

A Picture Is Worth a Thousand Words: Factors Influencing the Quality of Photos Received Through an Online Survey

Working paper

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Abstract

Given the growing presence of smartphone cameras allowing easy visual data capture, photos offer new opportunities to improve data quality by replacing conventional questions prone to measurement errors. However, their potential advantages might vary based on respondents' characteristics or behaviors. To address this, respondents of an online survey in Spain were asked to provide photos of their books at home. We analyzed photo quality in relation to respondents' characteristics, photo-taking habits, and self-perceived abilities. Data quality (measured through different indicators, like visual clarity) was not systematically affected by most variables. However, higher age increased the number of photos submitted but reduced information-extraction performance and was linked to more capture issues. These findings suggest that photo-based survey questions can be reliable across diverse populations, though low-barrier survey design may help capture multiple high-quality images. Overall, this study supports visual data's role in enhancing survey data quality.

Keywords

(Visual) data quality
Image collection
Mobile online surveys
Quality indicators
Books at home

The integration of visual data into surveys has the potential to complement and enhance existing data collection methods. While conventional survey questions provide valuable quantitative data, photos can offer rich insights that can be used to contextualize and interpret its findings. The rise of machine learning and the broader field of artificial intelligence (AI) techniques further increases the appeal of photos, as they might enable efficient extraction of image-based information and its integration into data analysis. Further, photos allow the capture of information unknown to respondents (e.g., the details of a wage statement) or that is not convenient to be captured through conventional questions (e.g., the titles of books at home) (Revilla, 2022). By combining conventional survey data with data extracted from photos, researchers can develop a more holistic understanding of social phenomena and address the limitations of relying solely on self-reported information.

Research on the collection of photos through surveys is still scarce. Most of them have focused on willingness to take and share photos (Revilla et al., 2019; Struminskaya, Lugtig, et al., 2021; Struminskaya, Toepoel, et al., 2021; Wenz et al., 2019), respondents' skills, availability, and perceived burden (Iglesias & Revilla, 2024), and actual participation in questions asking for photos (Iglesias, 2024; Bosch et al., 2019, 2022; Ilic et al., 2022; Jäckle et al., 2019; Ohme et al., 2021; Sewall et al., 2022; Slavec, 2024; Struminskaya, Lugtig, et al., 2021). Despite variations in empirical findings, the literature usually reports only moderate willingness and participation in visual data requests.

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When it comes to factors influencing willingness and participation, age has shown mixed results, with both negative (Iglesias & Revilla, 2024) and positive effects (Iglesias, 2024; Struminskaya, Lugtig, et al., 2021; Struminskaya, Toepoel, et al., 2021), while other sociodemographic variables, such as education and gender, appear to have no significant impact (Iglesias & Revilla, 2024; Struminskaya, Lugtig, et al., 2021; Struminskaya, Toepoel, et al., 2021). Associated behaviors, like frequency of taking photos, have yielded inconsistent results, ranging from no effects (Struminskaya, Lugtig, et al., 2021) to positive ones (Iglesias, 2024; Struminskaya, Toepoel, et al., 2021). In the work by Iglesias (2024), the frequency of taking photos was related to greater participation in image-based questions, while comfort with new technologies was linked to liking those types of questions. The frequency of sharing photos showed no significant impact on either participation or liking.

Regarding data quality, only a few studies have begun to explore the specific aspects linked to photos submitted in surveys (Bosch et al., 2019, 2022; Ilic et al., 2022; Ochoa & Revilla, 2025; Slavec, 2024; Wenz et al., 2025). Moreover, they consider only a limited set of indicators of quality, like item nonresponse and photos being in line with the request. Overall, they found that break off and nonparticipation are higher when photos are requested, but that the photos submitted are mostly in line. Nevertheless, a lack of specific quality frameworks for visual data (Daikeler et al., 2024) has hindered systematic analysis.

To the best of our knowledge, the only attempt to systematically review the quality of images obtained through surveys has been conducted by Iglesias (2026). The author conducted a literature review to identify indicators suitable to assess the quality of survey image-based answers, proposing a total of seven indicators for photos, such as the potential for classification (i.e., extracting the information of interest from the photo) and the occurrence of problems during photo capture and submission. Then, they proceeded to estimate such quality using data from an online survey asking information about the books respondents have at home through both conventional questions and image-based questions.

The author found that both conventional and image-based answers suffered from measurement errors: conventional questions presented rounding and don't know answers, while photos, even if they were in line and could be classified, lacked detailed information as the intended audience or languages. Further, when applying the same indicators to both methods, the author found that conventional answers provided more complete information than photos; however, photos could provide insights not captured through conventional questions, like book titles.

While this work is valuable in establishing indicators and assessing quality, it did not study whether respondents' characteristics play a role in the quality of the photos.

Sociodemographic factors such as age, gender, and educational background might significantly influence self-efficacy in technology usage and technology adoption patterns (Glowacki et al., 2021; Vekiri & Chronaki, 2008; Wenz & Keusch, 2023), which could transfer to photo-taking habits and skills. For instance, younger individuals tend to be more comfortable with technology and may be more likely to take high-quality photos, while older individuals may have limitations in their technical skills (Magsamen-Conrad & Dillon, 2020), such as knowing how to capture videos and sharing files with their smartphone (Iglesias & Revilla, 2024).

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Additionally, factors like spatial and verbal abilities, could also impact photo quality. Indeed, verbal abilities impact the understanding and following of instructions (McCrudden & Schraw, 2009), like those presented when asking to submit photos in a certain way, while spatial skills, like mental rotation, visualization, and spatial navigation, could affect how individuals capture such photos.

If photo quality is influenced by sociodemographic factors, this may introduce coverage bias, as analyses would rely on a selective subgroup of respondents—namely those with the skills, ability, and willingness to provide high-quality photos. This, in turn, may limit the generalizability of findings based on such data.

In this paper, we built on Iglesias (2026), drawing on the same book data but advancing the analysis beyond the original study. Our main goal is to assess the impact of respondents' age, gender, educational level, self-perception of spatial and verbal abilities, comfort with new technologies, and frequency of photo capture and sharing, on the quality of book photos provided through an online survey. Concretely, we investigate the following quality indicators: the number of submitted photos, their visual clarity and potential for classification, and the non-occurrence of problems.

Overall, this study contributes new insights into data quality for photo-based survey methodologies by considering respondents' characteristics and habits. By identifying how data quality fluctuates across diverse respondent profiles, our findings aim to provide a guide for future researchers in optimizing image-based data collection.

Methods and data

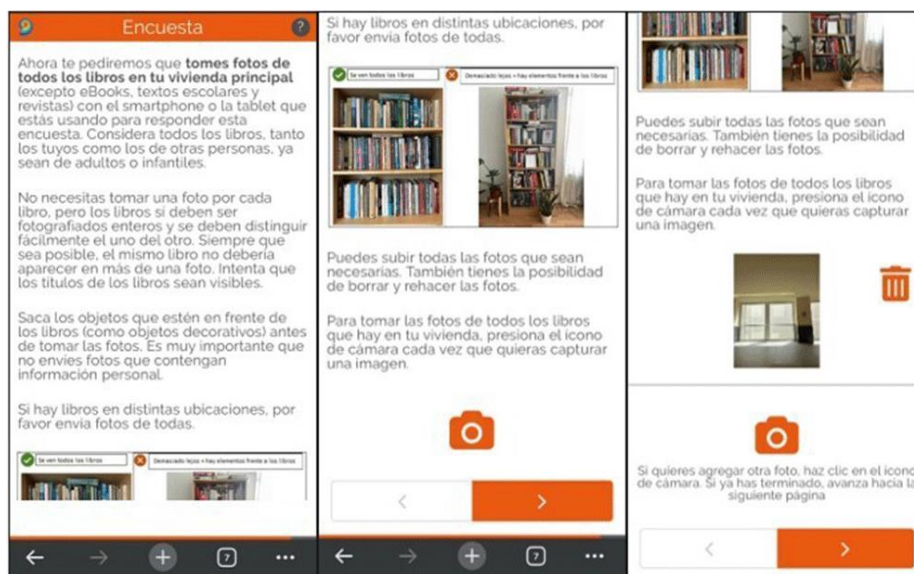
This paper is part of a bigger research project; only the aspects relevant for this study are highlighted in this section. See the study protocol (Iglesias et al., 2023) for further details on the project.

Data collection

Participants of an online mobile survey were asked to provide photographs of all the books in their main residence, including adult and children books. The photo request was implemented using the *WebdataVisual* tool (Revilla et al., 2022), which allows to capture and submit photos within the survey webpage, without need to leave the survey to take the photos. Figure 1 illustrates the presentation of the photo request, including instructions and examples. For detailed instructions, please refer to the study protocol.

Figure 1. Screenshots of the *WebdataVisual* tool in the survey

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Note: screenshot extracted from the study protocol (Iglesias et al., 2023)

Participants could access the survey only through mobile devices. Those accessing the link through a computer were blocked from continuing and were instead presented with a message asking them to re-enter the survey using a smartphone or tablet.

Experimental design and questions of interest

Participants were assigned to one of four experimental groups immediately prior to encountering the first book-related question. This was done using a balanced allocation strategy: participants were directed to the group with the fewest completed responses at that time to ensure equal distribution. The present analysis is restricted to the three groups required to submit photos; the fourth group was excluded as they were not requested to provide images¹:

- *Choice*: respondents could choose to send photos of the books or answer 11 conventional questions about the books. Only those sending photos are analyzed in this paper.
- *TextPlus-Images*: respondents were first asked to provide information through conventional questions, followed by submitting images.
- *Images-Text*: respondents were first asked to submit information through images, followed by conventional questions.

Data from the three experimental groups were aggregated for analysis, as the study's focus remains on the overall trends within the sample rather than inter-group comparisons.

Compared to previous surveys asking for photos and conventional questions, the present study adopts a more complex approach as, for the conventional questions, respondents were asked 11 questions requiring them to estimate the total number of books and per three categories (books for illiterate children, for literate children and teenagers, and for a

¹ Only participants successfully sending photos are considered in this analysis. For details on participation, consult Iglesias (2024). For information of all the groups in the overall study, refer to the protocol (Iglesias et al., 2023).

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general audience), the percentages of books in Spanish, other co-official languages in Spain, and other languages, and to indicate where books were stored (shelves, tables, closets, and other places).

For image-based questions, respondents were asked to submit as many photos as needed of items that could be located in different rooms of the household, whether accessible or not (e.g., the room where part of the books were kept might have been occupied during the survey). Further, respondents were asked to report any problems they encountered while submitting photos, including technical difficulties, challenges in understanding the tool's functionality, and inability to photograph all books.

The survey included up to 65 questions dealing with literature-related activities, self-assessment of verbal, spatial, and mathematical skills, and use and comfort with new technologies (see Supplementary Material (SOM) 1 in Iglesias et al. (2026) for the full questionnaire and its English translation; https://osf.io/hq78w/overview?view_only=02fc23b16d3242dab472440d9704663f).

In this study, we focus on age (numerical), gender (categories male and female), education level (mandatory secondary education or less, optional secondary education to higher technical education, and higher professional education), self-perception of mathematical, verbal, and spatial abilities compared to others (ordinal variables from 0 (“much lower abilities”) or 4 (“much higher abilities”)), comfort with new technologies (very or completely comfortable, somewhat or not comfortable), and frequency of photo capture and sharing (less than weekly, 1-6 times per week, daily).

Sample

The survey was conducted among parents of children in the first, third, or fifth primary school year from the Netquest panel, an opt-in online panel in Spain. Quotas were used for age, gender, and educational level to get respondents with similar characteristics to adults with children in primary school age in Spain.²

As seen in Figure 2, a total of 4,854 individuals were invited to participate in the survey, and 2,443 started it. 899 were filtered out due to non-compliance with security checks or not meeting survey requirements (such as not giving consent to participate), 72 were excluded due to quotas being filled, and 202 dropped out before reaching the questions about books.

Among the 1,270 respondents who reached the questions on books, 305 were assigned to the *Choice* group, of which 261 chose the conventional format and are thus excluded from the analysis. The remaining 44 in the *Choice* group opted to either send photos or did not state a preference. Those without a preference were assigned to the image-based format. 332 were part of the *TextPlus-Images* group (with 330 reaching the photo request), and 329 participants were assigned to the *Images-Text* group. 304 were assigned to the group not analyzed in this paper. Out of the 703 participants asked to submit photos of their books, 238 (34%) provided at least one, resulting in 724 submitted photos.

² The quotas distribution was estimated based on the Economically Active Population Survey of the Statistics Office of Spain. For more details, see the study protocol (Iglesias et al., 2023).

Figure 2. Sample size across survey stages, group allocation, and photo submission

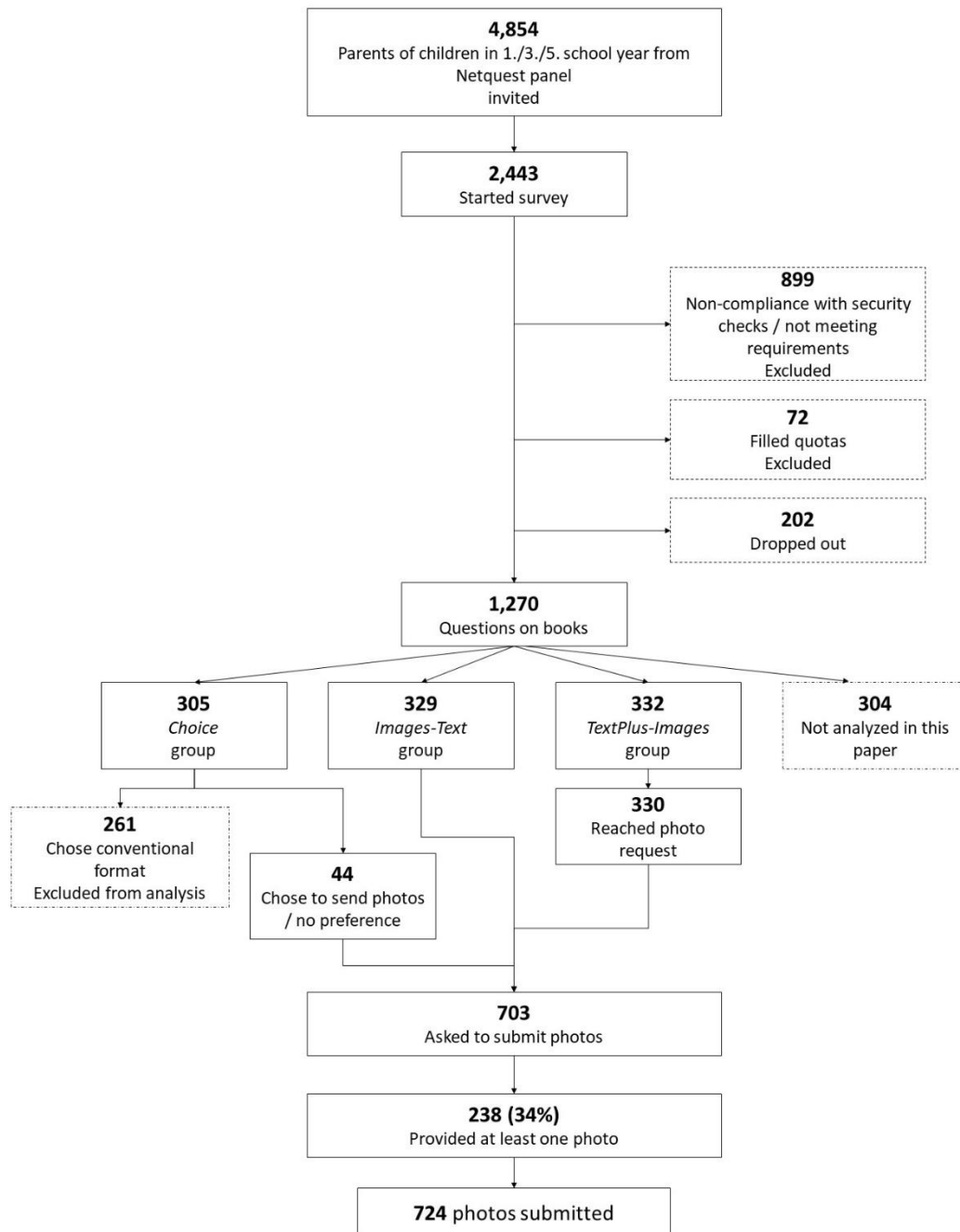


Table 1 shows the characteristics of those asked to submit photos and those who actually did so. They are overall quite similar. While raw p -values suggest minor differences in photo-taking frequency for those capturing photos less than weekly, $\chi^2(1, N = 879) = 7.18$, $p = .007$, and 1-6 times per week, $\chi^2(1, N = 879) = 4.43$, $p = .035$, only the former remains significant after Bonferroni correction ($p_{adj} = 0.22$).

Among photo senders, 65% are aged 41 or more and 61% are female. Around 40% have tertiary education. Although 39% report using their device cameras daily, only 25% share photos with the same frequency. Additionally, 56% consider themselves very or

completely comfortable with new technologies. Regarding self-perceived abilities, half of the participants believe they have higher verbal abilities than others, while 32% feel the same about their spatial abilities.

Table 1. Descriptive statistics of the respondents asked to submit photos and those actually sending them

	Asked to submit photos (n=703)		Only those sending photos (n=238)	
	n	%	n	%
Age:				
20-30	21	3	2	1
31-40	256	36	82	35
41+	426	61	154	65
Gender:				
Female	394	56	145	61
Male	309	44	93	39
Education:				
< Mandatory secondary education	247	35	77	32
Optional secondary education to higher technical education	192	27	59	25
Higher professional education	264	38	102	43
Camera use frequency:				
Less than weekly	194	30***	49	21
1-6 times per week	208	32**	95	40
Daily	241	37	92	39
Photo sharing frequency:				
Less than weekly	330	51	105	45
1-6 times per week	173	27	72	31
Daily	140	22	59	25
Comfort with new technologies:				
Very or completely comfortable	310	48	131	56
Less than very comfortable	331	52	105	45
Perceive own abilities as higher than those of others:				
Verbal	275	43	119	50
Spatial	196	31	76	32

Note: χ^2 values are reported with $df = 1$. ** $p < .05$; *** $p < .01$. Exact χ^2 and p -values are reported in SOM 2 in Iglesias et al. (2026)

(https://osf.io/hq78w/files/jxcsv?view_only=02fc23b16d3242dab472440d9704663f). In the analyses, age is used as a continuous variable and perception of abilities as an ordinal variable, although they are presented in groups in the table for the sake of simplicity.

Classification

Two trained researchers manually classified the received photos, with each handling half of the collection and a 100-photo overlap to identify and resolve classification discrepancies. Interrater reliability results are provided as supplementary material in Iglesias (2026). Classification was manual since, right before conducting this task (August 2023), the available computer vision algorithms were not capable of correctly identifying

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books. For instance, they would recognize only horizontal or vertical books, but not both when they were present in such ways in the same photo.

The classification process extracted information equivalent to the 11 conventional questions: number of books overall and per category, presence of books in Spanish, other co-official languages in Spain, and other languages, and about the locations where books were stored. Further, information about the visual clarity, pertinence of the photo, and potential for obtaining the information of interest from the photos was also classified (see the *Indicators of data quality* section for more details). The guidelines for classification, including the criteria and variables of interest, can be found in SOM 3 in Iglesias et al. (2026)

(https://osf.io/hq78w/files/r26yu?view_only=02fc23b16d3242dab472440d9704663f).

Indicators of data quality

Building on Iglesias (2026)'s, we evaluated the following indicators of data quality:

- *Number of photos sent per participant*
- *Visual clarity and pertinence of the photos*³: this metric assessed whether the photos were in line with the study's requirements (i.e., included books) and of sufficient visual quality. The values for this variable were 1 (all photos submitted by a participant were relevant and of high visual quality), and 0 (not all photos met these standards).
- *Possibility to identify the information of interest (potential for classification)*: this metric measured the ability to classify information from the photos, specifically:
 - o total number of books,
 - o number of books per category,
 - o type of storage, and
 - o languages.

A value of 1 indicates that all photos sent by the same respondent allowed for complete classification of the information (i.e., for all books in each photo), while 0 indicates that not all photos permitted this.

- *Non-occurrence of problems during photo submission*: a binary variable was created to indicate the non-occurrence of problems: respondents who reported no problems were coded as 1, while those presenting issues were coded as 0. Details on each problem's frequency are available in SOM 4 in Iglesias et al. (2026) (https://osf.io/hq78w/files/g4hc9?view_only=02fc23b16d3242dab472440d9704663f).

Taken together, these indicators shed light on technical as well as behavioral aspects of photo-data quality. Except for the number of photos sent (numerical), 0 indicates lower quality and 1 higher quality.

Table 2 summarizes the descriptive statistics for the quality indicators. Half of the respondents submitted between 2 and 6 photos, while 40% submitted only one. The average was 3 photos, with a median of 2. Overall, 95% of respondents sent photos in line and of sufficient visual quality for analysis. The potential for complete classification of the required information varied by type: storage identification was achievable for 91% of

³ Although Iglesias (2026) assesses visual clarity and photo pertinence separately, this paper analyzes them together as over 95% of respondents sent photos meeting both criteria.

respondents, whereas language identification was possible for only 16%. Book count and categorization fall in the middle, being possible for 41% of respondents. Lastly, 26% of respondents experienced at least one problem during the photo submission process.

Table 2. Descriptive statistics of the dependent variables

	Sample size	%
Number of photos (mean=3, median=2)		
1 photo	94	40
2-6 photos	122	51
7 photos or more	22	9
All photos were in line and good visual quality	226	95
Potential for classification		
Total number of books	94	41
Number of books per category	94	41
Type of storage	207	91
Languages	36	16
Non-occurrence of problems	174	74

Note: respondents sending photos = 238.

Analysis

To assess how respondents' characteristics impact each indicator of data quality, we used linear regressions for the number of photos submitted, and logistic regressions for the remaining indicators. For each indicator, several models were estimated, including: 1) only the three sociodemographics (age, gender, educational level), 2) sociodemographics and self-perception of abilities, 3) sociodemographics, comfort with new technologies, and frequency of photo capture and sharing, and 4) sociodemographics, self-perception of abilities, comfort with new technologies, and frequency of photo capture and sharing.

For clarity and because results do not vary largely among models, only the more complete models (Model 4) for each data quality indicator are presented in this paper. The partial and full models can be found in Iglesias et al. (2026) as SOM 5, (https://osf.io/hq78w/files/7vrnc?view_only=02fc23b16d3242dab472440d9704663f), the code for the entire analyses as SOM 6 (https://osf.io/hq78w/files/rjtve?view_only=02fc23b16d3242dab472440d9704663f), and the dataset as SOM 7 (https://osf.io/hq78w/files/cgbrm?view_only=02fc23b16d3242dab472440d9704663f).

All analyses were done using R statistical software (version 4.4.2; R Core Team, 2024).

Results

Table 3 details the results of the complete regression models.

Starting with the sociodemographic variables, *age* emerges as the predictor with more significant effects on the data quality indicators. On the one hand, older age is positively correlated with the number of photos submitted, $b = 0.09$, $t = 2.942$, $p = .004$, suggesting that older participants may have more books or demonstrate a higher willingness to submit such photos. On the other hand, age has a marginal negative association with an inability to classify book language, $OR = 0.93$, $90\%CI[0.86, 1.00]$, $z = -1.90$, $p = .057$.

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Further, age is significantly and negatively associated with storage, $OR = 0.87$, $99\%CI[0.79,0.96]$, $z = -2.88$, $p = .004$.

Older individuals could have accumulated more books and decorative objects over time, which could impact the visibility of book languages in photographs. Moreover, older respondents might not have captured photos as explained in the instructions: from a distance so that the storage type could be identifiable, as a very close photo does not allow to determine if, for instance, books are in shelves or a closet. All in all, while older individuals contribute more frequently, their photos are more difficult to extract information from due to these challenges. Furthermore, older age correlates with a higher frequency of reported problems during the photo capture and submission process.

The *gender* and *education level* of participants yield limited significant results. Being female is associated with an inability to classify book language compared to males, $OR = 0.32$, $99\%CI[0.13,0.74]$, $z = -2.62$, $p = .009$. Similarly, higher levels of education (relative to mandatory secondary education or less) are associated with difficulties in classifying books into one of the three categories. Specifically, this is significant for those with optional secondary to higher technical education, $OR = 0.41$, $95\%CI[0.19,0.86]$, $z = -2.34$, $p = .019$, and reached marginal significance for those with higher professional education, $OR = 0.54$, $90\%CI[0.27,1.05]$, $z = -1.83$, $p = .068$. As the remaining quality indicators are unaffected by these variables, gender and education significantly impact only one of the seven metrics each.

Regarding self-perceived abilities, their impact is quite limited. *Spatial abilities* show no significant effect on any of the seven quality indicators, while *verbal abilities* only significantly affect the number of photos submitted, $b = 0.63$, $t = 2.384$, $p = .018$. Similar to age, those perceiving their own verbal abilities as superior to those of others may be more prone to have more books or to show their books when asked for them. Overall, the self-perception of both spatial and verbal abilities shows no measurable impact on the quality of submitted book photos.

As for technology-related variables, results indicate that being *very or totally comfortable with new technologies* is associated with a higher likelihood of extracting book categories from the photos, $OR = 2.04$, $95\%CI[1.11,3.83]$, $z = 2.27$, $p = .023$. Similarly, this comfort level was associated with a marginally higher likelihood of the non-occurrence of problems during submission, $OR = 1.80$, $90\%CI[0.92,3.54]$, $z = 1.71$, $p = .087$. Furthermore, photos provided by those who *capture images daily* (vs. less than weekly) allowed for more successful book counts, $OR = 2.93$, $95\%CI[1.19,7.47]$, $z = 2.30$, $p = .022$. *Sharing photos 1–6 times per week* shows a marginal association with a more successful language classification from the images, $OR = 2.36$, $90\%CI[0.881,6.78]$, $z = 1.67$, $p = .095$. Overall, greater familiarity and comfort with the relevant devices (i.e., cameras and smartphones) lead to better data quality.

No variable presented significant effects on visual clarity and pertinence of the photos, indicating that it is an indicator not affected by the respondents' characteristics in the book case.

Finally, an additional model summarizing the quality indicators —except the number of photos — was estimated. This binary model (1 = all photos visually clear and pertinent, all

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information classifiable, and no respondent-reported problems; 0 = otherwise), available in SOM 5 in Iglesias et al. (2026)

(https://osf.io/hq78w/files/7vrnc?view_only=02fc23b16d3242dab472440d9704663f)

shows no significant effect from the independent variables.

Table 3. Full regression models for the photo-quality indicators

Variables	# of photos	Visual clarity and pertinence	Potential for classification				Non-occurrence of problems
			Book count	Book categorization	Storage	Language	
Age	0.094*** (0.032)	0.082 (0.058)	-0.026 (0.027)	-0.007 (0.026)	-0.136*** (0.047)	-0.071* (0.038)	-0.056* (0.029)
<i>Ref = Male</i>							
Female	0.614 (0.393)	0.663 (0.724)	-0.457 (0.322)	-0.024 (0.319)	0.114 (0.554)	-1.149*** (0.438)	-0.232 (0.354)
<i>Ref = Mandatory secondary education or less</i>							
Optional secondary education to higher technical education	-0.444 (0.470)	0.525 (0.889)	0.222 (0.377)	-0.895** (0.383)	0.093 (0.680)	-0.265 (0.494)	0.304 (0.419)
Higher professional education	0.533 (0.431)	-0.133 (0.757)	-0.497 (0.355)	-0.625* (0.343)	-0.173 (0.618)	-0.691 (0.488)	0.519 (0.384)
Spatial abilities	-0.298 (0.257)	0.594 (0.462)	0.104 (0.222)	-0.217 (0.217)	-0.360 (0.390)	-0.151 (0.292)	0.343 (0.230)
Verbal abilities	0.634** (0.266)	0.656 (0.502)	-0.321 (0.217)	-0.138 (0.216)	0.229 (0.935)	0.369 (0.278)	-0.207 (0.242)
<i>Ref = Not at all to quite comfortable with new technologies</i>							
Very or totally comfortable with new technologies	0.204 (0.386)	0.252 (0.686)	0.269 (0.315)	0.715** (0.315)	0.726 (0.539)	-0.036 (0.422)	0.586* (0.343)
<i>Ref = Less than weekly</i>							
Capturing photos 1-6 times per week	0.202 (0.530)	-0.533 (1.042)	0.129 (0.442)	-0.344 (0.420)	0.879 (0.836)	-0.377 (0.621)	0.384 (0.458)
Capturing photos daily	0.548 (0.571)	0.124 (1.187)	1.074** (0.467)	-0.194 (0.454)	-0.301 (0.790)	0.044 (0.623)	0.818 (0.523)

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Variables	# of photos	Visual clarity and pertinence	Potential for classification				Non-occurrence of problems
			Book count	Book categorization	Storage	Language	
<i>Ref = Less than weekly</i>							
Sharing photos 1-6 times per week	0.244 (0.461)	0.009 (0.896)	0.187 (0.375)	0.204 (0.368)	-0.966 (0.710)	0.860* (0.515)	0.027 (0.433)
Sharing photos daily	-0.640 (0.542)	-1.175 (0.986)	-0.377 (0.443)	-0.575 (0.447)	-0.888 (0.747)	0.049 (0.611)	-0.809 (0.500)
Constant	-2.728 (1.689)	-3.347 (2.728)	1.134 (1.458)	1.164 (1.429)	8.608*** (2.761)	1.455 (2.021)	2.534* (1.521)
Observations	236	236	226	226	226	226	234
R ²	0.112	-	-	-	-	-	-
Adjusted R ²	0.069	-	-	-	-	-	-
Log Likelihood	-	-42.354	-140.761	-144.660	-60.644	-87.661	-124.935

Note: * $p < .1$, ** $p < .05$, *** $p < .01$. Standard error in parentheses. Full p -values reported in SOM 8 in Iglesias et al. (2026)

(https://osf.io/hq78w/files/vq3kw?view_only=02fc23b16d3242dab472440d9704663f).

Discussion

Understanding photo quality is relevant, as photo-based survey tasks may offer a long-term alternative to conventional questions. Such tasks can reduce respondent burden, minimize measurement error, and open new avenues for collecting rich, contextualized data. Therefore, identifying potential barriers or facilitators related to respondent characteristics is a critical step toward integrating visual data collection into standard survey practice.

This paper aimed to elucidate the impact of respondents' sociodemographic characteristics, relation with technology and smartphone cameras, and self-perceived abilities on the quality of the photos submitted to an online survey asking for pictures of the books stored at home. Given the nature of the topic, this study dealt with a complex task: asking for potentially more than one photo of items located around the household.

The findings suggest that photo-based tasks are broadly feasible, though not equally effective across all respondent groups. Indeed, this effectiveness is reduced only among older participants, who were more engaged but often faced difficulties in producing high-quality photos for detailed analysis.

Many explanatory variables were not consistently associated with higher photo quality, including gender, self-perceived abilities, education, familiarity with technology, and photo-capture and photo-sharing frequency. These variables showed only occasional effects on specific quality indicators and no overall patterns, suggesting that, at least for books-at-home photos, survey photo quality does not depend on these factors.

These findings are very relevant to the collection of photos through surveys, addressing a gap in the literature. Indeed, most prior studies have emphasized willingness to participate and actual participation in photo-based survey tasks, with comparatively less attention to photo quality. To our knowledge, this is among the first studies to understand how survey photo quality can be affected by respondents' characteristics, opinions, and behaviors.

Contrasted with the previous work on how respondents' characteristics, opinions, and behaviors relate to willingness to participate and actual participation, our findings align with earlier results finding no significant associations for education (Iglesias & Revilla, 2024; Struminskaya, Lugtig, et al., 2021; Struminskaya, Toepoel, et al., 2021) or gender (Iglesias & Revilla, 2024; Struminskaya, Toepoel, et al., 2021).

Further, age, which in previous literature had presented mixed results in willingness and participation in photo requests, is related to a higher number of photos, but the potential for classification worsens and more problems take place during photo capture, indicating a trade-off between submission volume and downstream usability.

As for the frequency of taking photos, which it was associated to a higher likelihood of participating in a question asking for photos (Iglesias, 2024), it did not present consistent significant effects, suggesting that while using the camera often relates to higher participation, it does little to improve quality. Moreover, the same study had found that comfort with new technologies associates with liking photo request, and although sporadic, we identified some positive effects of this variable, particularly in the non-occurrence of problems. The frequency of sharing images, which had shown no impact on participation or liking, does not impact data quality either.

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Considering these results, several implications for survey design emerge. First, photo requests should be aligned with the level of detail required; when older respondents are included, it would be relevant to prioritize simpler shots that do not demand fine detail or that entail less work, like moving decorations or moving across different rooms.

Second, the limited effects of behaviors, opinions, and self-perceived abilities overall suggest that specialized skills are not a prerequisite for participating in photo-based surveys. This finding is encouraging: photos can be requested regardless of respondents' verbal or spatial abilities, and their photo-taking or photo-sharing frequency. However, this finding might relate to respondents of the panel being more familiar with answering surveys and using their devices more often than the rest of the population. That said, intuitive, user-friendly capture interfaces remain important to facilitate the task for all users and to support those who may face greater challenges producing high-quality images.

Taken together, the results suggest that photo-based survey items are generally feasible across diverse populations, but that task design must be sensitive to subgroup-specific barriers. Clear instructions, low-effort implementation, and potentially technical aids (e.g., real-time feedback) may help ensure consistent quality. Moreover, as visual data collection and classification become increasingly viable due to advancements in AI, understanding these patterns is critical for ensuring equity and data quality in future applications.

Finally, photo-based surveys could be effectively employed as an alternative or complementary measurement in various fields, such as using pictures of vehicles for mobility research or food for nutrition research (see Silverman et al., 2022), analyses of smartphone use (Ohme et al., 2021; Sewall et al., 2022), or expenditure data (Schouten et al., 2020; Wenz et al., 2025). However, careful consideration of the content being photographed and the associated quality implications for different respondent groups is essential, to assure quality from the respondents' side (that is, taking photos that clearly show the items of interests) and when classifying the information (manually or automatically). Researchers can look to contributions like the guidelines by Iglesias et al. (2024) for best practices on capturing high-quality survey images.

Limitations

This study is subject to certain limitations. First, the age range of the participants –parents of children in primary school– does not represent the broader population, potentially underestimating challenges faced by older groups. Second, abilities were self-assessed and responses may not reflect the actual abilities of respondents. Third, the use of an opt-in online panel in a single country (Spain) may limit the generalizability of the findings to other populations and survey contexts. Fourth, the specific topic of books at home might influence the quality assessment of the content: as it was a topic where visual details were needed to successfully classify the data (e.g., identifying languages from book titles), higher quality results could be expected in less demanding topics. Finally, the manual classification of data was challenging and not exempt of errors, even after different rounds of review, which could impact the results of the quality indicators.

Future research

It is important to confirm the robustness of our findings and study in more detail if, for instance, age plays an important role in other types of requests: as this was a complex request of photos, in other topics or settings age might not have such an important impact on data quality as in this study. Further, this would allow to confirm the lack of impact of the other independent variables.

Similarly, it would be relevant to assess how different contexts affect data quality, like other types of panels (i.e., probabilistic), countries, target populations, but also requests. For instance, to study whether offering respondents the opportunity to take the photos beforehand, facilitating to leave and return to the survey smoothly, and offering real-time feedback, impact data quality and potentially participation.

Further, as this study collected information about books in conventional ways as well, data quality comparison could be established between this type of questions and photo requests. Indeed, the request for conventional questions might have entailed counting, summing books, and moving around rooms to get the total number of books, which could relate to the studied but also other abilities, like mathematical ones.

Finally, as this study classified the information manually, it would be interesting to gather knowledge from the promising avenues of computer vision, which might allow for faster and more reliable results by using algorithms. In that line, quality assessment could vary when implementing state-of-the-art automatic classification.

Conclusions

The findings demonstrate that self-perceived skills, photo-capture and share frequency, comfort with technologies, gender, and education play only a minor role in determining the quality of book photos sent through surveys—a positive sign for the robustness of this method. However, age is linked to lower quality in this topic. These results underscore the need to consider respondent diversity and technological engagement when designing methods that rely on participant-provided visual data, so that useful photos could be collected from all participants, regardless of their individual characteristics. Further, it is crucial to evaluate the classification possibilities and limitations, especially when assessing visually demanding data.

Data availability

Supplementary online materials, including dataset and code, are available in the project's repository (https://osf.io/hq78w/overview?view_only=02fc23b16d3242dab472440d9704663f).

References

- Bosch, O. J., Revilla, M., & Paura, E. (2019). Answering mobile surveys with images: An exploration using a computer vision API. *Social Science Computer Review*, 37(5), 669–683. <https://doi.org/10.1177/0894439318791515>

Factors Influencing the Quality of Photos

Bosch, O. J., Revilla, M., Qureshi, D., & Höhne, J. K. (2022). A new experiment on the use of images to answer web survey questions. *Journal of the Royal Statistical Society, Series A (Statistics in Society)*, *185*(3), 955–980.

<https://doi.org/10.1111/rssa.12856>

Daikeler, J., Fröhling, L., Sen, I., Birkenmaier, L., Gummer, T., Schwalbach, J., Silber, H., Weiß, B., Weller, K., & Lechner, C. (2024). Assessing Data Quality in the Age of Digital Social Research: A Systematic Review. *Social Science Computer Review*, *0*(0), 1–37. <https://doi.org/10.1177/08944393241245395>

Daikeler, J., Gauly, B., & Rosenthal, M. (2020). Linking PIAAC Data to Individual Administrative Data: Insights from a German Pilot Project. In D. B. Maehler & B. Rammstedt (Eds.), *Large-Scale Cognitive Assessment: Analyzing PIAAC Data* (pp. 271–290). Springer International Publishing. https://doi.org/10.1007/978-3-030-47515-4_11

Glowacki, E. M., Zhu, Yaguang, Bernhardt, Jay M., & Magsamen-Conrad, K. (2021). Technological capital within aging United States-based populations: Challenges and recommendations for online intervention uptake. *Journal of Applied Communication Research*, *49*(3), 347–367. <https://doi.org/10.1080/00909882.2021.1885051>

Iglesias, P. A. (2024). Preferences, Participation, and Evaluation of Answering Questions About the Books Participants Have at Home Through Conventional and Image-Based Formats. *Methods, Data, Analyses*, *0*, Article 0. <https://doi.org/10.12758/mda.2024.07>

Iglesias, P. A. (2026). Unlocking insights: Assessing the quality of conventional and image-based responses on books at home in an online mobile survey. *Quality & Quantity*. <https://doi.org/10.1007/s11135-025-02519-7>

Factors Influencing the Quality of Photos

Iglesias, P. A., Daikeler, J., Draxler, F., Eckman, S., & Revilla, M. (2026). Supplementary materials to “A Picture Is Worth a Thousand Words: Factors Influencing the Quality of Photos Received Through an Online Survey”. OSF.

https://osf.io/hq78w/overview?view_only=02fc23b16d3242dab472440d9704663f

Iglesias, P. A., Ochoa, C., & Revilla, M. (2024). A practical guide to (successfully) collect and process images through online surveys. *Social Sciences & Humanities Open*, 9, 100792. <https://doi.org/10.1016/j.ssaho.2023.100792>

Iglesias, P. A., & Revilla, M. (2024). Skills, availability, willingness, expected participation and burden of sharing visual data within the frame of web surveys. *Quality & Quantity*, 58(2), 1071–1092. <https://doi.org/10.1007/s11135-023-01670-3>

Iglesias, P. A., Revilla, M., Heppt, B., Volodina, A., & Lechner, C. (2023). Protocol for a web survey experiment studying the feasibility of asking respondents to capture and submit photos of the books they have at home and the resulting data quality [version 1; peer review: 2 approved; 1 approved with reservations]. *Open Research Europe*, 3(202), 1–14. <https://doi.org/10.12688/openreseurope.16507.1>

Ilic, G., Lugtig, P., Schouten, B., Streefkerk, M., Mulder, J., Kumar, P., & Höcük, S. (2022). Pictures instead of survey questions: An experimental investigation of the feasibility of using pictures in a housing survey. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 185(Supplement_2), S437–S460. <https://doi.org/10.1111/rssa.12960>

Jäckle, A., Burton, J., Couper, M. P., & Lessof, C. (2019). Participation in a mobile app survey to collect expenditure data as part of a large-scale probability household panel: Coverage and participation rates and biases. *Survey Research Methods*, 13(1), 23–44. <https://doi.org/10.18148/srm/2019.v1i1.7297>

Magsamen-Conrad, K., & Dillon, J. M. (2020). Mobile technology adoption across the lifespan: A mixed methods investigation to clarify adoption stages, and the

Factors Influencing the Quality of Photos

- influence of diffusion attributes. *Computers in Human Behavior*, 112, 106456.
<https://doi.org/10.1016/j.chb.2020.106456>
- McCrudden, M. T., & Schraw, G. (2009). The Effects of Relevance Instructions and Verbal Ability on Text Processing. *The Journal of Experimental Education*, 78(1), 96–117.
<https://doi.org/10.1080/00220970903224529>
- Ochoa, C., & Revilla, M. (2025). Photos requests in surveys: Comparing in-the-moment and conventional approaches. *International Journal of Market Research*, 67(5), 613–629. <https://doi.org/10.1177/14707853251348786>
- Ohme, J., Araujo, T., de Vreese, C. H., & Piotrowski, J. T. (2021). Mobile data donations: Assessing self-report accuracy and sample biases with the iOS Screen Time function. *Mobile Media & Communication*, 9(2), 293–313.
<https://doi.org/10.1177/2050157920959106>
- R Core Team. (2024). *R: A Language and Environment for Statistical Computing* [Computer software]. R Foundation for Statistical Computing. <https://www.R-project.org>
- Revilla, M. (2022). How to enhance web survey data using metered, geolocation, visual and voice data? *Survey Research Methods*, 16(1), 1–12.
<https://doi.org/10.18148/srm/2022.v16i1.8013>
- Revilla, M., Couper, M. P., & Ochoa, C. (2019). Willingness of online panelists to perform additional tasks. *Methods, Data, Analyses*, 13(2), 223–252.
<https://doi.org/10.12758/mda.2018.01>
- Revilla, M., Iglesias, P. A., Ochoa, C., & Antón, D. (2022). *WebdataVisual: A tool to collect visual data within the frame of web surveys* [Computer software]. OSF.
<https://doi.org/10.17605/OSF.IO/R7CAX>
- Schouten, B., Bulman, J., Järvensivu, M., Plate, M., & Vrabič-Kek, B. (2020). *Report on the action @HBS* (p. 28).

Factors Influencing the Quality of Photos

<https://ec.europa.eu/eurostat/documents/54431/11489222/1+Report+on+the+action.pdf>

Sewall, C. J. R., Goldstein, T. R., Wright, A. G. C., & Rosen, D. (2022). Does Objectively Measured Social-Media or Smartphone Use Predict Depression, Anxiety, or Social Isolation Among Young Adults? *Clinical Psychological Science, 10*(5), 997–1014.
<https://doi.org/10.1177/21677026221078309>

Silverman, J., Barasch, A., Diehl, K., & Zauberger, G. (2022). Harder Than You Think: Misconceptions about Logging Food with Photos versus Text. *Journal of the Association for Consumer Research, 7*(4), 419–428.
<https://doi.org/10.1086/720444>

Slavec, A. (2024, March 18). *Visual data in web surveys: The case of bedroom flooring*. WEB DATA OPP Workshop.

Struminskaya, B., Lugtig, P., Toepoel, V., Schouten, B., Giesen, D., & Dolmans, R. (2021). Sharing Data Collected with Smartphone Sensors. *Public Opinion Quarterly, 85*(S1), 423–462. <https://doi.org/10.1093/poq/nfab025>

Struminskaya, B., Toepoel, V., Lugtig, P., Haan, M., Luiten, A., & Schouten, B. (2021). Understanding willingness to share smartphone-sensor data. *Public Opinion Quarterly, 84*(3), 725–759. <https://doi.org/10.1093/poq/nfaa044>

Vekiri, I., & Chronaki, A. (2008). Gender issues in technology use: Perceived social support, computer self-efficacy and value beliefs, and computer use beyond school. *Computers & Education, 51*(3), 1392–1404.
<https://doi.org/10.1016/j.compedu.2008.01.003>

Wenz, A., Jäckle, A., Burton, J., Couper, M. P., & Read, B. (2025). Quality of Expenditure Data Collected With a Mobile Receipt Scanning App in a Probability Household Panel. *Survey Research Methods, 19*(2), 105–122.
<https://doi.org/10.18148/srm/2025.v19i2.8178>

Factors Influencing the Quality of Photos

Wenz, A., Jäckle, A., & Couper, M. P. (2019). Willingness to use mobile technologies for data collection in a probability household panel. *Survey Research Methods*, 13(1), 1–22. <https://doi.org/10.18148/srm/2019.v1i1.7298>

Wenz, A., & Keusch, F. (2023). The second-level smartphone divide: A typology of smartphone use based on frequency of use, skills, and types of activities. *Mobile Media & Communication*, 11(3), 459–483. <https://doi.org/10.1177/20501579221140761>