013), Japanese (Nanishi & Jimba, 2014), and isiZulu (Tuthill et al., 2014).

Many international studies have been conducted on the reliability and validity of the IIFAS. Researches have reported conflicting evidence on reliability, with Cronbach's α coefficients estimates of internal consistency ranging between 0.50 (Wallis et al., 2008) and 0.89 (Dungy et al., 2008). Moreover, the low internal consistency of the IIFAS found in some previous studies has not been explained.

The factor structure of the IIFAS has been considered unidimensional, and the total IIFAS score has been used in all previous research to provide evidence of validity. However, a discrepancy in results on the structure of the IIFAS among publications was found. Previous findings supported structures with one (Charafeddine et al., 2015; Nanishi & Jimba, 2014), three (Lau et al., 2015) or four (Dai, Guan, Li, You, & Lau, 2013) factors for the IIFAS.

As in the original study (de La Mora et al., 1999), other authors found that the IIFAS discriminated between women who intended to breastfeed and those who decided to use artificial feeding (de La Mora et al., 1999; Lawton, Ashley, Dawson, Waiblinger, &

Conner, 2012). Also IIFAS predicted the initiation and the duration of breastfeeding in women with higher scores (Chen et al., 2013; Ho & McGrath, 2011b; Scott et al., 2006).

The IIFAS has not previously been translated into Spanish and psychometrically tested among mothers in Spain, where a validated version could be useful to identify groups at risk of early breastfeeding cessation or to evaluate interventions. The objectives of this study were (1) to translate the scale into Spanish, and (2) to test its psychometric properties and obtain data on Spanish-speaking mothers in Spain. The conflicting evidence on the factor structure of the IIFAS and the low internal consistency of the scale observed in some previous studies indicated the need to explore item reduction for the Spanish version.

Method

Participants.

We conducted an instrumental study. A convenience sample of 1354 pregnant women in their third trimester was recruited from 6 hospitals in eastern Spain, as part of a larger study on factors related to early breastfeeding cessation. All the hospitals involved were implementing different strategies to improve breastfeeding practices and two of them had been designated as Baby-Friendly Hospitals before the initiation of the study, by taking the steps recommended by the UNICEF/WHO's Baby-Friendly Hospital Initiative to improve breastfeeding practices in health care (World Health Organization., 2009).

All participants were able to read and speak Spanish and they had no problems that could seriously complicate or contraindicate breastfeeding such as HIV infection,

previous breast surgery, or congenital fetal pathology diagnosed during pregnancy. In the postpartum follow-up, women were excluded if they had preterm deliveries or multiple births, or when medical problems existed that prevented or seriously hampered breastfeeding; these included problems of the newborn such as an Apgar score below 6 at 5 minutes of life, neonatal sepsis, cleft lip, cleft palate, or Down syndrome. All recruited women agreed to participate in the study. The study received approval from the institutional review board.

Instrument: IIFAS.

The IIFAS is a 17-item questionnaire that uses a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Nine of the items are worded in a manner favorable to breastfeeding, while the remaining items are favorable to formula feeding. Items favoring artificial feeding are reversed scored and a total score is computed via an equally weighted sum of responses to the individual items. The total attitude scale can range from 17-85; higher scores indicate that the respondent is likely to breastfeed (de La Mora et al., 1999).

Translation procedures.

Linguistic validation of the Spanish IIFAS was performed using the standard procedure of translation and blind back-translation with the aim of ensuring content, semantic and technical equivalence. The translators, two for the translation and two for the back-translation, were not otherwise involved in the project and were not experts in maternal breastfeeding. Data were collected on difficulty in translating (1= not at all difficult; 10= maximum difficulty), and on the applicability to the Spanish

183 cultural context or changes made to each item in order to maintain semantic and
184 conceptual equivalence.

185 Once the translated version and data concerning the items were available, the
186 research team held meetings with the translators to revise the translation and reach a
187 consensus in order to produce a single version in Spanish. A pilot study was
188 conducted with 10 pregnant women in order to test comprehensibility and legibility of
189 the translated IIFAS.

190 **Data collection**

191 During a third trimester pregnancy check-up (28-42 weeks), participants completed a
192 battery of self-report questionnaires, including the translated IIFAS, and provided
193 data on age, level of maternal education and income, marital status, parity, previous
194 experience of breastfeeding, breastfeeding duration and assessment, and selected
195 infant feeding method and decided duration.

196 In order to obtain follow-up information on breastfeeding, we collected data at
197 postpartum discharge, 5 months, and one year after birth (*Figure 1*). First, prior to
198 postpartum discharge from the hospital (2 to 4 days postpartum), participants
199 completed a self-administered questionnaire on in-hospital initiation of breastfeeding
200 and supplementation with infant formula or other liquids before discharge. Also, we
201 obtained data on obstetric variables such as mode of delivery from clinical records. In
202 addition, at 5 and 12 months after delivery data were obtained concerning the time at
203 which breastfeed infants was first given additional water-based liquids, breast milk
204 substitutes and complementary foods at least once a day, and the time of weaning.
205 At 5 months postpartum a self-administered postal questionnaire was sent to

mothers who were breastfeeding their child at discharge or with missing data after delivery. This was sent up to three times to non-responders, with a period of three weeks between each mailing, and included the form to complete, a pen, and a postage paid envelope for submitting responses to the research team. Finally, 12 months after delivery, a telephone survey is conducted by one of the authors not involved in in-hospital attention, of mothers who were breastfeeding their child or with missing data at 5 months postpartum.

The description of the breastfeeding practices is based on the definitions proposed by WHO (World Health Organization, 1991): exclusive breastfeeding, when infants only received breast milk, although rehydration solutions, drops, and syrups were also allowed; and any breastfeeding, when infants received any amount of breast milk with or without other liquids or foods. The duration of exclusive breastfeeding was considered to be the time until the introduction of water based drinks, juices, infant formula, or complementary foods, and the duration of any breastfeeding as the time during which the infants received any quantity of mother's milk.

Data analysis

We calculated the mean and standard deviation of item scores, and the proportion of respondents with the lowest or highest possible score was determined in order to assess normality of the distributions of variables. The median duration and proportion of infants by age for exclusive and any breastfeeding were calculated using the survival table method, including information collected at discharge, 5 months and 12 months postpartum. For data analysis, we only used records in which 100% of IIFAS items had been answered. The Kolmogorov-Smirnov test was used to assess normal distribution of variables. We assessed the association between variables using

Pearson's or Spearman's correlation, as appropriate, and the hypotheses were contrasted using parametric (Student's T test) or non-parametric tests (Mann–Whitney U, χ^2) depending on distribution of variables. Reliability of the translated IIFAS was assessed using the following criteria: Cronbach's α coefficient, estimation of alpha when an item was deleted from the scale, and adjusted item-total correlation.

In order to determine construct validity, we performed a principal component factor analysis, forcing the extraction of one factor. We reduced the scale to obtain a short version by deleting items with an adjusted item-total correlation or factor loading of less than (0.30), in line with the criteria proposed by Nunnally and Bernstein (Nunnally, J., Bernstein, I., 1994). In addition, following the strategy proposed by Smith, Fisher, and Fisher (2003) aimed at assessing the validity of each item in relation to a criterion (Smith, Fischer, & Fister, 2003), the items that presented no relationship with at least 3 of these 5 following variables were removed: initiation of breastfeeding after delivery, exclusive breastfeeding at discharge, at 1 and 6 months postpartum, and any breastfeeding at 12 months postpartum.

Lastly, a confirmatory factor analysis was conducted. We tested 3 models: model 1 tested a one-factor model, in which the 17 IIFAS items were assumed to be indicators of a single latent factor. Model 2 examined the presence of 4 latent variables identified in a previous study (Dai et al., 2013). Finally, model 3 explored the unifactorial solution of the IIFAS-S obtained through the item reduction process explained above. We did not test the Japanese model (Nanishi & Jimba, 2014) because it did not fit for just one dimension, and because it included all the same items as the original except item 17.

As data were ordinal, not normally distributed, there is a ceiling effect in some items, and the sample is large, the weighted least square (WLS) method was used to fit models (Bentler, 2004). The models were assessed using the goodness-of-fit index (GFI) and the comparative fit index (CFI), with values of > 0.9 indicating an acceptable fit and > 0.95 indicating a good fit (Hu, L.T., Bentler, P.M., 1999); the root mean squared error of approximation (RMSEA), which favors more parsimonious models, with a value of 0.06 indicating a good fit and 0.10 representing an acceptable fit (Hu, L.T., Bentler, P.M., 1999); and the standardized root mean square residual (SRMR), with values of $< .08$ indicating a good fit and $< .10$ representing an acceptable fit (Hu, L.T., Bentler, P.M., 1999; Kline, 2005). In addition, the χ^2/DF was calculated, considering the fit acceptable if < 4 (Bentler, 2004; Kelloway, 1998).

To further assess construct validity, a known group comparison was conducted with the hypothesis that women who decided to breastfeed during pregnancy and those who intended to breastfeed their babies for more time would have higher total scores than women who did not intend to do so. We also expected that mothers with a higher socioeconomic status, as assessed by annual income or educational status, older mothers, mothers with prior and longer breastfeeding experience, and those who assessed their previous experience positively, would also have higher IIFAS scores.

Lastly, predictive validity was determined by examining the association between the IIFAS score and the variables used to remove items in order to improve criterion validity as described above. Also, receiver operating characteristic (ROC) curves were used to determine predictive validity and utility of IIFAS scores for differentiating between mothers who initiated breastfeeding after delivery from those who did not

initiate breastfeeding. The ROC curves were constructed for the whole sample, primiparous women, and multiparous women. The area under the ROC curve (AUC) was computed. We considered that an AUC greater than 0.9 can be said to be highly accurate, while 0.7 – 0.9 indicates moderate accuracy (Fischer, Bachmann, & Jaeschke, 2003). Youden’s J ($J = \text{sensitivity} + \text{specificity} - 1$) was used to identify the optimal cut-off point (Perkins & Schisterman, 2006).

Results

Description of sample.

The mean age of the sample was 31.87 years ($SD = 4.77$), ranging from 14 to 48 years old. Most of the participants were married, had a high school or higher education, and an annual family income of more than 18000 Euros. Most women wanted to breastfeed and the mean intended breastfeeding duration was 9.24 ($SD = 5.97$) months. The principal delivery method was vaginal and for most women, this was their first child (Table 1).

At discharge, we excluded for the follow-up sample 68 cases because they met an exclusion criterion or due to lack of information on exclusion criteria (Figure 1). Also, a total of 110 women that did not initiate breastfeeding after delivery were not included in the follow-up after postpartum discharge. For the follow-up sample after postpartum discharge ($n = 1176$), information on breastfeeding duration was obtained from 986 (84%) women that completed the postal questionnaire, answered the telephone survey, or both. Statistically significant differences were observed between women participating and women not participating in the follow-up after postpartum discharge. Women not participating were younger ($t = 4.58$, $p < .01$), with lower

educational status ($\chi^2 = 18.38$, $p < .01$), lower family annual incomes ($\chi^2 = 9.67$, $p < .01$) and lower IIFAS scores ($U = 55173$, $p < .01$), more frequently singles ($\chi^2 = 4.47$, $p = .04$), without previous breastfeeding experience ($\chi^2 = 8.29$, $p < .01$), and more frequently they did not want to breastfeed during the third trimester of pregnancy ($\chi^2 = 36.48$, $p < .01$). No differences were observed for having previous children ($\chi^2 = 1.86$, $p = .17$) or delivery method ($\chi^2 = 2.56$, $p = .11$) between women participating and not participating in the follow-up after discharge.

We obtained complete information referring to the first year postpartum for the whole follow up sample, including women that did not initiate breastfeeding, on duration exclusive breastfeeding for 1075 (84%) cases, and on duration of any breastfeeding for 866 (67%) cases. The median of duration of exclusive breastfeeding and any breastfeeding was 120 and 210 days, respectively.

Semantic equivalence.

None of the 17 items on the scale was considered inappropriate for the Spanish context. It was not necessary to make any changes to 14 of the items. Meanwhile, expressions that were more suitable in the Spanish context were introduced in the rest of the items in order to ensure equivalence. For instance, the expression “great joys of motherhood” in item seven was changed to “better experiences of motherhood” (“*mejores experiencias de la maternidad*”), the expression “less expensive” in item sixteen was changed to “more economic” (“*más económica*”), and “increases” was changed to “reinforces” (“*fortalece*”) in item three. According to the translator evaluation, the average difficulty of the translation was 2.1, and in no case did it rise above 3 on the established scale of 1-10. Semantic differences were not

detected in the translated version, and reading and comprehension problems were not encountered during the pilot study (Muñiz, Elosua, & Hambleton, 2013).

Reliability, validity and test information of IIFAS.

Cronbach’s alpha coefficient was 0.726 for the Spanish version of the IIFAS, with a mean total scale score of 66.12 ($SD = 7.68$). The item mean was 3.89, ranging from 2.13 to 4.78. Table 2 shows the item-adjusted test correlations, Cronbach’s alpha if the item was deleted, the means and standard deviation of item responses, and the proportion of extreme value responses and response frequency for each item. The Cronbach’s alpha coefficient for the IIFAS was not increased by more than 0.1 if any of the items were deleted.

Item 1 (“The benefits of breast milk last only as long as the baby is breastfeed”); item 4 (“Breast milk is lacking in iron”); item 8 (“Women should not breast-feed in public places such as restaurants”); item 10 (“Breastfed babies are more likely to be overfed than formula-fed babies”); item 11 (“Fathers feel left out if a mother breastfeeds”); item 17 (“A mother who occasionally drinks alcohol should not breastfeed her baby”), had loadings below .30, and all of them plus item 16 (“Breastmilk is cheaper than formula”) had item-adjusted test correlations below .30 (Table 2). These 7 items, plus item 5 (“Formula-fed babies are more likely to be overfed than breastfed babies”), showed low predictive validity related to breastfeeding (Table 3), and were proposed for elimination.

Table 4 shows the fit indexes obtained from the confirmatory factor analysis of the 3 models tested. Model 3 showed the best-fit indexes and corresponds to the final

version of the 9-item Spanish adaptation of the IIFAS, considering a unifactorial solution (IIFAS-S).

Reliability and validity of the short Spanish version IIFAS-S.

The total score average of the IIFAS-S was 36.15 ($SD = 5.66$), with a non-normal distribution. The Cronbach's alpha coefficient was 0.79. Table 5 shows the item-adjusted test correlations and Cronbach's alpha when the item was deleted.

The average score in the IIFAS-S was 36.97 ($SD = 4.77$) for women who wanted to breastfeed their infant during the third trimester of pregnancy, 29.85 ($SD = 6.57$) for those who had not yet decided, and 26.86 ($SD = 6.98$) for those who had decided to give their infant formula milk, reflecting significant differences between the IIFAS-S scores ($H = 167.2$; $p < .001$). Intended breastfeeding duration during pregnancy correlated positively with IIFAS-S scores ($r_s = 0.31$; $p < .001$).

Women that initiated breastfeeding and those that were exclusively breastfeeding during postpartum hospitalization, at 1 month postpartum, and at 6 months postpartum, had respectively higher IIFAS-S scores than mothers that did not initiate or did not offer exclusive breastfeeding at discharge or at 1 or 6 months postpartum, respectively. Lastly, women breastfeeding at 12 months postpartum had higher IIFAS-S scores than women that had weaned their babies previously (see Table 3).

Regarding utility to predict the initiation of breastfeeding after delivery, the AUCs were 0.81 (95% CI: [0.76, 0.85]), 0.75 (95% CI: [0.67, 0.82]) and 0.85 (95% CI: [0.80, 0.90]) for the whole sample, primiparous and multiparous women, respectively. For the whole sample, Youden's J was higher at IIFAS-S score of 31, with a

sensitivity and specificity of 86% and 60%, respectively. For primiparous women, Youden’s J was higher at IIFAS-S score of 32, with a sensitivity and specificity of 83% and 50%, respectively. For multiparous women, Youden’s J was higher at IIFAS-S score of 31, with a sensitivity and specificity of 85% and 71%, respectively.

Several of the demographic variables were found to be significant correlates of attitudes toward infant feeding. Mothers with a primary school or lower education had a significantly ($U = 221851.5$; $p = .016$) lower IIFAS-S score ($M = 35.84$, $SD = 5.41$) than those with a high school or higher education ($M = 36.36$, $SD = 5.85$). Furthermore, mothers with previous breastfeeding experience ($M = 36.73$, $SD = 5.64$) had higher average of IIFAS-S scores ($U = 9976$; $p < .001$) than mothers without experience ($M = 30.18$, $SD = 6.57$), while longer duration ($r_s = 0.41$; $p < .001$) and better assessment ($r_s = 0.32$; $p < .001$) of that experience correlated positively with IIFAS-S scores. No differences in attitudes toward breastfeeding were found regarding maternal age ($r_s = 0.04$; $p = 0.17$) or annual family income ($r_s = 0.05$; $p = 0.08$).

Discussion

We are the first investigators to report on use of the IIFAS in Spain and describe the adaptation and psychometric properties of the scale in a large sample of prenatal Spanish women. Data on the psychometric properties of the adapted 17-item Spanish version of the IIFAS, reported in this study, together with the discrepancy in the evidence on the factor structure of the IIFAS and the low internal consistency of the scale observed in some previous studies, indicated the need to explore item reduction for the Spanish version. Our findings provided a shorter version than the

391 original IIFAS (9 items) and presented evidence of reliability and validity in our
392 sample.

393 The translation process was systematic and rigorously conducted to ensure that
394 equivalence was established. The pilot test showed that none of the items required
395 special attention or modification.

396 The evidence of reliability obtained for the adapted Spanish scale was high for the
397 17-item version and higher still for the short 9-item version (the IIFAS-S). Although
398 the IIFAS-S has fewer items than the original, we nevertheless obtained better
399 Cronbach's alpha values (0.792) than most previous studies. The reliability of the
400 IIFAS scale has been variable in previous studies. Findings from nearly half of the
401 studies showed values close to or below 0.60 (Charafeddine et al., 2015; Dai et al.,
402 2013; Nanishi & Jimba, 2014; Wallis et al., 2008), while the other half demonstrated
403 acceptable reliability, above 0.70 (de La Mora et al., 1999; Dungy et al., 2008; Ho &
404 McGrath, 2011a; Lau et al., 2015; Sittlington et al., 2007; Twells et al., 2014). It is
405 difficult to assess whether the reliability of some of these earlier versions could have
406 been improved by eliminating items, as done in our study, since most authors only
407 mentioned correlation ranges, with a lower limit well below 0.30 in some of them (Dai
408 et al., 2013; de La Mora et al., 1999; Twells et al., 2014). However, in those studies
409 that did provide data, the items with lower adjusted item-test correlations coincided
410 with those that we have removed (Charafeddine et al., 2015; Dai et al., 2013; Ho &
411 McGrath, 2011a; Twells et al., 2014). It is noteworthy that item 17 was not adjusted in
412 any of the versions analyzed, and was only removed in two studies (Lau et al., 2015;
413 Nanishi & Jimba, 2014).

The reduced number of items in the proposed IIFAS-S scale decreases respondent burden. In addition, since an attitude scale can be useful for predicting a behavioral criterion such as breastfeeding behavior (Smith et al., 2003), one of our study's novel contributions, besides using the classic strategy of reducing the number of items, has been to propose predictive validity criteria. All items with poor reliability or structural validity according to standard criteria also showed the worst predictive ability, although this criterion made it possible to eliminate an additional item (item 5).

As mentioned previously, although a total IIFAS score has been used in all previous research to provide evidence of validity, only 2 validation studies reported a unifactorial structure of the scale. However, one of these, a Japanese study, tested the IIFAS structure using principal components analysis without rotation, forcing the extraction of 1 factor, although this was not adjusted properly (Hu, L.T., Bentler, P.M., 1999; Nanishi & Jimba, 2014). In the second study, the authors based the result of a one-dimensional structure not on the principal components analysis, which revealed a 6 factors structure, but on the scree plot, even though there were items with a very low corrected item-total correlations (less than 0.2) when a unifactorial model was tested, indicating a poor adjustment of this model (Charafeddine et al., 2015). Our proposed short version of the IIFAS fits a one-dimensional model, achieving very good fit indexes in confirmatory factor analysis.

(CALLOUT 2.)

Regarding predictive validity, given that the items retained individually predicted at least 3 of the breastfeeding behaviors proposed, it was not surprising that the scale as a whole showed statistically significant associations with initiation of breastfeeding, exclusive breastfeeding at discharge, at 1 month and 6 months

postpartum and any breastfeeding at 12 months postpartum. Other researches (de La Mora et al., 1999; Scott, Shaker, & Reid, 2004; Sittlington et al., 2007) had reported that mothers who initiated breastfeeding in hospital present higher total scores on the IIFAS scale than those using artificial feeding (Dungy et al., 2008; Holbrook, White, Heyman, & Wojcicki, 2013) or longer duration of breastfeeding in other studies (Chen et al., 2013; Donnan et al., 2013; Ho & McGrath, 2011b; Scott et al., 2006).

Also, the IIFAS-S showed a good AUC and good sensitivity and specificity properties to discriminate women initiating or not breastfeeding after delivery for the entire sample, the primiparous and the multiparous women. The cut-off points were similar between these groups. However, the IIFAS-S had slightly better sensitivity and specificity properties for multiparous women. These results are novel since only one previous research group showed the IIFAS ROC results, but for intended breastfeeding during pregnancy instead of the initiation of breastfeeding after delivery (Twells et al., 2014).

As in previous studies, we found other variables related to breastfeeding were associated with higher scores for the total IIFAS scale score, such as the mother's previous experience (Holbrook et al., 2013; Wilkins, Ryan, Green, & Thomas, 2012) and intended breastfeeding (de La Mora et al., 1999; Donnan et al., 2013; Dungy et al., 2008; Nanishi & Jimba, 2014; Scott et al., 2004; Twells et al., 2014). Our findings provided additional understanding of prenatal breastfeeding attitude. First, higher IIFAS-S scale scores were associated with longer duration of a previous breastfeeding experience and with its positive assessment, showing that not only previous experience but also its success, influence in maternal attitude. Finally, the

IIFAS-S scale scores were associated with intended breastfeeding duration, as expected, since attitudes are a good predictor of behavioral intention (Dick et al., 2002).

(CALLOUT 3.)

As expected, IIFAS-S scale scores were positively associated with a higher educational level (Chen et al., 2013; de La Mora et al., 1999; Sittlington et al., 2007; Wilkins et al., 2012). However similar to previous findings, IIFAS-S scores were not related to age (Saied et al., 2013; Scott et al., 2004; Sittlington et al., 2007; Wallis et al., 2008), marital status (Chen et al., 2013; Scott et al., 2006), or a higher level of family income. It is possible that the use of a short version of the IIFAS scale, differences inherent in the Spanish context compared to previous studies, or the self-selection of mothers to participate in this study may explain the absence of differences in IIFAS-S scores for these variables. Moreover, given the economic crisis underway at the time of this study, family income is perhaps not as good an indicator of socioeconomic status as the mother's educational level that did explain differences in IIFAS-S scores.

Implications

The IIFAS has been validated for use in Spanish women. Since Spanish is one of the most frequently spoken languages around the world, our version facilitates the adjusted linguistic validation (Acquadro, Conway, Girourdet, & Mear, 2004) for other countries with Spanish-speaking populations. Moreover, our shorter version decreases respondent burden, has a structure that enhances the simplicity of the theoretical model, good metric properties, high reliability, and good evidences of

validity in relation to sociodemographic and experiential variables, intention of breastfeeding, and breastfeeding behavior. Thus, the IIFAS-S shortened version improves the usability in research on breastfeeding attitudes.

Lastly, from the perspective of the clinical utility, the scale can be used to assess maternal attitudes to infant feeding, to discriminate women at risk of not initiate breastfeeding after delivery, and to evaluate the effectiveness of health interventions to promote breastfeeding. Nearby scores, less than or equal to 32 for primiparous women and less than or equal to 31 for multiparous women, can be taken as indicators of a need for interventions to promote breastfeeding.

Limitations

The use of a convenience sample was a limitation of our study. The follow-up sample after postpartum discharge had characteristics that positively influence breastfeeding duration, including older age, higher educational level, higher economic status, being married, having previous breastfeeding experience, and having decided to breastfeed during pregnancy (Thulier & Mercer, 2009). These characteristics, besides the higher average IIFAS scores of the follow-up sample, and the characteristics of the hospitals involved in the study explained the longer duration of breastfeeding of the sample compared with the Spanish average. The proposed cut-off points can be used as a normative reference, in similar samples may be lower if the IIFAS-S is used with women at higher risk of early breastfeeding cessation.

Future research is needed to obtain data on more representative samples, evidence of the structural validity of IIFAS-S versions in other countries, and data on the responsiveness of the scale to health promotion interventions. The scale was

adapted to Spanish as spoken in Spain, and not to the Spanish variants spoken in other countries; thus, an adjusted linguistic validation would be required for studies involving Spanish speakers from other countries.

Conclusion

This is the first prenatal breastfeeding attitudes survey to be conducted using the Spanish version of the IIFAS (IIFAS-S). A 9-item Spanish version was obtained by applying the criteria of improving the reliability and predictive power of the items. The scale had a one-dimensional structure and showed optimal evidence of reliability and validity. The scale also showed a good relationship with maternal intention to breastfeed, discriminated women according to their previous experience, and was a good predictor of initiation, exclusiveness, and duration of breastfeeding.

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Figure 1.

Flow Chart of the study.

708 **Table 1.**

709 ***Characteristics of the study sample.***

Variable	n	%
Educational status		
Primary school or lower	641	47.3
High school or more	703	51.9
Missing data	10	.7
Marital status		
De facto or Married	1186	87.6
Single	127	9.4
Divorced	33	2.4
Missing data	8	.6
Family annual incomes		
Less than 18.000 Euros	734	54.2
More than 18.000 Euros	510	37.7
Missing data	110	8.1
First child		
Yes	725	53.5
No	623	46.1
Missing data	6	.4
Previous breastfeeding experience		
Yes	523	38.6
No or first birth	824	60.9
Missing data	7	.5
Duration of previous breastfeeding		
4 months or less	167	31.9
More than 4 months	353	67.5
Missing data	3	.6
Self-assessment of previous breastfeeding experience		
Good	366	70
Fair	95	18.1
Bad	60	11.5
Missing data	2	0.4
Intention of breastfeeding during third trimester of pregnancy		
Yes	1210	89.4
No	75	5.5
Not decided	58	4.3
Missing data	11	.8
Attended in a Baby-Friendly hospital		
Yes	319	24.8
No	967	75.2
Delivery Method		
Vaginal	854	65.5
Cesarean	272	20.2
Missing data	184	14.3
Initiation of breastfeeding		
Yes	1148	89.2

No	110	8.6
Missing data	28	2.2
Current feeding in-hospital		
Exclusive breastfeeding (only breast milk)	618	48.1
Predominant breastfeeding (breast milk + no nutritive liquids)	25	1.9
Partially breastfeeding (breast milk + formula)	281	21.9
Formula feeding	110	8.6
Missing data	252	19.6
Exclusive breastfeeding at 1 month postpartum		
Yes	851	66.2
No	177	13.7
No initiation of breastfeeding	110	8.6
Missing data	148	11.5
Exclusive breastfeeding at 6 month postpartum		
Yes	168	13.1
No	807	62.7
No initiation of breastfeeding	110	8.6
Missing data	201	15.6
Any breastfeeding at 12 months postpartum		
Yes	201	15.6
No	555	43.2
No initiation of breastfeeding	110	8.6
Missing data	420	32.6

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724 **TABLE 2.**

725 **Iowa Infant Feeding Attitude Scale-Spanish (IIFAS-S) with principal**
 726 **components factor loadings, reliability results, floor and ceiling effects, means**
 727 **(*M*), standard deviation (*SD*) and response frequency for each item (*n*).**

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Item	Loading	Corrected item-total correlation	Cronbach's α if item deleted	Floor “1”%	Ceiling “5”%	<i>M</i>	<i>SD</i>	<i>n</i>
1. *The benefits of breast milk last only as long as the baby is breastfeed.	.129	.148	.773	9.8	34.6	3.58	1.32	1289
2. *Formula-feeding is more convenient than breast-feeding.	.520	.413	.703	2.5	64.3	4.40	.93	1337
3. Breastfeeding reinforces mother-infant bonding.	.612	.447	.703	1.8	78.1	4.64	.79	1340
4. *Breast milk is lacking in iron.	.232	.194	.723	2.2	50.0	4.11	1.01	1308
5. Formula-fed babies are more likely to be overfed than breastfed babies.	.378	.318	.711	15.1	11.3	3.00	1.15	1331
6. *Formula-feeding is the better choice if the mother plans to go out to work.	.495	.408	.701	8.3	17.9	3.25	1.16	1346
7. Mothers who formula-feed miss one of the better experiences of motherhood.	.679	.462	.695	6.7	46.5	3.96	1.20	1340
8. *Women should not breast-feed in	.291	.275	.715	2.6	60.2	4.28	1.03	1343

public places such as restaurants.								
9. Breastfeed babies are healthier than formula-feed babies.	.686	.481	.692	9.1	28.5	3.55	1.22	1345
10. *Breastfed babies are more likely to be overfed than formula-fed babies.	.096	.147	.728	5.4	30.5	3.67	1.10	1335
11. *Fathers feel left out if a mother breastfeeds.	.168	.150	.726	2.6	66.8	4.46	.91	1333
12. Breast milk is the ideal food for babies.	.647	.453	.704	1.7	79.9	4.70	.72	1344
13. Breast milk is more easily digested than formula.	.586	.424	.701	3.0	41.2	3.96	1.03	1333
14. *Formula is as healthy for infants as breastmilk	.566	.421	.701	5.4	14.0	3.22	1.06	1340
15. Breastfeeding is more convenient than formula feeding.	.697	.497	.696	2.8	59.0	4.37	.93	1340
16. Breastmilk is <i>more</i> <i>economic</i> than formula.	.329	.214	.720	1.6	85.4	4.78	.64	1344
17. *A mother who occasionally drinks alcohol should not breastfeed her baby.	.050	.029	.745	44.8	7.7	2.13	1.27	1342

729 * Variables reverse scored to calculate total infant feeding attitude score.

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Table 3.

Iowa Infant Feeding Attitude Scale (IIFAS) Predictive Validity by item and total scores.

	BF Initiation		EBF at discharge		EBF 1 month		EBF 6 months		ABF 12 months	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Item 1	3.61 (1.33)	3.61 (1.23)	3.66 (1.34)	3.54 (1.27)	3.64 (1.35)	3.50 (1.26)	3.81 (1.35) *	3.55 (1.32)	3.71 (1.35)	3.52 (1.34)
Item 2	4.47 (.94)*	3.79 (.98)	4.47 (.90)*	4.19 (1.02)	4.52 (.88)	4.41 (.94)	4.64 (.79)*	4.46 (.90)	4.69 (.66)*	4.43 (.91)
Item 3	4.71 (.72)*	4.01 (1.22)	4.74 (.69)*	4.42 (1.01)	4.77 (.64)*	4.55 (.94)	4.87 (.42)*	4.69 (.74)	4.87 (.45)*	4.67 (.75)
Item 4	4.12 (1.02)	4.03 (.98)	4.15 (1.02) *	3.98 (1.05)	4.13 (1.05)	4.00 (1.10)	4.13 (1.06)	4.09 (1.07)	4.16 (1.06)	4.07 (1.08)
Item 5	3.06 (1.16) *	2.42 (1.09)	3.13 (1.16) *	2.79 (1.14)	3.09 (1.17)	3.04 (1.12)	3.19 (1.21)	3.03 (1.13)	3.09 (1.11)	2.95 (1.17)
Item 6	3.32 (1.16) *	2.49 (1.18)	3.34 (1.16) *	2.98 (1.21)	3.40 (1.18) *	3.12 (1.19)	3.51 (1.09) *	3.28 (1.14)	3.58 (1.08) *	3.26 (1.14)
Item 7	4.08 (1.12) *	2.97 (1.45)	4.14 (1.08) *	3.62 (1.37)	4.14 (1.08) *	3.86 (1.26)	4.38 (.87)*	4.00 (1.15)	4.19 (.98)	4.02 (1.15)
Item 8	4.29 (1.03) *	4.05 (1.15)	4.31 (1.04) *	4.20 (1.04)	4.33 (1.01)	4.23 (.84)	4.48 (.93)*	4.26 (1.02)	4.49 (.94)*	4.19 (1.05)
Item 9	3.69 (1.17) *	2.55 (1.29)	3.74 (1.13) *	3.21 (1.34)	3.73 (1.12) *	3.03 (1.32)	3.96 (.97)*	3.57 (1.20)	3.93 (1.07) *	3.52 (1.19)
Item 10	3.65 (1.13)	3.71 (1.03)	3.68 (1.14)	3.59 (1.06)	3.70 (1.11)	3.63 (1.07)	3.76 (1.11)	3.64 (1.09)	3.68 (1.11)	3.58 (1.10)

Item 11	4.47 (.92)	4.35 (1.01)	4.49 (.94)	4.14 (.97)	4.48 (.93)	4.51 (.81)	4.49 (.95)	4.48 (.90)	4.45 (.95)	4.49 (.91)
Item 12	4.76 (.63)*	4.01 (1.20)	4.79 (.61)*	4.48 (.93)	4.77 (.64)	4.73 (.60)	4.86 (.44)*	4.74 (.67)	4.85 (.54)*	4.47 (.68)
Item 13	4.03 (1.01) *	3.42 (1.07)	4.05 (1.01) *	3.78 (1.05)	4.06 (1.00) *	3.87 (1.17)	4.14 (.99)	3.98 (1.02)	4.16 (.94)*	3.94 (1.04)
Item 14	3.23 (1.05) *	2.62 (1.12)	3.30 (1.06) *	3.03 (1.09)	3.33 (1.05)	3.21 (1.01)	3.49 (1.02) *	3.25 (1.04)	3.44 (.98)*	3.19 (1.06)
Item 15	4.46 (.86)*	3.68 (1.09)	4.48 (.85)*	4.20 (.96)	4.49 (.83)*	4.35 (.85)	4.60 (.73)*	4.43 (.869)	4.58 (.78)*	4.44 (.83)
Item 16	4.78 (.65)*	4.68 (.68)	4.76 (.68)	4.76 (.63)	4.79 (.65)	4.77 (.60)	4.83 (.44)	4.77 (.69)	4.78 (.59)	4.78 (.68)
Item 17	2.14 (1.28) *	1.89 (1.20)	2.13 (1.29)	2.17 (1.35)	2.19 (1.28) *	1.96 (1.22)	2.20 (1.28)	2.13 (1.26)	2.15 (1.19)	2.09 (1.25)
IIFA S	67.02 (7.18) *	58.35 (7.89)	67.48 (7.11) *	63.41 (8.18)	67.69 (7.04) *	65.09 (7.28)	69.42 (6.76) *	66.50 (7.05)	69.07 (6.62) *	65.87 (7.05)
IIFA S-S	36.87 (4.99) *	29.46 (6.90)	37.12 (4.85) *	33.95 (6.49)	37.24 (4.83) *	35.49 (5.44)	38.56 (4.13) *	36.44 (5.05)	38.36 (4.24) *	36.19 (5.13)

*Significative differences with U Mann Whitney test ($p < .05$)

EBF: exclusive breastfeeding.

ABF: any breastfeeding

Table 4.

Confirmatory factor analysis fit indexes of the Iowa Infant Feeding Attitude Scale (IIFAS).

	Model 1 ^a	Model 2 ^b	Model 3 ^c
χ^2	3425.063	192.700	192.702
DF	136	35	35
χ^2 / DF	25.18	5.50	5.50
GFI	.950	.720	.994
CFI	.728	.000	.979
SRMR	.067	.16	.038
RMSEA	.080	.19	.038

^aOne-factor model with the 17 IIFAS items, $n = 1187$; ^bfour latent variables (Dai et al., 2013), $n = 1187$; ^cUnifactorial solution (items 2, 3, 6, 7, 9, 12, 13, 14, 15), $n = 1294$.

765 **TABLE 5.**

766 ***Iowa Infant Feeding Attitude Scale-Spanish (IIFAS-S) with reliability results (n =***
 767 ***1280)***

Item	Corrected item-total correlation	Cronbach's α if item deleted
2. *Formula-feeding is more convenient than breast-feeding.	.388	.776
3. Breastfeeding <i>reinforces</i> mother-infant bonding.	.487	.767
6. *Formula-feeding is the better choice if the mother plans to go out to work.	.366	.781
7. Mothers who formula-feed miss one of the <i>better experiences</i> of mother hood.	.563	.753
9. Breastfeed babies are healthier than formula-feed babies.	.598	.748
12. Breastmilk is the ideal food for babies.	.488	.768
13. Breastmilk is more easily digested than formula.	.458	.768
14. *Formula is as healthy for infants as breastmilk	.463	.767
15. Breastfeeding is more convenient than formula feeding.	.554	.757

768 * Variables reverse scored to calculate total infant feeding attitude score.

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D^a Patrocinio Gascón Calderón, Secretaria del Comité Ético de Investigación Clínica del Hospital de la Plana de Vila-real (Castellón).

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Que el Comité Ético de Investigación Clínica, según consta en acta de la reunión celebrada el día 30 de septiembre de 2013, ha evaluado el proyecto de investigación titulado:

“Adaptación de herramientas para la evaluación de los cuidados durante el parto desde la perspectiva materna (estudio metodológico/observacional multicéntrico de ámbito nacional)”

Investigador principal: D. Antonio Oliver Roig.

Entendiendo que dicho estudio se ajusta a las norma éticas esenciales y criterios deontológicos que rigen en este Centro, y, por tanto, ha decidido su aprobación.

Lo que firmo, en Vila-real, a 7 de octubre de 2013

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paper text:

Reliability, Validity and reduced Spanish

version of the Iowa Infant Feeding Attitude Scale (IIFAS) Abstract Objective: To 1
translate the

scale into Spanish, to test its psychometric properties and to explore item reduction for the Spanish version.
Design: Instrumental study. Settings: Six hospitals in eastern Spain.

Participants: A convenience sample of 1354 pregnant women was recruited 7

and data

on sociodemographic variables, breastfeeding experience and intention, as well as the 2
Spanish version of the IIFAS was obtained. Also, data on breastfeeding

types during the first year was obtained.

Methods: The IIFAS was translated using forward and back translation. 7

Dimensional structure, internal consistency and construct validity of the Spanish IIFAS 2
version were assessed. Criteria of

improving

the reliability of

the

scale and the

predictive power

of the items

49

were used to reduce the scale. Results: Statistics on the psychometric properties suggested the need of item reduction. Cronbach’s alpha coefficient of the 9-item final version of the Spanish IIFAS (IIFAS-S) was 0.792. The confirmatory factor analysis showed a unidimensional structure.

Demographic response patterns and correlations with

IIFAS-S scale

provided further

evidence of construct validity.

3

Pregnancy IIFAS-S scores significantly predicted breastfeeding rates and exclusivity. Conclusion:

The results

of

this study

indicate

that the

Spanish translation

of the

23

IIFAS

7

is

a valid and reliable

measure

of maternal attitudes toward

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breastfeeding.

24 Précis:

IIFAS-

S

can be used to

assess

the

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of

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the Spanish women towards 25 breastfeeding and

is a

good

predictor of initiation,

exclusiveness

and duration of

17

26 breastfeeding. 27 Keywords: Breastfeeding, Iowa Infant Feeding Attitude Scale, psychometrics 28 properties, breastfeeding attitudes, validity, reliability. 29 Callouts 31 Callout 1.

Maternal breastfeeding attitudes are better predictors of infant feeding 32 **method**
during the postpartum period than

11

the mother's socio-demographic 33 characteristics. 34 Callout 2. Our study suggests a Spanish adaptation of the IIFAS (IIFAS-S), 35 unidimensional, with very good reliability and validity data. 36 Callout 3. IIFAS-S shows a good relationship with maternal intention to breastfeed, 37 discriminates women according to their previous experience, and

is a good **predictor** 38 **of initiation,** exclusiveness **and duration of**

17

breastfeeding Introduction Breastfeeding is promoted

as the optimal **form of infant feeding**

9

due to its unique **short and long-term health benefits for** both the mother **and**

2

the infant (Section of Breastfeeding, 2012). Published studies have confirmed and quantified the risks of bottle-feeding, and breastfeeding should not be considered as just another way of feeding the newborn, but rather as a basic health issue, with important implications for the health, both in countries with high or low income (Section of Breastfeeding, 2012; Victora et al., 2016). The WHO

recommends that babies **be exclusively breastfed for 6 months**

5

and that breastfeeding should be continued

with appropriate complementary food **for at least 2 years**

8

(World Health Organization, 2013).

Despite these recommendations, only a minority of European **infants** **is** **breastfed**
(Callen & Pinelli, 2004). **In Spain,**

2

the rate of initiation of breastfeeding is high, above 80% (Rio et al., 2012). However, only 28.5% of Spanish women exclusively breastfeed their child, without offering other liquids or foods,

at 6 months postpartum, and **the median** of **duration of breastfeeding**

67

is 6 months (Directorate General of Public Health, 2011/12). The

Spanish National Health System's Quality Plan urges health professionals to incorporate
breastfeeding support intervention **into their practices (Spanish Ministry of Health and**
Social Policy,

3

2009). Premature cessation of breastfeeding

is usually the result of the **combination of various factors**

13

on different levels (Hector, King, Webb, & Heywood, 2005). First, factors such as the so-called bottle-feeding culture, with

cultural values that **have made formula feeding the norm,**

13

or cultural norms against breastfeeding in public are linked to the structure of society, and influence the acceptability and expectations of a woman about breastfeeding (Hector et al., 2005; Oliver-Roig, 2003). Secondly, factors such as the lack of support from significant others, the hospital practices that make breastfeeding difficult after delivery, or the difficulties after returning to work, are linked to the environment in which the women and their

children relate to others, and

affect the amount of energy, time and ability of the mother to solve breastfeeding problems

13

(Oliver-Roig, 2003; Thulier & Mercer, 2009). Finally, factors such as clinical, psychological, and personal history are linked

to the mother-child dyad and directly

13

associated with maternal decisions and breastfeeding practices (Meedya, Fahy, & Kable, 2010; Thulier & Mercer, 2009). Our study focused on the mother’s attributes that affect breastfeeding decisions in the mother-child dyad level.

Self-efficacy, postnatal depression, anxiety, maternal intention to breastfeed, attitudes toward breastfeeding and social support are factors that have been implicated in breastfeeding initiation and duration

29

(de Jager, Skouteris, Broadbent, Amir, & Mellor, 2013; Meedya et al., 2010).

24

One important variable at this individual level is maternal attitude toward breastfeeding, since women’s attitudes are one of

the possible modifiable variables related to breastfeeding outcomes. Attitudes

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are associations between attitudinal objects (practically any aspect of the social world) and evaluations of these objects,

22

and constitute durable assessments

of various aspects of the social world that are stored in memory.

22

They are important because they strongly influence social thinking or how we think about and process social information. Attitudes function as schemas, or cognitive frameworks, possessing and organizing information about specific concepts, situations or events. Attitudes have been the focus of research because it is assumed that they always

influence behavior; therefore, knowing something about them can help us to predict people's behavior in

39

many contexts (Baron & Byrne, 4 1998).

Maternal breastfeeding attitudes are better predictors of infant feeding method during the postpartum period than

11

the mother's socio-demographic characteristics (Dungy, Losch, & Russell, 1994; Scott, Binns, Oddy, & Graham, 2006). Women with positive attitudes are

more likely to breastfeed and tend to do so for longer than

26

those with less positive attitudes (Thulier & Mercer, 2009)

(de La Mora, Russell, Dungy, & et al.,

16

1999; Scott et al., 2006). (CALLOUT 1.)

De La Mora and Russell, from the Iowa

7

State University, originally designed in 1999 the

Iowa Infant Feeding Attitude Scale (IIFAS) (de La Mora et al.,1

1999) to assess ten aspects related to

women’s attitudes toward breastfeeding, five related to the characteristics of7

breast milk and formula milk (i.e., cost, mother’s physical shape, sexual pleasure,10
mental-physical comfort, and nutritional product) and five related to the process of
feeding the baby (i.e., parental role, physical closeness, infant food intake, ease of feeding,
and nighttime feeding).

The scale was developed to

predict the choice of infant feeding method as well as duration of breastfeeding;7

higher rates indicate that women are likely to breastfeed. The IIFAS consists of 17 items selected from an initial pool of 26 items to optimize reliability. In the original study, which consists in three substudies conducted at a

community hospital in a medium-sized Midwestern city of10

USA, the reliability of the IIFAS ranged since 0.68 to 0.96. On behalf validity, the IIFAS discriminated between

women who intend to breastfeed and those who decide to use artificial feeding.32

The IIFAS

has been tested in various populations (Ho & McGrath, 2010), including prenatal and postpartum women, low-income women

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(Dungy, McInnes, Tappin, Wallis, & Opreescu, 2008), social networkers (Dungy et al.,

55

2008), fathers (Karande & 5 Perkar, 2012), and students (Kavanagh, Lou, Nicklas, Habibi, & Murphy, 2012). The original English version has been used in the USA

(de La Mora et al., 1999), Australia, (Scott et al.,

9

2006)

Northern Ireland (Sittlington, Stewart-Knox, Wright, Bradbury, & Scott, 2007), Scotland (Dungy et al.,

9

2008), Croatia (Zakarija-Grkovic & Burmaz, 2010), Syria (Al-Akour, Khassawneh, Khader, Ababneh, & Haddad, 2010), India (Karande & Perkar, 2012), and Singapore (Lau, Htun, Lim, Ho-Lim, & Klainin- Yobas, 2015). Besides being used in English, it has

been translated into Romanian (Wallis et al., 2008), Chinese (Ho & McGrath,

16

2011a), Arabic (Charafeddine, Tamim, Soubra, de la Mora, & Nabulsi, 2015; Saied, Mohamed, Suliman, & Al Anazi, 2013), Japanese (Nanishi & Jimba, 2014), and isiZulu (Tuthill et al., 2014). Many international studies have been conducted on the IIFAS and the reliability and validity of this scale. Previous studies have reported conflicting evidence on reliability, with internal consistency coefficients (?) ranging between 0.89

(Dungy et al., 2008) and 0.50 (Wallis et al., 2008). Moreover, the low internal consistency of

46

the IIFAS found in some previous studies has not been explained. The factor structure of the IIFAS has been considered unidimensional, and the total IIFAS score has been used in all previous research to provide evidence of validity. However, a discrepancy in results on the structure of the IIFAS between publications is found. Previous studies have reported structures with one (Charafeddine et al., 2015; Nanishi & Jimba, 2014), three (Lau et al., 2015) or four (Dai, Guan, Li, You, & Lau, 2013) factors for the IIFAS. As in the original study

(de La Mora et al., 1999), other authors found that the

11

IIFAS discriminates between

women who intend to breastfeed and those who decide to use artificial feeding

32

(de La Mora et al., 1999; Lawton, Ashley, Dawson, Waiblinger, & 6 Conner, 2012). Also IIFAS predicts the initiation

and the duration of breastfeeding in women

41

with higher scores (Chen et al., 2013; Ho & McGrath, 2011b; Scott et al., 2006). The IIFAS

has not previously been translated into Spanish and psychometrically tested among mothers in Spain,

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where a validated version

could be useful to identify groups at risk of early breastfeeding cessation

15

or to evaluate interventions. The objectives

of this study were (1) to translate the scale into Spanish, and (2) to test its

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psychometric properties

and obtain data on Spanish-speaking mothers in Spain. The conflicting evidence on the factor structure of the IIFAS and the low internal consistency of the scale observed in some previous studies indicated the need to explore item reduction for the Spanish version. Method Participants We conducted an instrumental study.

A convenience sample of 1354 pregnant women in their third trimester

2

was recruited from 6 hospitals in eastern Spain, as part of a larger study on factors related to early breastfeeding cessation. All the hospitals involved were implementing different strategies to improve breastfeeding practices and two of them had been designated

as Baby-Friendly Hospitals before the initiation of

74

the study, by taking the steps recommended by the

UNICEF/WHO's Baby-Friendly Hospital Initiative to improve breastfeeding practices in

38

health care (World Health Organization., 2009).

All participants were able to read and speak Spanish and they

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had no problems that could seriously complicate or contraindicate breastfeeding such as HIV infection, 7 previous breast surgery, or congenital fetal pathology diagnosed during pregnancy. In the postpartum

follow-up, women were excluded if they had

66

had preterm deliveries or multiple births, or when medical problems existed that prevented or seriously hampered

breastfeeding; these included problems of the newborn such as an Apgar score below 6 at 5 minutes of life, neonatal sepsis, cleft lip, cleft palate, or Down syndrome. All recruited women agreed to participate in the

study. The study received approval from the institutional review board.

2

Instrument:

IIFAS The IIFAS is a 17-item questionnaire **that**

36

uses

a 5-point Likert scale ranging from 5 (strongly agree) to 1 (strongly disagree).

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Nine of **the items**

are worded in a manner favorable to breastfeeding, while **the remaining** items are **favorable to formula feeding. Items favoring** artificial **feeding are** reversed **scored**

7

and a total score is

computed via an equally **weighted sum of responses to the individual items.**

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The

total attitude scale **can range from 17-85;** higher rates indicate **that**

65

the respondent is likely

to breastfeed (de La Mora et al., 1999).

9

Translation procedures Linguistic validation of the Spanish IIFAS was performed using the standard procedure of translation and blind back-translation, with the aim of ensuring content, semantic and technical equivalence. The translators, two for the translation and two for the back-translation, were not otherwise involved in the project and were not experts in maternal breastfeeding. Data was collected on difficulty in translating

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(1= not at all difficult; 10= maximum difficulty), and on the applicability to the

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Spanish cultural context or changes made to each item

in order to maintain semantic and conceptual equivalence. Once the

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translated version and data concerning the items were available, the research team

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held

meetings with the translators to revise the translation and reach a consensus in order to produce a single version in Spanish. A pilot study was conducted with

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10 pregnant women in order

to test comprehensibility and legibility of the

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translated IIFAS. Data collection During a third trimester pregnancy check-up (28-42 weeks),

participants completed a battery of self-report questionnaires,

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including the translated IIFAS, and provided data

on age, level of maternal education and income,

76

marital status, parity, previous experience of breastfeeding, breastfeeding duration and assessment, and selected infant feeding method and decided duration. In order to obtain follow-up information on breastfeeding, we consider three moments for data collection: at postpartum discharge, at 5 months, and at one year after delivery (Figure 1). First, prior to postpartum discharge from the hospital (2 to 4 days postpartum), we collected data from a self-administered questionnaire on in-hospital initiation of breastfeeding and supplementation with infant formula or other liquids before discharge. Also, we obtained data on obstetric variables such as mode of delivery from clinical records. In addition, at 5 and 12 months after delivery data was obtained concerning the time at which breastfeed infants was first given

additional water-based liquids, breast milk substitutes and complementary foods at least once a day, and the time of weaning.

12

At 5 months postpartum a self-administered postal 9 questionnaire was sent to mothers who were breastfeeding their child at discharge or with missing data after delivery. This was sent up to three times to non-responders, with a period of three weeks between each delivery, and included the form to complete, a pen, and a postage paid envelope for submitting responses to the research team. Finally, 12 months after delivery, a telephone survey was conducted by one of the authors not involved in in-hospital attention, of mothers who were breastfeeding their child or with missing data at 5 months postpartum. The description of the breastfeeding practices is based on the definitions proposed by WHO

(World Health Organization, 1991) : exclusive breastfeeding, when infants only received breast milk,

21

although rehydration solutions, drops, and syrups were also allowed; and any breastfeeding,

when infants received any amount of breast milk with or without other liquids or foods.

12

The duration of exclusive breastfeeding was considered to be the time until the introduction of water based drinks, juices, infant formula or complementary foods, and the duration of any breastfeeding as the time during which the infants received any quantity of mother's milk. Data analysis We calculated the

mean and standard deviation of item scores, and **the** proportion **of** respondents with **the**

4

lowest or highest possible score was determined

in order to assess floor and ceiling effects. The median duration and **proportion of**

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infants by age for exclusive and any

breastfeeding were calculated using the survival table method,

12

including information collected at discharge, 5 months and 12 months postpartum. For data analysis, we only used records in which 100% of IIFAS items had been answered. The

Kolmogorov-Smirnov test was used to assess normal distribution of variables.

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We assessed the association between variables using Pearson's or 10 **Spearman's**
correlation, as appropriate, and the hypotheses were contrasted using parametric
(Student's T test)

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or non-parametric tests (Mann–Whitney U,

75

χ^2) depending on distribution of variables.

Reliability of the translated IIFAS was assessed using the following criteria:

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Cronbach's α coefficient, estimation of alpha when an item was deleted from the scale, and adjusted item-total correlation.

In order to determine construct validity, we performed a principal component analysis, forcing the extraction of one factor. We reduced the

3

scale to obtain a short version by deleting

items with an adjusted item-total correlation or factor loading of less than

58

0.30, in line with the criteria proposed by Nunnally and Bernstein (Nunnally, J., Bernstein, I., 1994). In addition, following the strategy proposed by Smith aimed at assessing the validity of each item in relation to a criterion (Smith, Fischer, & Fister, 2003), the items that presented no relationship with at least 3 of these 5 following variables were removed:

initiation of breastfeeding after delivery, exclusive breastfeeding at

79

discharge, at 1 and

6 months postpartum and any breastfeeding at 12 months postpartum.

8

Lastly,

a confirmatory factor analysis was conducted. We tested 3 models: model 1

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tested

a one-factor model, in which the 17 IIFAS items were assumed to be indicators of a single latent factor.

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Model 2 examined the presence of 4 latent variables identified in a previous study (Dai et al., 2013). Finally, model 3 explored the unifactorial solution of the IIFAS-S obtained through the item reduction process explained above. We did not test the Japanese model (Nanishi & Jimba, 2014) because it did not fit for just one dimension, and because it includes all the same items as the original except item 17. 11 As data were ordinal, not normally distributed, there was a

ceiling effect in some items, and the

2

sample is large, the weighted least square (WLS) method

was used to fit models (Bentler, 2004). The models were assessed using the goodness-of-fit index (GFI) and the comparative fit index (CFI), with values

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of

>0.9 indicating an acceptable fit and >0.95 indicating a good fit (Hu, L.T., Bentler,

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P.M.,

1999); the root mean squared error of approximation (RMSEA), which favors more

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parsimonious models, with a value

of

0.06 indicating a good fit and 0.10 representing an acceptable fit (Hu, L.T., Bentler,

2

P.M.,

1999); and the standardized root mean square residual (SRMR), with values

2

of

<0.08 indicating a good fit and <0.10 representing an acceptable fit (Hu, L.T., Bentler,

2

P.M., 1999; Kline, 2005). In addition, the χ^2

/DF was calculated, considering the fit acceptable if <4 (Bentler, 2004; Kelloway, 1998).

2

To further assess construct validity, a known group comparison was conducted with the hypothesis

4

- based on previous studies on the IIFAS - that women who decided to breastfeed during pregnancy and those who intended to breastfeed their babies for more time would obtain

higher total scores than women who did not intend to

4

do so. We also expected that mothers with a higher socioeconomic status, as assessed by annual income or educational status, older mothers, mothers with prior and longer breastfeeding experience and those who assessed their previous experience positively, would also present higher IIFAS scores. Lastly,

predictive validity was determined by examining the association between the IIFAS score and

4

the variables used to remove items in order to improve criterion validity as described above. Also,

receiver operating characteristic (ROC) curves were used to determine predictive validity
and **utility of** IIFAS **scores for differentiating between mothers who**

6

initiated breastfeeding after delivery from those who did not 12 initiate breastfeeding. The ROC curves were constructed for the whole sample,

primiparous women and multiparous women. The

81

area under the ROC curve (AUC) was computed.

6

We considered that

an AUC greater than 0.9 can be said to be highly accurate, while 0.7–0.9 indicates moderate accuracy

6

(Fischer, Bachmann, & Jaeschke, 2003).

Youden's J ($J = \text{sensitivity} + \text{specificity} - 1$) was used to identify the optimal cut-off point

6

(Perkins & Schisterman, 2006). Results

Description of sample The mean age of the sample was 31.87 years old (SD=4.

2

77),

ranging from 14 to 48 years old. Most of the participants were married,

69

had a high school or higher education, and an annual family income of more than 18000 Euros. Most women wanted to breastfeed and the mean intended breastfeeding duration was 9.24 ? 5.97 months. The principal delivery method was vaginal and for most women, this was their first child (Table 1). At discharge, we excluded for the follow-up sample 68 cases because they met an exclusion criterion or due to lack of information on exclusion criteria (Figure 1). Also, a total of 110 women that did not initiate breastfeeding after delivery were not included in the follow-up after postpartum discharge. For the follow-up sample after postpartum discharge (n=1176), information on breastfeeding duration was obtained from 986 (83.8%) women that completed the postal questionnaire, answered the telephone survey, or both. Statistically significant differences were observed between women participating and women not participating in the follow-up after postpartum discharge. Women not participating were younger ($t=4.58$, $p<0.01$), with lower 13 educational status ($\chi^2=18.38$, $p<0.01$), lower family annual incomes ($\chi^2=9.67$, $p<0.01$) and lower IIFAS scores ($U=55173$, $p<0.01$), more frequently singles ($\chi^2=4.47$, $p=0.04$), without previous breastfeeding experience ($\chi^2=8.29$, $p<0.01$), and more frequently they did not want to breastfeed during the third trimester of pregnancy ($\chi^2=36.48$, $p<0.01$). No differences were observed for having previous children ($\chi^2=1.86$, $p=0.17$) or delivery method ($\chi^2=2.56$, $p=0.11$) between women participating and not participating in the follow-up after discharge. We obtained complete information referring to the first year postpartum for the whole follow up sample, including women that did not initiate breastfeeding, on duration of exclusive breastfeeding for 1075 (83.6 %) cases, and on duration of any breastfeeding for 866 (67.4 %) cases. The median of

duration of exclusive breastfeeding and any breastfeeding was 120 and

15

210 days, respectively.

Semantic equivalence None of the 17 items on the scale was considered inappropriate for the Spanish context. It was not necessary to make any changes to 14 of the items. Meanwhile, expressions that were more suitable in the Spanish context were introduced in the rest of the items in order to ensure equivalence. For instance, the expression

2

“great joys of motherhood” in item seven was changed to “better experiences of motherhood” (“mejores experiencias de la maternidad”), the expression “less expensive” in item sixteen was changed to “more economic” (“más económica”), and “increases” was changed to “reinforces” (“fortalece”) in item three.

According to the translator **evaluation, the average difficulty of the translation was 2.** 1, **and in no case did it rise above** 3 **on the established scale of 1-10.**

2

Semantic differences were not detected in the translated version,

3

and

reading and comprehension problems were not encountered

2

during the pilot study (Muñiz, Elosua, & Hambleton, 2013). Reliability, validity and test information of IIFAS.

Cronbach's alpha coefficient **was 0.726** **for the** Spanish **version of** the **IIFAS,** with a **mean** total scale score **of**

7

66.12 (SD= 7.68). The item mean was 3.89, ranging from 2.13 to 4.78. Table 2 shows the item-adjusted test correlations,

Cronbach's alpha if the item was **deleted, the**

5

means

and standard deviation of item responses, and the proportion of

4

extreme value responses and response frequency for each item.

The Cronbach’s alpha coefficient for the IIFAS was

4

not increased by more than 0.1 if any of the items were deleted. Item

1 (“The benefits of breast milk last only as long as the baby is breastfeed”); item 4 (“Breast

1

milk is lacking in iron”); item

8 (“Women should not breast-feed in public places such as restaurants”);

1

item

10 (“Breastfed babies are more likely to be overfed than formula-fed babies”);

1

item 11

(“Fathers feel left out if a mother breastfeeds”);

1

item17

(“A mother who occasionally drinks alcohol should not breastfeed her baby”),

1

had loadings below 0.30, and all of them plus

item 16 (“Breastmilk is cheaper than formula”) had item-64

adjusted test correlations below 0.30 (Table 2). These 7 items, plus item

5 (“Formula-fed babies are more likely to be overfed than breastfed babies”),1

showed low predictive validity related to breastfeeding (Table 3), and were proposed for elimination from the short version. Table 4 shows the fit indexes obtained from

the confirmatory factor analysis of the 3 models tested.2

Model 3 showed the best-fit indexes and corresponds to the final version of the 9-item Spanish adaptation of the IIFAS, considering a unifactorial solution (IIFAS-S).

Reliability and validity of the short Spanish version IIFAS-S. The4

total score average of the IIFAS- S was4

36.15±5.66, with a non-normal distribution. The

Cronbach’s alpha coefficient was 0.2

792. Table 5 shows the item- adjusted test correlations and

Cronbach's alpha when the item was deleted. The

2

average score in the IIFAS-S was 36.97 ± 4.77

for women who wanted to breastfeed their infant during the third trimester of pregnancy,

2

29.85 ± 6.57 for those who had not yet decided and 26.86 ± 6.98

for those who had decided to give their infant formula milk, reflecting significant differences between the IIFAS-S scores (KW= 167.2; $p < 0.001$).

2

Intended breastfeeding duration during pregnancy correlated positively with IIFAS-S scores ($r_s=0.31$; $p<0.001$).

Women that

initiated breastfeeding and those that were exclusively breastfeeding during postpartum hospitalization, at 1

38

month postpartum, and at 6 months postpartum, had respectively higher IIFAS-S scores than mothers that did not initiate or did not offer exclusive breastfeeding at discharge or at 1 or 6 months postpartum, respectively. Lastly, women breastfeeding at 12 months postpartum had higher IIFAS-S scores than women that had weaned their babies previously (see Table 3). Regarding utility to predict the initiation of breastfeeding after delivery, the AUCs

were 0.81 (95% CI: 0.76 to 0.85), 0.75 (95% CI: 0.67 to 0.82) and 0.85 (95% CI: 0.80 to 0.90) for

25

the whole sample, primiparous and multiparous women, respectively. For the whole sample, Youden's J was higher at IIFAS-S score of 31,

with a sensitivity and specificity of 86% and 60%, respectively.

23

For primiparous women, Youden's J 16 was higher at IIFAS-S score of 32,

with a sensitivity and specificity of 83% and 50%, respectively.

23

For multiparous women, Youden's J was higher at IIFAS-S score of 31,

with a sensitivity and specificity of 85% and 71%, respectively.

23

Several of the demographic variables were found to be significant correlates of attitudes toward infant feeding.

10

Mothers with a primary school or lower education obtained a significantly ($U=221851.5$; $p=0.016$) lower IIFAS-S score ($\text{mean}=35.84\pm5.41$) than those with a high school or higher education ($\text{mean}=36.36\pm5.85$). Furthermore, mothers with previous breastfeeding experience ($\text{mean}=36.73\pm5.64$) obtained higher average of IIFAS-S scores ($U=9976$; $p<0.001$) than mothers without experience ($\text{mean}=30.18\pm6.57$), while longer duration ($r_s=0.41$; $p<0.001$) and better assessment ($r_s=0.32$; $p<0.001$) of that experience correlated positively with IIFAS-S scores. No differences in attitudes toward breastfeeding were found regarding

maternal age ($r_s=0.04$; $p=0.173$) or annual family income ($r_s=0.05$; $p=0.081$).

3

081).

Discussion This paper is the first report on use of

1

the IIFAS in Spain, and describes the adaptation and

psychometric properties of the scale in a large sample of

34

prenatal Spanish women. Data on the

psychometric properties of the adapted 17-item **Spanish version of the**

19

IIFAS, reported in this study, together with the discrepancy in the evidence on the factor structure of the IIFAS and the low internal consistency of the scale observed in some previous studies, indicated the need to explore item reduction for the Spanish version. Our study provides a shorter, 9-item version than the original IIFAS-S, which presents optimal evidence of reliability and validity in our sample. 17

The translation process was systematic and **rigorously conducted to ensure that**
equivalence was established. The pilot test showed that

7

none of the items required special attention or modification. The evidence of reliability obtained for the adapted Spanish scale was high for the 17-item version and higher still for the short 9-item version (the IIFAS-S). Although the IIFAS-S has fewer items than the original, we nevertheless obtained better Cronbach's alpha values (0.792) than most previous studies. The reliability

of the IIFAS scale has been variable **in previous studies.**

16

Nearly half of the studies performed obtained values close to or below 0.60 (Charafeddine et al., 2015; Dai et al., 2013; Nanishi & Jimba, 2014; Wallis et al., 2008), while the other half reported acceptable reliability, above 0.70

(de La Mora et al., **1999; Dungy et al., 2008; Ho & McGrath,**

16

2011a; Lau

et al., 2015; **Sittlington et al., 2007;** Twells **et al.,**

1

2014). It is difficult to assess whether the reliability of some of these earlier versions could have been improved by

eliminating items, as proposed in the present study, since most only mentioned correlation ranges, with a lower limit well below 0.30 in some of them (Dai et al., 2013;

de La Mora et al., 1999; Twells et al.,

9

2014). However, in those studies that did provide data, the items with lower adjusted item-test correlations coincide with those that we have removed (Charafeddine et al., 2015; Dai et al., 2013; Ho & McGrath, 2011a; Twells et al., 2014). It is noteworthy that item 17 was not adjusted in any of the versions analyzed, and was only removed in two studies (Lau et al., 2015; Nanishi & Jimba, 2014). The reduced number of items in the proposed IIFAS-S scale decreases respondent burden. In addition, since an attitude scale can be useful for predicting a behavioral criterion such as breastfeeding behavior (Smith et al., 2003), one of the study's novel 18 contributions, besides using the classic strategy of reducing the number of items, has been to propose predictive validity criteria. All items with poor reliability or structural validity according to standard criteria also showed the worst predictive behavior, although this criterion made it possible to eliminate an additional item (item 5). As mentioned in the introduction, although a total IIFAS score has been used in all previous research to provide evidence of validity, only 2 validation studies have reported a unifactorial structure of the scale. However, one of these, a Japanese study, tested the IIFAS structure using principal components

analysis without rotation, forcing the extraction of 1 factor,

4

but this was not adjusted properly (Hu, L.T., Bentler, P.M., 1999; Nanishi & Jimba, 2014). In the second study, the authors based the result of a one-dimensional structure not in the principal components analysis, which revealed a 6 factors structure, but in the scree plot, even though there were items with a very low corrected item-total correlations (less than 0.2) when a unifactorial model was tested, indicating a poor adjustment of this model too (Charafeddine et al., 2015). The short version proposed here fits to a one-dimensional model, achieving very good fit indexes in confirmatory factor analysis. (CALLOUT 2.) As regards predictive validity, given that the items retained individually predicted at least 3 of the breastfeeding behaviors proposed, it is not surprising that the scale as a whole showed statistically significant associations with initiation of breastfeeding, exclusive

breastfeeding at discharge, at 1 month

9

and

6 months postpartum and any breastfeeding at 12 months postpartum.

8

Other studies

(de La Mora et al., 1999; Scott, Shaker, & Reid, 2004; Sittlington et al.,

9

2007) have reported

that mothers who initiate breastfeeding in hospital present higher total scores

56

on the IIFAS scale than 19 those using artificial feeding (Dungy et al., 2008; Holbrook, White, Heyman, & Wojcicki, 2013) or with longer duration of breastfeeding

in other studies (Chen et al., 2013; Donnan et al., 2013;

47

Ho & McGrath, 2011b; Scott et al., 2006). Also, the IIFAS-S showed a good AUC and good sensitivity and specificity properties to discriminate women initiating or not breastfeeding after delivery, for the entire sample, the primiparous and the multiparous women. The cut-off points are similar between these groups. However, IIFAS-S has slightly better sensitivity and specificity properties for multiparous women. These results are a novelty. Only one previous study had showed the IIFAS ROC results, but for intended breastfeeding during pregnancy instead of the initiation of breastfeeding after delivery (Twells et al., 2014). In our study, as in previous studies, other variables related to breastfeeding were associated with higher scores for the total IIFAS scale score, such as the mother's previous experience (Holbrook et al., 2013; Wilkins, Ryan, Green, & Thomas, 2012) and the intended breastfeeding (de La Mora

et al., 1999; Donnan et al., 2013; Dungy et al., 2008;

1

Nanishi & Jimba, 2014;

Scott et al., 2004; Twells et al.,

9

2014).

This study offers some novelties about prenatal attitudes. First,

2

higher IIFAS-S scale scores were associated with longer duration of a previous experience and with its positive assessment, showing that not only previous experience but also its success, influence in the maternal attitude. Finally, the IIFAS-S scale scores were associated with intended breastfeeding duration, as was to be expected, since attitudes are a good predictor of behavioral intention (Dick et al., 2002). (CALLOUT 3.) Regarding sociodemographic variables, as expected, IIFAS-S scale scores were positively associated with a higher educational level (Chen et al., 2013; de La Mora

et al., 1999; Sittlington et al., 2007; Wilkins et al.,

1

2012). However, in our study, like in other studies, they were not related to age (Saied

et al., 2013; Scott et al., 2004; Sittlington et al., 2007; Wallis et al., 2008),

1

marital status (Chen

et al., 2013; Scott et al.,

20

2006) or a higher level of family income. It is possible that the use of a short version of the IIFAS scale, differences inherent in the Spanish context compared to previous studies, or the self-selection of mothers to participate

in this study, may explain the absence of differences in

57

IIFAS-S scores for these variables. Moreover, given the economic crisis underway at the time of this study, family income is perhaps not as good an indicator of socioeconomic status as the mother's educational level, which did explain differences in IIFAS-S scores.

Implications: First, the IIFAS has been validated for use in

5

Spanish women. The Spanish is one of the most spoken languages around the world. This version facilitates the adjusted linguistic validation (Acquadro, Conway, Girourdet, & Mear, 2004) for other countries with Spanish-speaking population. Moreover, the reduced version proposed decreases the respondent burden, has a structure that enhances the simplicity of the theoretical model, good metric properties, high reliability, and good evidences of validity in relation to sociodemographic and experiential variables, intention of breastfeeding, and breastfeeding behavior. Thus, the IIFAS-S shortened version improves the usability in research on breastfeeding attitudes. Lastly, from the perspective of the clinical utility, the scale can

be used to assess maternal attitudes to infant feeding,

5

to discriminate women at risk of no initiate breastfeeding after delivery, and

evaluate the effectiveness of health **interventions to promote breastfeeding.**

1

Nearby scores, less than or equal to 32 for primiparous women and less than or equal to 31 for multiparous women,

can be taken as indicators of a need for interventions to promote **breastfeeding.**

6

Limitations: The

use of a convenience **sample** was **a** limitation **of** the **study. The**

34

follow-up sample after postpartum discharge had characteristics that positively influence the breastfeeding

duration, including older age, higher educational level, higher economic status, being married, having previous breastfeeding experience, and having decided to breastfeed during pregnancy (Thulier & Mercer, 2009). These characteristics, besides the higher average of IIFAS scores of the follow-up sample, and the characteristics of the hospitals involved in the study explain the higher duration of breastfeeding of the sample compared with the Spanish average. The proposed cut-off points can be used as a normative reference in similar samples and it should be considered that they could be lower if the IIFAS-S is used with

women at higher risk of early breastfeeding cessation.

13

Future research is required in order to obtain data on more representative samples, evidences of the structural validity of versions in other countries, and data on the responsiveness of the scale to health promotion interventions. The scale was

adapted to Spanish as **spoken in Spain, and not**

3

to the variants spoken in other countries; thus,

an adjusted linguistic validation would be required **for studies involving Spanish speakers from other countries.** 22 507 **Conclusion**

3

508

This is the first prenatal breastfeeding attitudes **survey** to be conducted **using the**
509 **Spanish version of**

2

the IIFAS (IIFAS-S). A 9-item Spanish version has been obtained, 510 which is shorter than other existing versions, applying the criteria of improving the 511 reliability and predictive power of the items. The scale presents a one-dimensional 512 structure and shows optimal evidence of reliability and validity. The scale also shows 513 a good relationship with maternal intention to breastfeed, discriminates women 514 according to their previous experience, and

is a good predictor of initiation, 515 exclusiveness and duration of

17

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Figure 1. Flow Chart of the study.

Table 1. Characteristics of the study sample. Variable n % Educational status Primary school or lower High school 2

or more Missing data

Marital status De facto or Married Single 2

Divorced Missing data Family annual incomes Less than 18.000 Euros More than 18.000 Euros Missing data First child Yes No Missing data Previous breastfeeding experience Yes No or first birth Missing data

Duration of previous breastfeeding 4 months or less More than 4 months 48

Missing data Self-assessment of previous breastfeeding experience Good Fair Bad Missing data Intention of breastfeeding during third trimester of pregnancy Yes No Not decided Missing data Attended in a Baby-Friendly hospital Yes No Delivery Method Vaginal Cesarean Missing data Initiation of breastfeeding Yes No Missing data 641 703 10 1186 127 33 8 734 510 110 725 623 6 523 824 7 167 353 3 366 95 60 2 1210 75 58 11 319 967 854 272 184 1148 110 28 47.3 51.9 0.7 87.6 9.4 2.4 0.6 54.2 37.7 8.1 53.5 46.1 0.4 38.6 60.9 0.5 31.9 67.5 0.6 70 18.1 11.5 0.4 89.4 5.5 4.3 0.8 24.8 75.2 65.5 20.2 14.3 89.2 8.6 2.2 Current feeding in-hospital

Exclusive breastfeeding (only breast milk) Predominant breastfeeding (breast milk 3

4/5/2016

Largest Matches

+ no nutritive liquids) Partially breastfeeding (breast milk + formula) Formula feeding Missing data Exclusive breastfeeding at 1 month postpartum Yes No No initiation of breastfeeding Missing data Exclusive breastfeeding at 6 month postpartum Yes No No initiation of breastfeeding Missing data Any breastfeeding at 12 months postpartum Yes No No initiation of breastfeeding Missing data 618 25 281 110 252 851 177 110 148 168 807 110 201 201 555 110 420 48.1 1.9 21.9 8.6 19.6 66.2 13.7 8.6 11.5 13.1 62.7 8.6 15.6 15.6 43.2 8.6 32.6

TABLE 2. IIFAS-s with principal components factor loadings,

reliability results, floor and ceiling effects, means (M), standard deviation (SD)

2

and response frequency for each item (n). Item Loadin g

Corrected item-total correlation Cronbach' s α if item deleted

4

Floor "1"% Ceiling "5"% M SD n

1. *The benefits of breast milk last only as long as the baby is

1

breastfeed.

2. *Formula- feeding is more convenient than breast-feeding. 3.

1

Breastfeeding reinforces mother-infant bonding.

4. *Breast milk is lacking in iron.

4

5.

Formula-fed babies are more likely to be overfed than breastfed babies. 6. *Formula-feeding is the better choice if the mother plans to go out to work. 7. Mothers who

1

formula-feed miss one of the better experiences of motherhood.

8. *Women should not breast-feed in public places such as

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0.129 0.148 0.773 9.8 34.6 3.58 1.32 1289 0.520 0.413 0.703 2.5 64.3 4.40 0.93 1337 0.612 0.447 0.703 1.8 78.1
4.64 079 1340 0.232 0.194 0.723 2.2 50.0 4.11 1.01 1308 0.378 0.318 0.711 15.1 11.3 3.00 1.15 1331 0.495 0.408
0.701 8.3 17.9 3.25 1.16 1346 0.679 0.462 0.695 6.7 46.5 3.96 1.20 1340 0.291 0.275 0.715 2.6 60.2 4.28 1.03
1343 restaurants. 9. Breastfeed

babies are healthier than formula- feed babies.

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10. *Breastfed babies are more likely to be overfed than formula-fed babies.

1

11. *Fathers feel left out if a mother breastfeeds. 12. Breast

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milk is the ideal food for babies.

13. Breast milk is more easily digested than formula.

4

14. *Formula is as healthy for infants as breastmilk

1

15. Breastfeeding is more convenient than formula feeding.

4

16. Breastmilk is more economic than formula.

17. *A mother who occasionally drinks alcohol should not breastfeed her baby.

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0.686 0.481 0.692 9.1 28.5 3.55 1.22 1345 0.096 0.147 0.728 5.4 30.5 3.67 1.10 1335 0.168 0.150 0.726 2.6 66.8
4.46 0.91 1333 0.647 0.453 0.704 1.7 79.9 4.70 0.72 1344 0.586 0.424 0.701 3.0 41.2 3.96 1.03 1333 0.566 0.421
0.701 5.4 14.0 3.22 1.06 1340 0.697 0.497 0.696 2.8 59.0 4.37 0.93 1340 0.329 0.214 0.720 1.6 85.4 4.78 0.64
1344 0.050 0.029 0.745 44.8 7.7 2.13 1.27 1342 *

Variables reverse scored to calculate total infant feeding attitude

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score. Table 3. IIFAS Predictive Validity by item and total scores. BF Initia tion Yes No Mean Mean (SD) (SD) EBF
at disch arge Yes No Mean Mean (SD) (SD) EBF 1 mont h Yes No Mean Mean (SD) (SD) EBF 6 mont hs Yes No
Mean Mean (SD) (SD) ABF 12 mont hs Yes No Mean Mean (SD) (SD) Item 1 3.61 3.61 (1.33) (1.23) 3.66 3.54
(1.34) (1.27) 3.64 3.50 (1.35) (1.26) 3.81 3.55 (1.35) (1.32) * 3.71 3.52 (1.35) (1.34) Item 2 4.47 3.79 (0.94) (0.98) *
4.47 4.19 (0.9)* (1.02) 4.52 4.41 (0.88) (0.94) 4.64 4.46 (0.79) (0.90) * 4.69 4.43 (0.66) (0.91) * Item 3 4.71 4.01
(0.72) (1.22) * 4.74 4.42 (0.69) (1.01) * 4.77 4.55 (0.64) (0.94) * 4.87 4.69 (0.42) (0.74) * 4.87 4.67 (0.45) (0.75) *
Item 4 4.12 4.03 (1.02) (0.98) 4.15 3.98 (1.02) (1.05) * 4.13 4.00 (1.05) (1.10) 4.13 4.09 (1.06) (1.07) 4.16 4.07
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3.09 2.95 (1.11) (1.17) Item 6 3.32 2.49 (1.16) (1.18) * 3.34 2.98 (1.16) (1.21) * 3.40 3.12 (1.18) (1.19) * 3.51 3.28
(1.09) (1.14) * 3.58 3.26 (1.08) (1.14) * Item 7 4.08 2.97 (1.12) (1.45) * 4.14 3.62 (1.08) (1.37) * 4.14 3.86 (1.08)
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(0.63) (1.20) * 4.79 4.48 (0.61) (0.93) * 4.77 4.73 (0.64) (0.60) 4.86 4.74 (0.44) (0.67) * 4.85 4.47 (0.54) (0.68) * Item
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2. ***Formula-feeding is more convenient than** breast-feeding. 3.

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Breastfeeding reinforces mother-infant bonding. 6.

***Formula-feeding is the better choice if the mother plans to go** out **to work.** 7.
Mothers who formula-feed miss one of the better experiences **of**

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mother hood. 9. Breastfeed

babies are healthier than formula- feed **babies.**

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12. **Breastmilk is the ideal food for babies.**

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13. **Breastmilk is more easily digested than formula.**

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14. ***Formula is as healthy for** infants **as breastmilk**

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15. **Breastfeeding is more convenient than formula feeding.**

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item-total correlation if item deleted

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0.388 0.776 0.487 0.767 0.366 0.781 0.563 0.753 0.598 0.748 0.488 0.768 0.458 0.768 0.463 0.767 0.554 0.757 *

Variables reverse scored to calculate total infant feeding attitude

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