

Patient Perception, Preference and Participation

Patients' preferences for visuals: Differences in the preferred level of detail, type of background and type of frame of icons depicting organs between literate and low-literate people

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ABSTRACT

Objective: To evaluate icons of organs with systematic variations in design to provide directions for the development of pictograms that support patient leaflets targeted at a low-literate audience.**Methods:** In interview questionnaires, 191 pharmacy visitors (IJsselstein, The Netherlands), indicated for four organs in which image the organ was represented most clearly. The icons vary in level of detail of the depicted organ, in the organs that are shown in the background, and in how much of the body is shown as frame. Participants' literacy was determined through the Dutch Rapid Estimate of Adult Literacy in Medicine (REALM-D).**Results:** For the three internal organs, the intestines, lungs and kidneys, low-literate participants were more likely than literate participants to opt for less context in the form of the frame of the body.**Conclusion:** When the meaning of the visual is given, low-literate people prefer organ icons with less context of the body over a depiction of the whole body.**Practice implications:** Since literate and low-literate people differ in perceptual preferences, continued involvement of people with limited literacy skills in the design process is essential to target the visuals to their needs.

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1. Introduction

Half of the acute hospital admissions related to medication are potentially preventable [1,2]. One of the main causes of this type of hospitalization is patients' deviation from the agreed recommended therapy [2,3]. Addressing this problem through patient communication and education is important, because this non-adherence leads to suboptimal treatment and health risks, and is associated with enormous health care expenses [3].

Motivation to adhere is strongest in patients who have faith in their therapy and understand the reason for having to take their medication [4–7]. However, various authors have demonstrated

that leaflets are not suited to patients' needs [8–11]. To encourage safe use of medication, patient information should not simply provide educational context on the effects of the therapy, it should do so in a way the patient can make sense of [12].

Visuals have the potential to make information more accessible to patients and help them process information better compared to text-only formats [13,14]. Visual aids can increase understanding and recall, as well as intentions and behaviors toward adherence, as extensively reviewed by Houts and colleagues [15]. In addition, well-designed visuals can have a positive effect on how information is perceived, for example as more reliable and useful [16]. According to the Elaboration likelihood model (ELM), visuals that are positively evaluated can serve as peripheral cues, acting as a short-cut to acceptance of the message [17]. And while not always so, patients' preference for materials has been shown to reflect objective measures as understanding and recall [18–20].

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The use of visuals to explain a therapy's effect may be particularly effective for people who have inadequate skills in reading, to decrease their dependency on written text alone [13,15]. In the Netherlands, 11% of the population is classified as low-literate, and may struggle to manage their health [21]. This is reflected in the finding that low-literate people have a relatively low therapy-adherence rate and are at an increased risk of hospitalization [22,23].

However, not all visuals are effective, and they have to be designed so that they match the preferences and needs of their target group. For example, purely decorative visuals can distract older people from finding information in a leaflet [24]. And visuals that are perfectly understood in one culture can be misinterpreted in another [25]. Also, cognitive overload can occur when the demands on the visual channel are too high [26]. When designing for low-literate people, it should be taken into consideration that generally, they have a smaller working-memory and less health-related knowledge than literate people, as pointed out by Baker [27], referring to works of among others Macabasco-O'Connell [28] and Baker [29]. Also, people with lower literacy levels benefit most

from visuals with as little distracting detail as possible [30]. This means that visuals for low-literate patients have to meet specific requirements with respect to context and detail [31].

For instance, depicting a visual of an organ in relation to other organs, or in the frame of a whole body, may have one of two possible effects on perception. Moving from the assumption that low-literate people have a lower baseline health-knowledge than literate people, the former can be expected to prefer visuals that add a familiar context to help identify the specified organ [27,28,32]. On the other hand, details can distract low-literate people from interpretation of visuals more easily than for literate people, due to cognitive overload [33]. This might suggest that low-literate people would prefer less-detailed depictions. Such insights are important in the design of new visuals.

The aim of this study was to, through a systematic approach, evaluate images and gain insight into what low-literate people value in visuals for patient information leaflets. Results should provide guidelines for future development of visuals. These visuals serve as cognitive shortcuts that motivate patients to interpret the message and can aid the education of patients on

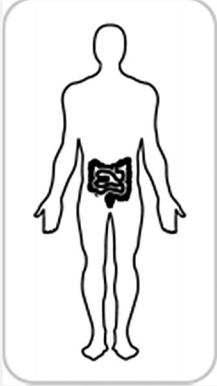
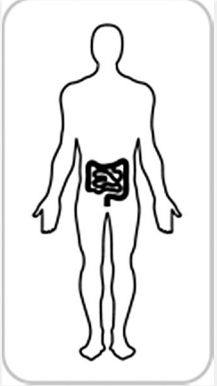
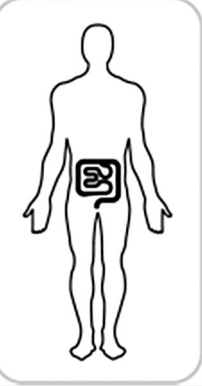
	Detail+	Detail+-	Detail-	
Detail				
	Skeleton	Arbitrary organs	Organ system	Empty
Background				
	Whole body	Body++	Body+	Isolated organ
Frame				

Fig. 1. Variables detail (of the organ), background (organs), and frame (of the body) for the intestines.

the effect of a therapy on their body. Specifically, the study assessed what low-literate and literate people consider the clearest amount of detail and context in visuals of organs.

2. Methods

2.1. Participants

In this cross-sectional study, convenience (non-probability) sampling was used to select customers of a community pharmacy located in IJsselstein, The Netherlands. The pharmacy is located in an area in which the mean socioeconomic status is around the national average [34]. Without selection criteria, pharmacists invited customers to participate in the study in weeks 29 and 30 of July, 2012. 79% agreed to be interviewed. After the researcher had explained the procedure, three participants withdrew from the test (one due to lack of time, one due to poor knowledge of both Dutch and English, and one due to reluctance to provide socio-demographic data). Seven customers under the age of 18 were excluded, as the literacy test has only been validated for adults, and two customers were excluded who did not provide a “highest completed education”. The total number of participants (*N*) in this sample was 191 (the valid response rate 74.6%).

2.2. Procedure

After participants were invited to participate, the first author explained the purpose of the study and the proceeding of the interview. Participants who gave informed consent were asked to provide socio-demographic information (gender, age, mother-language, and highest completed level of education). Subsequently, the Rapid Estimate of Adult Literacy in Dutch (REALM-D) was administered.

In the last part of the interview, participants were asked twelve times (four organs times three variables) to select the visual that depicted a specific organ most clearly. Each question contained three or four visuals depending on the variable (see rows of Fig. 1). All participants viewed all visuals, and the order of the questions was randomized between subjects. During the process participants were reminded that there were no wrong answers. Participants were automatically redirected to a new question/visual by clicking on the visual of their choosing.

2.3. Materials

The Rapid Estimate of Adult Literacy in Dutch (REALM-D) was used to assess literacy, following instructions published by Safeer and Keenan [35]. The REALM-D has a Cronbach alpha of 0.91 (internal consistency), correlates with the health literacy measure SBSQ-D ($r = 0.59$, $p = .00$), and is able to significantly distinguish between low and high educated people. The REALM has a test-retest reliability of 0.99 [36].

The visuals were specifically developed for this study by a graphic designer, biomedical and pharmaceutical scientists, and a communication scientist specialized in visual language. The authors guided the design process with instructions based on the Gestalt laws of perceptual organization, to stimulate intuitive interpretation of the visuals, and on literature on visual processing of low-literate people [31,37–39]. Throughout the process, drafts were shown to lay people and experts in both biomedicine and visual communication for suggestions for improvements. Adjustments were made accordingly.

For the test, four organs were selected based on a diversity of positions and functions that might require different frames and backgrounds. These were (1) the intestines from the digestive system, (2) the lungs from the respiratory system, (3) the kidneys

from the excretory system, and (4) the ear from the sensory system. Visuals varied in (1) the level of detail (low, medium, high) of the depicted organ, (2) the type of background (empty body, skeleton, a set of arbitrary organs, and organs from the corresponding organ system), and (3) the type of frame in which the organ is depicted (four levels, ranging from “no” frame – depicting the organ in isolation – to “full body” frame – depicting the organ in the context of a whole body). A total of forty-four visuals were developed for this study. For examples of the visuals, see Fig. 1. Visuals were either 65 mm × 65 mm or 65 mm × 120 mm in size, and were viewed on a laptop screen positioned in front of the participant on a desk.

2.4. Measures

For the evaluation of the visuals, a digital questionnaire was developed consisting of twelve questions: one for each variable of each organ. Every question was shown on a new screen to reduce priming effects. Following the forced-choice method, subjects chose one visual per question. The phrasing of the question (“Which picture shows the [organ] most clearly in your opinion?”) was kept consistent to encourage participants to answer intuitively and to avoid cognitive overload. For the same reasons, all questions concerning one organ were asked before continuing to the next organ. Within a single question, visuals could be presented in two orders. This sequence was randomized between subjects, but was kept constant within subjects. The rest of the presentation of the organs and visual characteristics was completely random. Final adjustment was made after a pretest of the questionnaire on six lay people of varying age, gender and educational level.

2.5. Analysis

Pearson’s Chi-Square test (or Fisher’s Exact Test when at least one of the expected cell counts was less than 5) was used to test for association between literacy level and preference for the various icons. One-sample Chi-Square tests were performed to determine if the distribution of visual-choice differed from an even distribution. Finally, using multinomial (*i.e.* more than two categorical outcomes) logistic regression, models were tested to predict the probability that (low-)literate choose for a certain visual while adjusting for demographic variables.

3. Results

3.1. Demographics and literacy

Over half of the participants were female ($n = 118$). Participants’ mean age was 58.9 ($SD = 16.1$). Most participants ($n = 80$) had a low level of education (primary education or preparatory secondary vocational education), 57 were educated at secondary level, and 54 were higher educated (higher vocational education or university) [40]. For the majority of the participants ($n = 175$), Dutch was their (reported) native language. One hundred sixty-one participants scored at least 60 out of 66 words correct on the REALM-D and were classified as (adequately) literate. 30 participants scored under 60, meaning they are likely to struggle with patient materials. These will be referred to in this study as having low-literacy levels. Participants’ mean scores were 62 out of 66 words pronounced correctly ($SD = 7.1$).

Gender, age, native language and highest (completed) educational level were tested on association with literacy. For age and gender this association was not detected in this sample ($t(189) = 0.6$, $p = .95$; Chi-Square(1) = 2.09, $p = .16$). Literacy levels were found to be associated with native language ($p < .01$) (see Table 1 for overview). As expected, native Dutch respondents

Table 1

Demographic characteristics of low-literate and literate participants. Values are given as number (percentages), except for age.

	Low-literate REALM-D < 61 30 (15.7%)	Literate REALM-D ≥ 61 161 (84.3%)	Total 191 (100%)	p-Values
Sex				
Female	15 (12.7%)	103 (87.3%)	118 (100%)	$\chi^2(1)=2.09$, $p=0.15$
Male	15 (20.5%)	58 (79.5%)	73 (100%)	
Language				
Dutch	23 (13.1%)	152 (86.9%)	175 (100%)	Fisher's, $p < 0.01^{**}$
Other	7 (43.8%)	9 (56.3%)	16 (100%)	
Education				
Low	23 (28.7%)	57 (71.2%)	80 (100%)	$\chi^2(2)=17.785$, $p < 0.01^{**}$
Middle	3 (5.3%)	54 (94.7%)	57 (100%)	
High	4 (7.4%)	50 (92.6%)	54 (100%)	
Age				
Min	29	18	18	$t(189)=0.06$ $p=0.95$
Max	92	90	92	
Mean	59.07	58.88	58.91	
SD	16.86	16.02	16.11	

χ^2 = Pearson's Chi-Square test. Fisher's = Fisher's Exact Test (when expected count < 5). t = independent samples test.

$^{**} p < 0.01$

were found to have higher REALM-D scores than people with a different native language. Also, literacy was found to be associated with educational levels ($\chi^2(2) = 17.79$, $p < .01$) in the sense that participants who reported to have completed middle or

high educational levels were found to be literate more often than those who reported to have completed a low educational level.

3.2. Choice of visuals and literacy

3.2.1. Level of detail

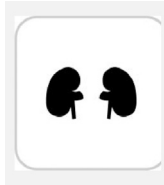
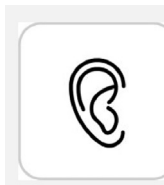
For two out of four organs, participants preferred the medium level of detail (Table 2). For the kidney and ear, distributions were significantly different from an even distribution ($\chi^2(2) = 23.92$, $p < .01$ and $\chi^2(2) = 123.47$, $p < .01$, respectively). Although a majority (77 out of 191) opted for the medium level of detail for the intestines as well, this distribution was not found to be significantly different from an even distribution ($\chi^2(2) = 4.22$, $p = .12$). For the lungs, the distribution differed significantly from an even distribution of answers ($\chi^2(2) = 12.14$, $p < .01$), with similar responses for the low and medium-detail options, contrasted with a relatively small count for the most detailed option.

Differentiating between low-literate and literate participants, a pattern is visible in which low-literate participants more often choose low-level detail depictions for the visuals of the three internal organs (kidneys, lungs and intestines) compared to literate participants. For the visuals of the external organ (the ear), this pattern was not visible. However, the association between literacy and visual-choice is significant only for the kidneys ($\chi^2(2) = 6.31$, $p = .04$) (see Table 2).

In the multinomial logistic regression model (supplement 1), this association was not apparent. The model included all defined variables and produced the odds of low-literate people selecting the medium ($OR = .37$, $p = .13$) or high ($OR = .40$, $p = .07$) rather

Table 2

Low-literates' and literates' choice for icons varying in detail of the depicted organ. Values are given as number (percentages).

		Detail +	Detail ±	Detail –	χ^2 /Fisher's
	Total $n = 191$	56 (29.3%)	77 (40.3%)	58 (30.4%)	$\chi^2(2)=4.22$, $p=0.12$ $\chi^2(2)=2.03$, $p=0.36$
	Low-literate $n = 30$	9 (30.0%)	9 (30.0%)	12 (40.0%)	
	Literate $n = 161$	47 (29.2%)	68 (42.2%)	46 (28.6%)	
	Total $n = 191$	41 (21.5%)	74 (38.7%)	76 (39.8%)	$\chi^2(2)=12.14$, $p < 0.01^{**}$ $\chi^2(2)=2.73$, $p=0.26$
	Low-literate $n = 30$	5 (16.7%)	9 (30.0%)	16 (53.3%)	
	Literate $n = 161$	36 (22.4%)	65 (40.4%)	60 (37.3%)	
	Total $n = 191$	53 (27.7%)	95 (49.7%)	43 (22.5%)	$\chi^2(2)=23.92$, $p < 0.01^{**}$ $\chi^2(2)=6.31$, $p=0.04^{*}$
	Low-literate $n = 30$	7 (23.3%)	11 (36.7%)	12 (40.0%)	
	Literate $n = 161$	46 (28.6%)	84 (52.2%)	31 (19.3%)	
	Total $n = 191$	58 (30.4%)	129 (67.5%)	4 (2.1%)	$\chi^2(2)=123.47$, $p < 0.01^{**}$ Fisher's = 0.76, $p=0.76$
	Low-literate $n = 30$	9 (30.0%)	20 (66.7%)	1 (3.3%)	
	Literate $n = 161$	49 (30.4%)	109 (67.7%)	3 (1.9%)	

χ^2 = Pearson's Chi-Square test. Fisher's = Fisher's Exact Test (when expected count < 5).

$^{*} p < 0.05$.

$^{**} p < 0.01$.

than the low level detail, compared to these odds for literate people.

3.2.2. Type of background

For the lungs and kidneys, the skeleton-background was the preferred type. Both distributions differed significantly from an even distribution of answers (Chi-Square(3) = 23.60, $p < .01$ and Chi-Square(3) = 35.87, $p < .01$ respectively). For the intestines and ear, however, the arbitrary or no organ type of background was preferred. The distribution of the answers for these visuals also differed significantly from an even distribution of answers (Chi-Square(3) = 13.50, $p < .01$ and Chi-Square(3) = 34.45, $p < .01$ respectively) (Table 3).

When we differentiated between low-literate and literate participants, crosstabs showed that literacy was not associated with choices for a type of background for any of the visuals.

However, in the multinomial logistic regression model, it was found that for visuals of the kidney, low-literate participants are less likely to choose the skeleton type of background over the no background-type compared to literate participants (OR = .27, $p = .02$) (see supplement 2).

3.2.3. Type of frame

For the intestines and lungs, visuals showing an organ in the directly surrounding area of the body (for example see Fig. 1, frame body+) were the preferred option most often (see Table 4). For both organs, distributions differed significantly from an even distribution of answers (Chi-Square(3) = 32.39, $p < .01$ and Chi-Square(3) = 46.26, $p < .01$ respectively). For the kidneys and ear the isolated organ type of frame was considered most clear,

seconded by the zoomed-in type of frame. However, distributions differed significantly from an even distribution of answers only for the ear and not for the kidneys (Chi-Square(3) = 138.57, $p < .01$ and Chi-Square(3) = 5.34, $p = .15$).

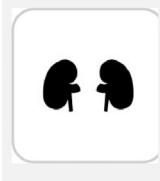
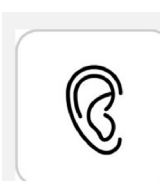
Compared to literate participants, low-literate participants more often choose less or no context. This difference was found to be significant for the visuals of the intestines Chi-Square(3) = 138.57, lungs and kidneys ($p < .01$; $p < .01$; and Chi-Square(3) = 16.11, $p < .01$, respectively), but not for the ear ($p = .63$).

In our multinomial logistic regression model, literacy was also found to be a predictor of visual choice with respect to the type of frame in which the organ is displayed (see supplement 3). For the lungs and kidney, low-literate people are less likely to opt for the whole body type of frame (as compared to the isolated organ type of frame; OR = 11, $p < .01$ and OR = .20, $p = .02$ respectively). For the intestines, lungs and kidneys the model also shows that low-literate participants are less likely to choose a large overview type of frame (as compared to the isolated organ type of frame; OR = .04, $p < .01$, OR = .15, $p = .02$, and OR = .08, $p = .02$ respectively). Finally, for the lungs, low-literate people were less likely to choose the directly surrounding area type of frame (as compared to the isolated organ type of frame; OR = .19, $p < .01$).

3.3. Exploratory analysis

Considering only the subgroup of native speakers ($n = 175$), the multinomial logistic regression models show a trend ($p = .06$, $p = .05$, & $p = .07$ respectively) for the intestines, lungs and kidneys where low-literate people are less likely to choose for a medium level of detail than the lowest level of detail compared to literate

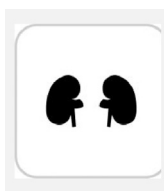
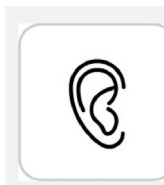
Table 3
Low-literates' and literates' choice for icons varying in depicted background organs. Values are given as number (percentages).

		Skeleton	Arbitrary organs	Organ system	Empty	χ^2 /Fisher's
	Total $n = 191$	26 (13.6%)	58 (30.4%)	53 (27.7%)	54 (28.3%)	$\chi^2(3) = 13.50, p < 0.01^{**}$ Fisher's = 1.62, $p = 0.66$
	Low-literate $n = 30$	2 (6.7%)	9 (30%)	10 (33.3%)	9 (30.0%)	
	Literate $n = 161$	24 (14.9%)	49 (30.4%)	43 (26.7%)	45 (28.0%)	
	Total $n = 191$	61 (31.9%)	19 (9.9%)	57 (29.8%)	54 (28.3%)	$\chi^2(3) = 23.60, p < 0.01^{**}$ Fisher's = 2.44, $p = 0.49$
	Low-literate $n = 30$	8 (26.7%)	5 (16.7%)	10 (33.3%)	7 (23.3%)	
	Literate $n = 161$	53 (32.9%)	15 (8.7%)	47 (29.2%)	47 (29.2%)	
	Total $n = 191$	74 (38.7%)	16 (8.4%)	50 (26.2%)	51 (26.7%)	$\chi^2(3) = 35.87, p < 0.01^{**}$ Fisher's = 2.30, $p = 0.51$
	Low-literate $n = 30$	10 (33.3%)	3 (10.0%)	6 (20.0%)	11 (36.7%)	
	Literate $n = 161$	64 (39.8%)	13 (8.1%)	44 (27.3%)	40 (24.8%)	
	Total $n = 191$	42 (22.0%)	66 (34.6%)	17 (8.9%)	66 (34.6%)	$\chi^2(3) = 34.45, p < 0.01^{**}$ Fisher's = 3.62, $p = 0.31$
	Low-literate $n = 30$	8 (26.7%)	9 (30.0%)	5 (16.7%)	8 (26.7%)	
	Literate $n = 161$	34 (21.1%)	57 (35.4%)	12 (7.5%)	58 (36.0%)	

χ^2 = Pearson's Chi-Square test. Fisher's = Fisher's Exact Test (when expected count < 5).
** $p < 0.01$.

Table 4

Low-literates' and literates' choice for icons varying in depicted frame of the body. Values are given as number (percentages).

		Whole body	Body++	Body+	Isolated organ	χ^2 /Fisher's
	Total n = 191	43 (22.5%)	51 (26.7%)	76 (39.8%)	21 (11.0%)	$\chi^2(3) = 32.40, p < 0.01^{**}$ Fisher's = 15.47, $p < 0.01^{**}$
	Low-literate n = 30	6 (20.0%)	1 (3.3%)	16 (53.3%)	7 (23.3%)	
	Literate n = 161	37 (23.0%)	50 (31.1%)	60 (37.3%)	14 (8.7%)	
	Total n = 191	40 (20.9%)	31 (16.2%)	88 (46.1%)	32 (16.8%)	$\chi^2(3) = 46.26, p < 0.01^{**}$ Fisher's = 16.37, $p < 0.01^{**}$
	Low-literate n = 30	2 (6.7%)	3 (10.0%)	12 (40.0%)	13 (43.3%)	
	Literate n = 161	38 (23.6%)	28 (17.4%)	76 (47.2%)	19 (11.8%)	
	Total n = 191	49 (25.7%)	35 (18.3%)	50 (26.2%)	57 (29.8%)	$\chi^2(3) = 5.34, p = 0.15$ $\chi^2(3) = 16.11, p < 0.01^{**}$
	Low-literate n = 30	4 (13.3%)	2 (6.7%)	6 (20.0%)	18 (60.0%)	
	Literate n = 161	45 (28.0%)	33 (20.5%)	44 (27.3%)	39 (24.2%)	
	Total n = 191	4 (2.1%)	12 (6.3%)	76 (39.8%)	99 (51.8%)	$\chi^2(3) = 138.57, p < 0.01^{**}$ Fisher's = 1.60, $p = 0.63$
	Low-literate n = 30	1 (3.3%)	1 (3.3%)	14 (46.7%)	14 (46.7%)	
	Literate n = 161	3 (1.9%)	11 (6.8%)	62 (38.5%)	85 (52.8%)	

χ^2 = Pearson's Chi-Square test. Fisher's = Fisher's Exact Test (when expected count < 5).
 $p < 0.01$.

people (with OR = .30, OR = .30; OR = .32 respectively). For the ear, the cell count was too low to do this analysis.

4. Discussion and conclusion

4.1. Discussion

In this study, clarity of visuals depicting organs in various levels of detail, type of background, and type of frame was investigated. Low-literate people consider visuals depicting an isolated organ to be clearer than visuals depicting an organ in the context of the body. This seemingly contradicts recommendations in the literature, that encourage to depict body parts in context rather than in isolation when designing for a low-literate audience [41]. According to this literature, depicting an organ within the body adds context that can be used for interpretation. Possibly, showing the outline of the body was a redundant detail in this study, because the information it added was not required to understand the message of the visual.

In this study the main interest was not understanding or interpretation, but preference and clarity. In a closer approximation of the final situation in which the visuals will be used, participants knew what organ was depicted, since the name of that organ was provided to them. Previous research has shown that low-literate people are more easily distracted by redundant details than literate people, which would explain our findings [30].

Surprisingly, low-literate and literate people showed little difference in preference for the level of detail in which the organ was depicted. It may be that the differences between the options were too small to have a significant impact on perception.

An exploratory sub-analysis on only native speakers showed that possibly, low-literate native speakers prefer less-detailed depictions over a more detailed visual compared to literate native speakers. This could indicate that native and non-native speakers should be considered separately. And, if the differences between the levels of detail were indeed too small, future research may investigate this further by comparing more abstract *versus* more literal depictions.

For all organs, the empty background scored well. This indicates that designers should not necessarily provide visual contextualization of localization of the organ, as in some cases, people experience such visual contextualization as distracting rather than as aiding. For example, the skeleton and organ system both score well for three organs, and poorly for one. In addition, arbitrary organs are the most preferred option for two organs, but the least preferred option for two others.

In the visuals where they are the least preferred option, the background organs hide a small part of the main organ. This is not the case for the other two organs, which might explain the division in answers. Also, it is possible that a higher transparency of the backgrounds would have led to fewer people preferring the empty background. So while the non-empty backgrounds appear unsuited for standardized use in their current form, there might still be potential for using familiar organs to give meaningful context to the main organ. Which organs have a high-shared familiarity within the target group and when they can be considered meaningful context would have to be examined further.

An explanation as to why the indicated preferences for visuals differed markedly for the ear as compared to the other organs, is that the ear is an external organ, with which our participants will

have been more familiar than with any of the internal organs. This degree of familiarity may be an important moderator. To quote Andreas Fuglesang, educator of low-literate people: “people cannot be expected to identify objects they have never experienced” (p. 159) [37].

4.1.1. Limitations of the study

Social stigmas make low-literate people, also described as the ‘hidden population’, a difficult group to sample from [42]. For this reason, this study has made use of a non-probability sampling method. While this gave rise to unequal group sizes of low-literate and literate participants, the proportion was in line with previous research in which 81% was adequately literate, compared to 84% in this study [43]. Unfortunately, the relatively small number of low-literate participants might have prevented some patterns that are visible in the results from reaching statistical significance due to a possible lack of statistical power. In future research, a stratified sampling method could be used to obtain more comparable group sizes.

An additional limitation of this study is the subjective measure of what patients consider the most clear depiction. Visuals that will be designed based on this perceived clarity will need to be tested in the context of patient materials on understanding and on their effect on behavior before they can be used in practice. Context can also affect appreciation of the materials, so that reevaluating patients’ satisfaction with the visuals might also be considered.

4.2. Conclusion

The researchers were interested in whether low-literate people had a different preference as to how organs are depicted in visuals than literate people. Our findings suggest that, for the systematic design of visuals depicting internal organs, using the skeleton is the best suitable option for both groups. When the meaning of the organ visual does not have to be inferred, low-literate people prefer to see less context to the depicted organs compared to literate people.

4.3. Practical implications

The outcomes of this study are used to guide development and testing procedures of medication information visuals targeted to low-literate people. The visuals will support textual information to educate patients on, for example, the effects of medication on the body, and will have to be tested in this context [44]. This strategy aims to increase patient satisfaction with and understanding of medication information, as well as to encourage adherence to therapy. Since low-literate and literate people differ in how they perceive and value visualized information, low-literate people should be involved in an evidence-based design process of these visuals.

Disclosure statement

“I confirm all patient/personal identifiers have been removed or disguised so the patient/person(s) described are not identifiable and cannot be identified through the details of the story.”

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.pec.2014.10.023>.

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