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A Functional Assessment of the Impact of Advantages and Disadvantages on Breastfeeding Attitude

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Although health and other benefits of breastfeeding for mother and child have been repeatedly shown, there is still a large proportion of women who do not initiate or continue breastfeeding. The aim of the current study is to analyze the contribution of the presentation of advantages and disadvantages of breastfeeding in developing an attitude towards breastfeeding among Dutch and Flemish women of reproductive age. In a functional measurement experiment factorial combinations of advantages and disadvantages of breastfeeding were presented to a group of women between 18 and 45 years. Women rated their attitude towards breastfeeding after each presentation of a combination of arguments. The results show that information on health related advantages produces the most positive attitude towards breastfeeding. Practical disadvantages were found to be the least important determinants of attitude. Three types of response patterns could be distinguished using cluster analysis. Although an averaging type integration rule was expected, the results suggest that some women do not take all information from the presented advantages and disadvantages into account to form an overall attitude towards breastfeeding. One cluster showed no main effect for advantages, only a small effect for disadvantages, but a main effect of attitude prior to the experiment. The second cluster showed a large main effect for advantages and only a modest effect for disadvantages. In the third cluster, both advantages and disadvantages impacted similarly on attitude. An averaging type integration rule could be discerned in the second and the third cluster. The current results imply that campaigns to promote breastfeeding should take into account differences between target populations.

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INTRODUCTION

Although breastfeeding is generally accepted as the optimal method of infant feeding, many infants in the Netherlands are breastfed only for a short period (Lanting, 2005). The WHO recommends exclusive breastfeeding for 6 months and continued breastfeeding until 2 years of age along with complementary foods (Kramer & Kakuma, 2001). In The Netherlands, 80% of women start with exclusive breastfeeding, but the breastfeeding rate drops rapidly to 51% at 1 month postpartum and declines further to 15% at 6 months (Lanting, 2005).

Encouraging women to initiate and continue breastfeeding presents a major challenge to health care professionals in the Netherlands. Social cognitive models for behavioural change provide a useful framework for studying infant feeding behaviour. One of the most complete models is the Integrated Change Model (I-Change Model, de Vries et al., 2004, 2005), which integrates ideas from various other social cognitive models. According to this model the motivation to demonstrate certain health behaviours depends on various factors, such as motivation factors (e.g., attitude and social influences), predisposing factors (e.g., biological or social cultural factors), awareness factors (e.g., knowledge) and information factors (e.g., message and channel). Many of these factors have been found to be associated with the initiation and continuation of breastfeeding. In this study, we focus on the contribution of information and awareness factors in developing an attitude towards breastfeeding.

Knowledge and attitude formation. Knowledge regarding breastfeeding can be acquired by several means and is expected to determine women's attitude towards breastfeeding and thus their intention to breastfeed. Knowledge of breastfeeding and attitude towards breastfeeding were found to be predictors of the intention to breastfeed in several studies (Fairbrother & Stanger-Ross, 2010; Marrone, Vogeltanz-Holm, & Holm, 2008; Kools, Thijs, & de Vries, 2005). On the other hand, the intention to breastfeed can be undermined by information about the alternatives. The availability of information about formulafeeding, for example, was found to be negatively correlated with the duration of breastfeeding (Howard et al., 2000). In this experimental study, comparing women who received promotion materials related to formulafeeding and a control group, a larger proportion of women in the experimental group stopped breastfeeding during the first two weeks (Howard et al., 2000). Moreover, this study showed that women who had no clear prior opinion regarding breastfeeding were even more inclined to stop breastfeeding when

exposed to the presented information. Although advertising formulafeeding products is prohibited in many countries (WHO, 1981), it is clear that providing women with information regarding the pros and cons of breastfeeding, may influence their attitude towards this behaviour and hence the actual behaviour as well.

Kools et al. (2005) investigated the association between pros and cons of breastfeeding and breastfeeding initiation. As expected, breastfeeding initiation is positively associated with the pros of breastfeeding and negatively with the cons (Kools et al., 2005). The attitude towards breastfeeding in this study was measured prenatally by two different scales 'pros' and 'cons' which contained questions about the perceived advantages and disadvantages of breastfeeding. This method can give good insight in the association between breastfeeding initiation and the total score on pros and cons, but does not reveal how the presented pros and cons are integrated by individuals to make the decision to breastfeed or not.

Information Integration Theory. According to the I-Change model (de Vries et al., 2005) attitude towards a healthy behaviour, such as breastfeeding, is formed by a rational and emotional balancing of pros and cons of that behaviour. With the mentioned studies, however, we do not gain insight into this process of rational and emotional balancing of pros and cons of breastfeeding.

A method to reveal the cognitive rules used by individuals to integrate information when making a decision is Functional Measurement, based on the Information Integration Theory (IIT; Anderson, 2001). This theory assumes that people place subjective values on different pieces of information and that they combine these subjective values by means of a cognitive algebra dominated by addition, multiplication, and averaging. Functional measurement infers from people's judgments of the combined value of two or more pieces of information the cognitive rules used to arrive at these judgments. With this methodology, participants evaluate combinations of factors, rather than single factors.

Another limitation of previous studies is the persuasion-centred approach, in which the average attitude is studied. Persuasion-centred theory of attitude formation assumes that a message is interpreted in a similar way by all its recipients. We believe that taking a persuasion-centred approach poses a limitation to previous studies on attitude formation, which largely ignore individual differences. With IIT however, research on attitude formation takes a person-centred approach (Anderson, 2009). Although a specific message may seem to represent support for some advocated position, it may well be interpreted differently by different

recipients. IIT provides a theoretical and empirical basis to test person-centred predictions concerning attitude formation.

The current study. In the present study we describe a functional measurement experiment in which several combinations of advantages and disadvantages of breastfeeding are presented to Dutch speaking women in the reproductive age. The aim of the study is to gain new insights into the integration of pros and cons of breastfeeding. The functional values derived from the experiment could help test the view that important individual differences exist with regard to the interpretation of persuasive messages related to breastfeeding. Findings of this study could help to optimize health education on breastfeeding.

The study also investigates the cognitive algebra with respect to the integration of several stimuli to form an overall evaluation regarding breastfeeding. According to Anderson (2009), attitude formation follows an averaging-type integration pattern. This is in accordance with de Vries et al. (2005) who state that attitude formation consists of balancing pros and cons to come to an overall attitude towards a health related behaviour. This conjecture will be tested in this experiment. The impact of the attitude towards breastfeeding, prior to the experiment will be tested as well, as this is expected to be of importance basing on both empirical evidence (Howard et al., 2000) as well as attitude formation theory (Anderson, 2009).

METHOD

Participants. A total of 98 women, who were contacted by e-mail, took part in a Web-based experiment. The mean age of the participating women was 29.02 years (SD = 7.08) and 85.10% had completed some form of higher education.

Stimuli. Statements of advantages as well as disadvantages of breastfeeding were used as experimental stimuli. The statements were pre-tested amongst a small group of women (N = 8) to ensure a sufficient spread of stimulus intensity. Table 1 includes the statements used in the study.

Table 1: Stimuli for the experiment. Mean rated importance of the statements including standard deviations (on a scale from 1 to 7) were added (originating from the pre-test).

Item	*M*	*SD*
Advantages		
a Breastfeeding is cheaper than formula feeding	4.38	1.30
b Breastfeeding helps you to recuperate more rapidly after pregnancy and has health advantages for the mother	5.13	1.36
c Breastfeeding is healthier than formula feeding; it contains all necessary nutrients for a baby and protects against several infections and diseases	7.00	0.00
Disadvantages		
a When breastfeeding you need to watch what you eat and be careful with dieting	2.38	1.69
b When breastfeeding it is impossible to know whether your baby had sufficient milk	3.50	2.07

Design. Stimuli were combined using a 3 (advantages) × 2 (disadvantages) full factorial design, to which the one-factor subdesign for advantages was added (i.e., advantages presented in absence of a disadvantage). This was done to be able to discern an additive from an averaging integration pattern (Anderson, 1982). Each stimulus was composed of either an advantage or a combination of both an advantage and a disadvantage.

Procedure. Upon clicking a URL in the e-mail invitation, participants were taken to a Website including the actual experiment. Before taking part in the experiment, participants were required to provide some background information, such as whether they were pregnant or planning to become pregnant. Additionally a single item, rated on a 250-point visual analogue scale (i.e., a slider bar), accompanied by two verbal end anchors, inquired upon their current attitude towards breastfeeding ("How would you rate breastfeeding at this moment?" with 0 being "very negative" and 250 being "very positive"). Finally, participants were able to familiarize themselves with the experimental procedure by judging a random set of 4 stimuli. After this phase, the actual experiment started. Each stimulus (an advantage with or without a disadvantage) was presented

twice in a Web page. This resulted in a total of 18 stimulus presentations which were rated using a visual analogue scale. Participants were asked to rate how they would judge breastfeeding based on the presented stimulus information (again, 0 being "very negative" and 250 being "very positive").

RESULTS

In a first step, single subjects analyses were performed in order to detect possible patterns in the data. Single subject statistical analysis as well as visual inspection of the data revealed that three distinct patterns were present in the data. As single subject analysis may be a somewhat subjective method to group individuals, the clustering method proposed by Hofmans and Mullet (in press) was subsequently applied to the data in order to discern the different patterns. Using K-means clustering (with $k = 3$ as suggested by the single subject analysis) on the scale values (which were standardized per individual and per factor), we obtained three different sets of participants (clusters).

Next, the data were analyzed per cluster by means of repeated measures ANOVAs with advantages and disadvantages as well as repetition as within subjects factors, and prior attitude as a covariate. Greenhouse-Geisser corrections were applied when sphericity could not be assumed.

Figure 1 shows the overall means patterns for the three clusters. In order to discern an additive from an averaging integration rule, the analyses were performed in two stages in accordance with Anderson (1982). In a first stage, the 2 × 3 design (excluding the stimuli containing only advantages) was analyzed and yielded no advantages × disadvantages interactions, thereby confirming an additive model in all three clusters. For conciseness these analyses are omitted from the text. The additivity can be observed by the parallelism of the uninterrupted lines in all three panels of Figure 1. The critical test to discern an additive from an averaging integration pattern consists of analyzing the 3 × 3 design and detecting a crossover interaction of the uncombined level (i.e., advantages presented without any disadvantage). The results of these analyses are reported in the following paragraphs.

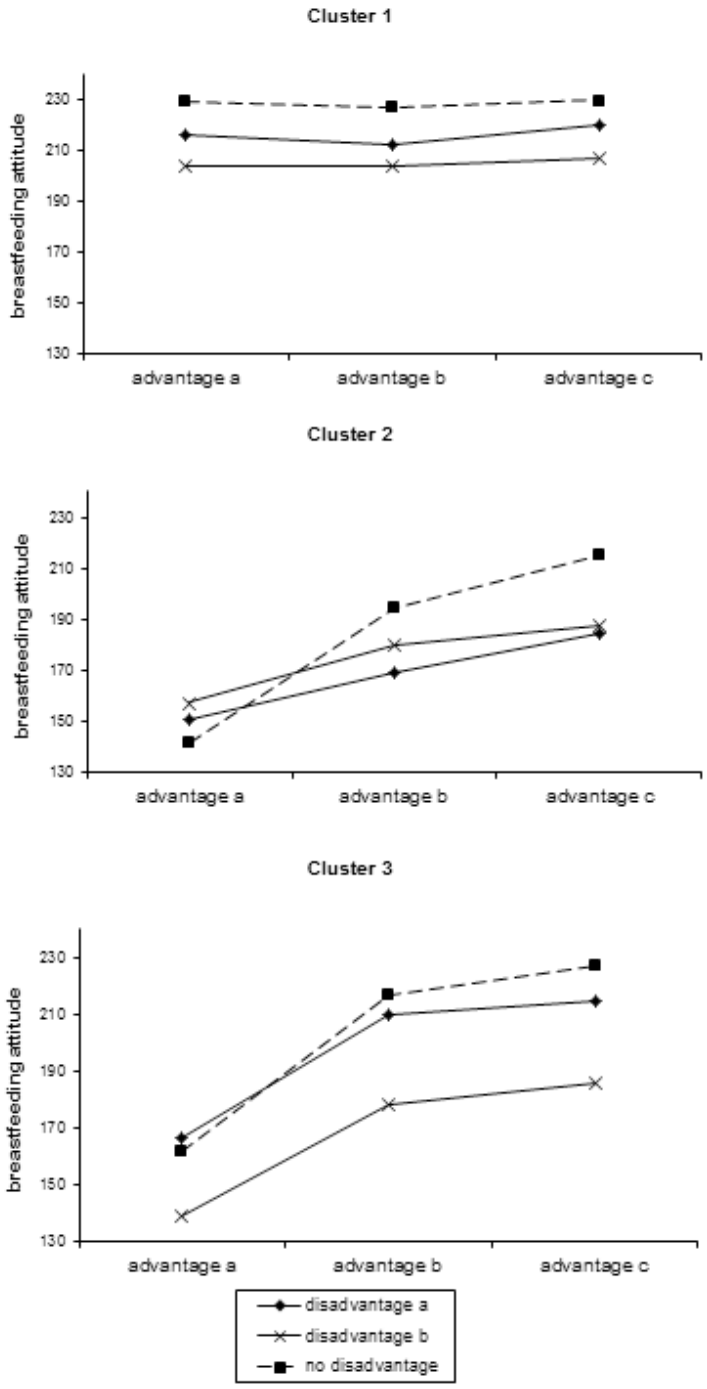

Figure1: Means plots for the 3 × 3 design, grouped by patterns discerned in the cluster analysis.

The first cluster (N = 16) showed a main effect for disadvantages, but no main effect for advantages nor an interaction effect. Attitude towards breastfeeding was consistently high regardless of the presented stimulus. Moreover attitude prior to the experiment had a significant main effect as well. A second group (N = 30) showed a large main effect for the advantages factor and a small effect of the disadvantages factor. The interaction effect was significant as well and due to a crossover of the uncombined level (i.e., advantages presented without any disadvantage), as can be observed in the centre panel of Figure 1. Finally, the third group (N = 52) showed a main effect for both factors as well as an interaction effect, which is also due to the crossover of the uncombined level. The results of these ANOVAs are presented in Table 2.

Table 2: ANOVA results from the 3 × 3 design for three groups resulting from the cluster analysis.

Pattern	Effect	df_{effect}	df_{error}	F	p	η^2
1	advantages	2	28	.84	.44	.06
	disadvantages	2	28	4.92	.02	.26
	advantages×disadvantages	2.34	32.80	.27	.90	.02
	prior attitude	1	14	5.95	.03	.30
2	advantages	1.66	46.59	49.75	.00	.64
	disadvantages	1.26	35.28	8.23	.00	.23
	advantages×disadvantages	2.41	67.55	12.39	.00	.31
	prior attitude	1	28	.10	.76	.00
3	advantages	1.52	75.91	81.87	.00	.62
	disadvantages	1.87	89.05	75.62	.00	.60
	advantages×disadvantages	4	200	5.56	.00	.10
	prior attitude	1	50	.29	.60	.01

With the exception of cluster one, where advantages are not rated differently, it can be observed in Figure 1 that advantage c, being that breastfeeding has health advantages for the child, produces the most favourable attitude towards breastfeeding, followed by the health advantages for the mother. Providing a statement excluding a disadvantage clearly yields the most favourable attitude in combination with all of the

advantages. A difference in the ratings produced by the disadvantages can be observed between cluster three and one on the one hand and cluster two on the other hand. In clusters one and three, the largest negative impact on attitude can be observed with the disadvantage 'with breastfeeding it may be difficult to know whether the baby has been fed a sufficient amount of milk' (disadvantage a). In cluster two however, the most negative attitude towards breastfeeding was found with the disadvantage related to dieting (disadvantage b).

The ANOVAs per pattern revealed relatively large differences in main effects between the groups. A group level repeated measures ANOVA was therefore performed including cluster membership as a between subjects factor. The results are reported in Table 3.

Table 3: results of the overall ANOVA including cluster membership as a between subjects factor.

Effect	df_{effect}	df_{error}	F	p	η^2
advantages	1.57	147.66	5.63	.00	.40
disadvantages	1.76	165.44	37.45	.00	.29
advantages×disadvantages	3.57	335.41	9.90	.90	.10
advantages×cluster	3.14	147.66	11.79	.00	.20
disadvantages×cluster	3.52	165.44	12.91	.00	.22
advantages×disadvantages×cluster	7.14	335.41	3.54	.00	.07
cluster	2	94	6.49	.00	.12

The overall analysis revealed a main effect for both advantages and disadvantages as well as a advantages × disadvantages interaction effect. The difference in main effects between the clusters was confirmed statistically as the advantages × cluster and the disadvantages × cluster interactions were both statistically significant. The advantages × disadvantages × cluster interaction was significant as well which is consistent with the finding that cluster one showed no significant advantages × disadvantages interaction in contrast with the other two clusters in which an interaction effect was present. Finally, the significant cluster main effect indicates a shift in overall means which can be observed in Figure 1 (with $M_{cluster1} > M_{cluster3} > M_{cluster2}$).

DISCUSSION

In this experiment the integration of pros and cons of breastfeeding in attitude formation towards breastfeeding was investigated. Three clusters of response patterns could be distinguished, with advantages and disadvantages differing in importance across groups. Furthermore, in two of the three clusters the integration of advantages and disadvantages obeyed an averaging rule, as was predicted by the Information Integration Theory (Anderson, 2009).

Response patterns. The sample of participating women could be divided into three clusters. One group showed no effect of the presentation of advantages and only a relatively small effect (compared to the other clusters) of disadvantages. It can be concluded that for this group of women (which was about 16% of the sample) the influence of the presented stimuli was rather limited and that only disadvantages produced somewhat different ratings. In contrast with the other two clusters, this group of women showed a main effect of attitude prior to the experiment, and had consistently higher ratings than the other two clusters, implying that their attitude was already strongly formed prior to the study. As was found in previous research on attitude formation, stronger attitudes are more stable over time than weak attitudes (Holland, Verplanken, & van Knippenberg, 2002), which could in part explain the results for this group of women.

The second pattern was defined by a relatively large main effect for advantages. Attitudinal differences between disadvantages on the other hand were relatively small. The attitude of this group of women seemed to be mostly influenced by the different advantages presented, with health advantages (for child and mother respectively) as the most important predictors of attitude. A qualitative difference of the impact of disadvantages was present as well: women in this cluster rated breastfeeding least positively when confronted with the disadvantage that it is necessary to watch one's diet when breastfeeding. In the other two clusters, the least favourable ratings were given when women read the disadvantage regarding the uncertainty of giving enough milk.

For the third group, both advantages and disadvantages impacted similarly on attitude. This cluster, which consisted of about half of the women in our sample, showed similar differences in ratings between advantages as well as disadvantages. These women seem to take into account both information about advantages and disadvantages in a similar way.

With respect to the advantages and disadvantages themselves, health advantages for the baby were considered to be most important for the

mother when considering breastfeeding as this resulted in the most positive attitude, regardless of which disadvantage it was combined with. As for the disadvantages, the uncertainty with regard to the amount of milk a baby has consumed yielded the most negative responses in two clusters. As an insufficient milk intake could be considered as a health disadvantage, this result seems in accordance with our earlier finding which showed that health advantages are the most important factor women consider when deciding whether or not to breastfeed. The mother's health is the second most important factor, deriving from the impact of both health advantages and disadvantages for the mother. Practical advantages seemed to be the least important determinant for most women.

Practical implications. With the exception of cluster one, visual inspection of the means plots in Figure 1, as well as the ANOVA on cluster level confirm an averaging type integration rule, which is in line with previous research on attitude formation (Anderson, 2001). This pattern of information integration can be seen as an implementation of the rational and emotional balancing of pros and cons in attitude formation towards healthy behaviour, mentioned in the I-Change model (de Vries et al., 2005). For campaigns promoting breastfeeding, this implies that the presentation of disadvantages of breastfeeding can have adverse effects on breastfeeding attitude and subsequent intention to breastfeed.

Furthermore, the results suggest we should take into account individual differences in interpretation of the stimuli, which is in line with the person centred approach of attitude formation according to Anderson (2009). Some women seem to be more susceptible to the presented advantages and disadvantages of breastfeeding as indicated by the quantitative differences in the impact of advantages as well as disadvantages. Some women seem to be mainly influenced by the advantages of breastfeeding when forming an attitude, while others' attitude is influenced similarly by advantages as well as disadvantages. Moreover, a qualitative difference was found between the clusters in the rating of the presented disadvantages indicating that these disadvantages impact different women in different ways. The experiment thus shows clearly that individual differences (such as prior attitude) are very important in attitude formation and should be taken into account when developing an intervention to promote breastfeeding.

Limitations and future research. The current results are based on data from a limited convenience sample of Dutch and Flemish women of reproductive age. It would be interesting to study a more representative group of women and to replicate our findings in order to estimate the distribution of women across the three patterns. Moreover it would be

interesting to find other variables which correlate with the integration patterns and to explain why women's attitude is determined in such a way. In this way, future campaigns to promote breastfeeding can be tailored based on specific characteristics of the target population.

Another aspect that needs to be taken into account in future research is the concept of message framing. Framing is concerned with the exact formulation of the persuasive message. To promote a healthy behaviour, for instance, one could opt to present advantages of this behaviour (gain-framed message, e.g., advantages of exercising) or to present disadvantages of the alternative behaviour (e.g., disadvantages of a sedentary lifestyle, loss-framed message) (O'Keefe & Jensen, 2007; Van 't Riet et al., 2010a, 2010b). Preliminary unpublished results of a second experiment show that presenting the advantages of breastfeeding in combination with advantages of bottle formulafeeding yields a more positive attitude towards breastfeeding than presenting the combination of advantages and disadvantages of breastfeeding. Van 't Riet et al. (2010b) showed that the effect of gain-framed information was mediated by positive affect. Presentation of the advantages of formulafeeding may induce positive affect, which in turn is related to a more positive attitude towards breastfeeding. Future studies should address this aspect in relation to breastfeeding information.

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