


# Exploring Vision-Related Quality of Life: A Qualitative Study Comparing Patients' Experience of Cataract Surgery with a Standard Monofocal IOL and an Enhanced Monofocal IOL

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**Purpose:** To explore quality of life related with intermediate vision of patients before and after cataract surgery, and to make patients' experience available for the design of future scales that assess visual function related with intermediate distance.

**Patients and Methods:** A qualitative research methodology based on thematic content analysis was used to explore vision-related quality of life based on the experiences of patients with cataract. Patients were recruited at the Service of Ophthalmology of the Hospital de Sant Pau (Barcelona, Spain). Data were collected through nineteen semi-structured interviews conducted with patients diagnosed with cataract and implanted with a standard aspheric monofocal intraocular lens (IOL) (Tecnis<sup>®</sup> ZA9003) (n = 6), an enhanced monofocal IOL (Tecnis<sup>®</sup> Eyhance ICB000) (n = 6), and patients from the waiting list (n = 7). The data analysis consisted in coding, aggregation, and theme development of the transcribed audios.

**Results:** Patients on waiting lists reported difficulty and insecurity in performing daily and meaningful tasks related to near visual ranges (eg: threading a needle, reading price tags), intermediate (eg: using a computer or dialling numbers on a smartphone), and distant (eg: recognizing faces, walking on uneven surfaces). Patients after surgery with the standard IOL reported improvement in performing activities mainly in the distant visual range, but also the need for a better communication with clinical staff to adjust their own expectations on the results of the surgery. Finally, patients implanted with the enhanced IOL reported satisfaction and improved visual function in performing daily activities, especially those related to the intermediate visual range.

**Conclusion:** Our exploratory study found that patients after cataract surgery with the enhanced IOL reported a better performance in activities that require the intermediate vision. These results will inform the development of scales to assess vision-related quality of life in the intermediate visual range prioritizing outcomes according to patients' daily and meaningful activities.

**Keywords:** quality of life, cataract, qualitative research, intraocular lenses

## Introduction

Cataract is among the most common causes of visual impairment in older people, affecting more than 90% of those aged 65 and over.<sup>1</sup> Visual impairment has an impact on person's ability to perform tasks safely and easily in different functional domains, including ambulation, driving, household management, work performance, financial and legal responsibilities, and recreation and leisure activities.<sup>2</sup> Visual impairment in older adults is also associated with reduced participation,<sup>3</sup> mobility functions,<sup>4</sup> falls risk<sup>5</sup> and to a fear of falling, which restrict their physical activities and put them at risk for social isolation and disability<sup>6</sup> and can lead to functional decline, depression, increased falls risk, and reduced quality of life.<sup>5</sup> Moreover, visually impaired people generally have a higher prevalence of anxiety disorders and

depression compared with people with good vision.<sup>7,8</sup> Hence, visual impairment has an impact on all aspects of daily life<sup>9</sup> and threatens the well-being of the individual.<sup>10</sup>

Cataract surgery has been shown to be cost-effective and to report consistent benefits in reducing disability, limitation in activities, anxiety, depression, risk of falls and fractures,<sup>11–17</sup> being phacoemulsification the preferred surgical technique in the developed world and tertiary centers in developing countries to remove cataract.<sup>18–21</sup> Several types of new intraocular lenses (IOL) have been introduced in surgical procedures during last years and reported to influence patients' opinions about their vision after cataract extraction.<sup>22</sup> A few studies have shown that an enhanced monofocal IOL provides, compared to other standard monofocal IOL, similar visual acuity at near and distant range and better performance at the intermediate distance range (50–100 cm).<sup>23–27</sup> Intermediate distance range covers a zone of activities including computer work, cooking, shopping, engaging in conversation, eating, controlling the car dashboard, or organizing a desk. Hence, it may be a reasonable option for those more dependent on intermediate vision in daily activities.<sup>28</sup>

From the patient's viewpoint, cataract and cataract surgery can influence many quality-of-life aspects affected by poor visual acuity, which may include ocular symptoms (eg, glare and halos), limitations to activities of daily living and convenience (freedom from spectacles).<sup>29</sup> Vision-related quality of life is a growing topic of interest in the literature. It is related with patients' concerns about coping with everyday life, incapacity to carry out ability preferred activities, and psychological distress including fear, lack of safety, frustration, annoyance, depression, embarrassment, and loneliness.<sup>30</sup> However, vision-related quality of life in patients with cataract has been mostly assessed using ophthalmic instruments originally developed for other eye diseases or non-disease specific patient-reported outcome instruments, and hence less sensitive to change.<sup>31,32</sup> Furthermore, few questionnaires measuring patient-reported outcomes related to visual function have been developed for cataract surgery,<sup>33,34</sup> and no specific scales have been identified to assess visual function in the intermediate distance range. The aim of this study was to explore vision-related quality of life of patients before and after cataract surgery with different types of IOL and to highlight relevant issues for the future development of scales that assess visual function in the intermediate visual range.

## Materials and Methods

The qualitative theoretical framework used in this study was phenomenology, which aims to describe the essence of a phenomenon from the perspective of those who have experienced it.<sup>35</sup> A convenience sampling technique was used to recruit 19 patients diagnosed with cataract through the service of ophthalmology at Hospital de Sant Pau (Barcelona, Spain). Sample size determination was guided by the criterion of saturation and informational redundancy, which means that no new data is elicited by sampling more units. Participants were distributed into one of these three study groups: Patients implanted with a standard aspheric monofocal IOL (Tecnis<sup>®</sup> ZA9003) (Group 1), patients implanted with an enhanced monofocal IOL (Tecnis<sup>®</sup> Eyhance ICB000) (Group 2), and patients from the waiting list (Group 3). The difference between the two lenses is that the model of the standard IOL is exclusively monofocal, while the enhanced IOL is monofocal with an improved intermediate function. The latter features a smooth continuous power change from the center towards the lens periphery. This feature seems to increase the depth of focus, thus mitigating the effects of presbyopia and delivering sharp vision at different distances. Both models have a modified anterior surface with a sphericity of  $-0.27 \mu\text{m}$  across their entire optic zone of 6 mm. They also have a 360 degrees continuous posterior squared margin. Their Abbe number is 55 and refractive index is 1.47.

Inclusion criteria: Patients had to be aged 65 or over, to be diagnosed with cataract, and to be emmetrope post-operatively (Sphere  $\pm$  0,5D; CyL  $\leq$  0,75D) with binocular visual acuity of at least 1.0 measured on the Snellen scale (groups 1 and 2) or with binocular visual acuity of 0.5 (6/12) (minimum eyesight standard for driving) measured on the Snellen scale (group 3). To avoid recall bias, patients did not know the type of lens they had been implanted. Face-to-face interviews were conducted between June and October of 2020. Due to the outbreak of the second wave of the COVID-19 pandemic in Spain (November 2020), the research team decided to carry out phone interviews instead of face-to-face interviews, until data saturation was reached. Moreover, three health professionals (two ophthalmologists and one optometrist) from the Service of Ophthalmology of the Hospital de Sant Pau were interviewed for triangulation purposes.

A semi-structured questionnaire with open-ended questions was developed ad hoc and used for the interviews. The questionnaire explored aspects related to the difficulty perceived by participants in performing tasks at different visual ranges before and after surgery, and its impact on several aspects of their vision-related quality of life. Adjustments to the questionnaire were made according to the data collection method (face-to-face or phone interview) and to previous experience and information participants had provided. All interviews were carried out by a researcher with a background in sociology of health who was not known to the participants before the beginning of the study. Face-to-face interviews were conducted in consultation rooms located at the Service of Ophthalmology at the Hospital de Sant Pau with all measures to prevent the transmission of COVID-19 (wearing masks, physical distancing, hydroalcoholic gel and ventilation). With respect to phone interviews, they were previously scheduled so that patients could feel comfortable and have enough time to attend the call. All interviews were digitally recorded with permission from participants and transcribed onto a Microsoft Word® file. Data collected were listed, coded, and categorized by visual range adapting the framework proposed by Atkinson et al.<sup>36</sup> Data processing occurred as an iterative process, so analysis started before data collection was completed. The study was complied with the Declaration of Helsinki and approved by the Ethics Committee of the Autonomous University of Barcelona. Participants received oral and written information about the study and signed the informed consent, which included publication of anonymised data. Participation in the study was volunteer, and participants did not receive any economic compensation.

## Results

The characteristics of participants are presented in Table 1. The age of participants ranged from 63 to 85 years old. Almost twice as many participants were women (63.16%). About half of participants had completed secondary studies (42.10%), a little more than a fourth had completed higher studies (26.31%) and a little less than a third (31.58%) had completed only primary studies or had not completed any studies at all. Only four participants (21.05%) were born in the same city where they currently live (Barcelona). The majority of them were married (68%) with only one participant living alone (5.26%).

## Performance of Daily Tasks Before Surgery

Transcripts were used to create lists of vision-dependent tasks organized in continuous visual ranges. Tables 2–4 show tasks reported by patients as difficult to perform in the near, intermediate, and distant visual range before cataract surgery.

**Table 1** Characteristics of Participants by Group

	<b>Total (n = 19)</b>	<b>Waiting List (n = 7)</b>	<b>Standard IOL (n = 6)</b>	<b>Enhanced IOL (n = 6)</b>
<b>Age</b> , in years, mean (standard deviation)	74.9 (6.82)	73.9 (6.2)	75.7 (8.4)	82.4 (6.9)
<b>Gender</b>				
Women, n (%)	12 (63.16)	6 (85.71)	4 (66.67)	2 (33.33)
Men, n (%)	7 (36.84)	1 (14.29)	2 (33.33)	4 (66.67)
<b>Education level</b>				
Without or only primary studies, n (%)	6 (31.58)	3 (42.86)	1 (16.67)	2 (33.33)
Secondary studies, n (%)	8 (42.10)	3 (42.86)	1 (16.67)	4 (66.67)
Higher studies, n (%)	5 (26.31)	1 (14.28)	4 (66.66)	0 (0.00)
<b>Born in the same city where currently living</b> , n (%)	4 (21.05)	1 (14.28)	2 (33.33)	1 (16.67)
<b>Marital status</b> , n (%)				
Married, n (%)	13 (68.42)	5 (71.44)	2 (33.33)	6 (100.00)
Separated or divorced, n (%)	3 (15.79)	1 (14.28)	2 (33.33)	0 (0.00)
Widow, n (%)	2 (10.53)	1 (14.28)	1 (16.67)	0 (0.00)
Religious, n (%)	1 (5.26)	0 (0.00)	1 (16.67)	0 (0.00)
<b>Living alone</b> , n (%)	1 (5.26)	1 (14.28)	0 (0.00)	0 (0.00)

**Note:** n=number of participants.

**Table 2** Performance of Tasks in the Near Visual Range Before the Surgery

Task	Verbatim	Participant
Threading a needle	"If I start sewing something I like, threading a needle is a mess. I mean ... it's an uphill climb to me. That's probably what I find most difficult."	Woman, 68, waiting list, secondary studies
Taking fine measurements	"When I had to take fine measures ... or connect cables"	Man, 71, enhanced IOL, secondary studies
Use tools (screwdriver, hammer, pliers, etc) to fix and/or adjust small objects	"If a radio or a watch is ruined ... o some mechanical staff ... I have fun with it. But I need more light, because when there is not much light you don't see it well"	Man, 75, enhanced IOL, secondary studies
	"Screws ... it's a handicap. I created strategies like picking up a magnifying glass. But to pick up a screw and look what kind of screwdriver you need ... it was difficult"	Man, 68, enhanced IOL, secondary studies
Do activities related to personal care (shaving, cutting nails, making up)	"What I noticed more is that I needed a lot of light from the very near distance, and very powerful, to do some things ... shaving, for example"	Man, 75, enhanced IOL, secondary studies
Read medication and/or nutritional labels, price tags and/or expiration dates on products	"I go shopping with him (husband). The prices ... he tells me because I can't see them well."	Woman, 85, waiting list, without studies
	"The most difficult thing is when I go shopping. Labels that are sometimes interesting to look at, sugar ... this is the most difficult. More than reading a book or looking at the mobile phone."	Woman, 68, waiting list, secondary studies
Enjoy reading books, journals and/or newspapers	"I wish I could read better clearer. Now all the letters come together."	Woman, 85, waiting list, without studies
	"When you have to read 500 or 1.000 pages ... after two hours with your eyes fixed in the book ... it was difficult, much more than before".	Man, 68, enhanced IOL, secondary studies
	"I just wanted to read after the surgery. Not being able to read ... it has been very hard for me (starts crying). ... I have not been able to read well ... however I have been able to do some small crafts, with some difficulty, but I have to do something in my life because I am an active woman"	
	"Reading as I read before, because I really liked reading, both books and magazines, watch television, or sew sometimes, too ... I can't do it because of the eyes."	Woman, 72, waiting list, secondary studies
	"Even if it is a little, read a little, because immediately my eyes become like they were in tears and cloudy. When I watch the TV, I open and close my eyes again and again, because I need to do it to see, I get an itch ... As much in the right eye, which is the one I have got sick, as in the left. Now the left is the one I feel more tired."	

Some examples of daily activities related to near vision included threading a needle and do-it-yourself tasks, while others imply strong limitations when shopping in a supermarket (see the price tags of products, read the expiration dates on nutritional labels). Reading also emerged as an important activity for patients, which was limited by cataract, causing feelings of disappointment, frustration, and sadness. Regarding the intermediate visual range, using the computer and watching TV were two of the most frequently mentioned activities. Specifically, they named problems to see the faces

**Table 3** Performance of Tasks in the Intermediate Visual Range Before the Surgery

Task	Verbatim	Participant
Use a standard size computer or laptop (to see images, watch videos, read/write e-mails)	"Mid-distance, especially if you are working with a computer ... if you cannot see well then it's a problem ... or you go shopping and you cannot see the prices ... and that's important. Up close, reading, for example, is very important ... but mid-distance is very important, too ... "	Woman, 69, waiting list, secondary studies
Enjoy hobbies and games within an intermediate distance range (sewing, cross stitch pattern, gardening, playing cards, painting, etc)	"When I start sewing, or reading, I put on my glasses. Otherwise, I couldn't."	Woman, 85, waiting list, without studies
	"Sewing ... I can't do it right."	
	"Although I see well up close, it's hard for me to do cross stitch pattern, and I've had to leave it ... I couldn't."	Woman, 69, waiting list, secondary studies
Feel steady and confident when falling on uneven ground, walk around without fear of falling, climb or descend stairs	"I don't feel safe when I'm on the street. If there's a step ... I'm careful about that."	Woman, 68, waiting list, secondary studies
	"I had headache on the street before, because I wasn't safe"	Woman, 71, enhanced IOL, primary studies
	"There are several things that you have to pay attention to much more than before. For example, walking down the street is what I find most dangerous, if there are slopes ... "	Woman, 68, waiting list, secondary studies
	"Then when you go out ... well I am very afraid of falling because you do not see well ... I always look at the ground, because if there is a slope you do not see it ..."	Woman, 69, waiting list, secondary studies
	"Changes on the surface of the ground ... you don't perceive them with the same sharpness as before"	Man, 68, enhanced IOL, secondary studies
	"If I had better vision, I would go safer, I find myself insecure. What happens to me is that the place where I live, I have got the shop in front of my house, and this is what is useful for me. Going to the first supermarket ... I dare more than going to the others, which are two streets further."	Woman, 72, waiting list, secondary studies
Recognize people you know across the room	"That in the intermediate distance ... it was basic ... perceive that someone's coming ... and not have to wait at the last moment to greet. And the paddle, the ball ... I couldn't reach it, and I had never arrived late in my life"	Man, 68, enhanced IOL, secondary studies
	"When you saw some in the distance, but until he moved closer like this ... I could not see his face sharply"	Man, 68, enhanced IOL, secondary studies
See facial expressions of friends or loved ones	"And it's the same thing with the faces, sometimes I see a person coming and I know that's my daughter by the way she moves, but until she's close I can't see her face well ... it's difficult for me to distinguish the faces."	Woman, 69, waiting list, secondary studies

(Continued)

**Table 3** (Continued).

Task	Verbatim	Participant
Read subtitles on the TV	"I can still read, but to watch TV, read subtitles ... neither."	Woman, 68, waiting list, secondary studies
	"I used to wear glasses to sew, and that's all. But it arrived a day that I started to see the TV blurred"	Woman, 71, enhanced IOL, primary studies
	"You're watching TV, you don't see the faces well, you can't read the subtitles, and that makes you nervous"	Woman, 69, waiting list, secondary studies

**Table 4** Performance of Tasks in the Distant Visual Range Before the Surgery

Task	Verbatim	Participant
See traffic lights, signals, lines of the road and/or intersections when driving or being inside a car	"When driving, at night, the lines (of the road) ... you do not perceive with the same acuity, or if somebody was coming with the light a little bit higher ... the blinding was bigger than before ... And this last summer, one of the days we went out, it was hazy in the road ... until it cleared up, it was an agony for me ... because my eyes could not .... and you reduce the speed so much"	Man, 68, enhanced IOL, secondary studies
Drive and/or feel safely in a car (at night, with oncoming lights or bright sunlight, etc)	"And when you're in the car, as you don't see well, you have the sensation that the driver sees as bad as you, and this is something that makes me anxious, this is what worries me the most."	Woman, 69, waiting list, secondary studies
	"Until now, I used to wear glasses for the distant visual range, for example when driving. But lately, when I put on my glasses, they were not very useful, because the cataract prevented me to have a good visual acuity ... you put your glasses and you did not achieve the same outcome as before"	Man, 68, enhanced IOL, secondary studies
Participating in outdoor activities without being handicapped by glare	"To do some sports, paddle, specifically. Outdoor, I had to start wearing glasses"	Man, 68, enhanced IOL, secondary studies

and read the subtitles on the screen. A second group of tasks that patients were unable to enjoy before the surgery included handcraft activities (eg, sewing and cross-stitch pattern). Thirdly, feelings of fear, insecurity, or even physical symptoms (eg, headache) emerged when patients talk about their difficulties to walk on uneven ground or to climb and/or descend steps, which clearly limit the possibility of going out from home. Finally, patients also highlighted the difficult of recognizing people at a certain approaching distance as well as facial expressions, which is something that obviously can affect social relationships. With respect to distant range, several examples were given related to the lack of safety when driving, either at night or with adverse atmospheric conditions. Other patients expressed feelings of anxiety when travelling inside a car before cataract surgery. One last example pointed to the difficulty of following small rapid balls, which means the impossibility to enjoy some sports.

## Impact of Cataract Surgery on the Vision-Related Quality of Life

Table 5 shows changes in the performance of vision-dependent tasks and vision-related quality of life before and after surgery. With respect to near and distant vision, improvements in the performance of tasks were found in patients who were implanted with the standard IOL as well as those implanted with the enhanced IOL. Examples given by participants referred to the possibility of seeing their own wrinkles for the first time, reading price tags, and threading a needle. They expressed their satisfaction to see things clearer, which implies that they were able to drive safer and to enjoy sightseeing. As for the intermediate visual range, only patients implanted with the enhanced IOL reported improvements in the

**Table 5** Changes in the Performance of Vision-Dependent Tasks and Vision-Related Quality of Life Before and After Surgery

Visual Range	Type of Lens	Verbatim	Participant
Near	Standard IOL	“When I went surgery for the left eye, and I looked myself in the mirror. God! How many wrinkles I have ... and what a wrinkled face I've got ..., and I didn't see it before.”	Woman, 78, without studies
	Enhanced IOL	“And also in the nearby, because if I had to thread a needle ... very bad, very bad ... Now I don't see well to do this, because my vision is not enough, but I can still thread with light, and I couldn't before”	Woman, 84, primary studies
Near, intermediate	Enhanced IOL	“Now, if I go to the supermarket, I see much better the price tags of products. The subtitles of the TV, I also see them better”	Man, 71, secondary studies
Intermediate	Enhanced IOL	“I have noticed a change, most of all in the intermediate distance. In the nearby ... I still need glasses, and I do not care about wearing them for the long-distance vision, because they are very specific activities. But I am happy to lead a normal life, without losing time trying to fix the glance o looking for your glasses ... at the end you have glasses for the near, glasses for the long ... and sometimes they do not adjust”	Man, 68, secondary studies
		“Uneven surfaces ... I see them fine now, maybe I had to gaze to them before. If I had to climb or descend stairs, I had to pay much more attention”	Man, 71, secondary studies
		“I was not safe (on the street), because sometimes I was walking”	Woman, 84, primary studies
		“When I went surgery I told the doctor. Wow! You are very handsome! I could not well the faces before”	Woman, 71, primary studies
	Enhanced IOL	“Now I cannot read, nor see the cell phone, nor sewing ... because I cannot see in the nearby. But now I see well I see the buses when they are coming, a sign, anything like this, o the faces of people, because before ... I saw a person, but I could not identify him. Now I can”	Woman, 71, primary studies
		“For example, when reading digital media. It's very unusual for me to look for glasses. When I was in the underground, I had to stop in front of the panel of the stations to check if I had to go to the left or to the right. But it was not looking sideways ... as I have done all my life ... I had to stop, try to locate the station ... I mean, paying much more attention, because the vision is not the same. And now it has improved a lot.”	Man, 68, secondary studies
	Enhanced monofocal IOL	“I go dancing. You enter and you see people, but you do not see the faces. I saw the faces before, and also now (after the surgery). It's very important to enter somewhere and see the faces. Without wearing glasses. I do not like wearing glasses, since I was a child, even if they suits me well ... I do not want glasses. I prefer not to have to wear them”	Woman, 71, primary studies
		“The TV ... I see it fine. It was not terrible before, but clarity and that ... I didn't see as much. Now much clearer, yes, much clearer.”	Woman, 84, primary studies
		“I don't need glasses to watch TV now. I see subtitles perfectly”	Woman, 71, primary studies
	Intermediate, distant	Enhanced IOL	“If I could have chosen, I had chosen what I've been done. Wearing glasses only for nearest things”

(Continued)



Table 5 (Continued).

Visual Range	Type of Lens	Verbatim	Participant
Distant	Standard IOL	"After surgery, the vision has improved at the long distance. The difference is that I see clearer now, but not cleaner."	Woman, 63, higher studies
		"I can see the lines in the road now, well outlined"	Man, higher studies
		"I can sit down and enjoy sightseeing now"	Woman, 68, higher studies
		"See the streets, clearly, the people, the trees, all these things have improved"	Man, 84, secondary studies
	Enhanced IOL	"Now, for the distant vision ... I see better than before. I see the same with or without glasses. Before the surgery, they told me that I would not need glasses for the distant vision"	Man, 71, secondary studies
		"I notice more light. And at the long distance, I see better than before"	Man, 75, secondary studies
		"To drive ... I see much better than before. Many times I put my glasses like this (points to his forehead) because I don't need. Before the surgery I felt better wearing glasses"	Man, 71, secondary studies
		"Now I see much more clearer when I drive. I noticed the difference. Traffic signs ... perfect"	Man, 68, secondary studies
Overall vision-related quality of life	Enhanced IOL	"I had to turn to my glasses to read anything before, to read very normal things. And now I don't need glasses. My quality of life had worsen compared to before the cataracts. And now I've recovered it".	Man, 68, secondary studies
		"I had to search how to accommodate my vision all the time ... Everybody is very satisfied now, because I've recovered part of the quality of life that I had lost".	Man, 68, secondary studies
		"I do not have any problem to see the cell phone. To watch TV, better, you notice it so much, because I saw double the subtitles, and now I see the perfectly without glasses. With no doubt, for the near, intermediate distance, I see perfectly. At the long distance ... I see an antenna at the top of the building in front of my house, and I see it well outlined. Now I see it as well as more than a year before ... I mean ... fine."	Man, 75, secondary studies
		"We have to remove the cataract, or whatever, so we can see and have a quality of life that if you could reach it ... you can help other people with any problem they have, for example, someone who stops you on the street and tells you ... Hey, cannot you look this for me? I cannot see well ..."	Woman, 71, primary studies
		"A whole world ... I couldn't imagine I see so well again ... now that I've gone on surgery ... I don't remember I could see so fine ... you can't explain it in words"	Woman, 71, primary studies
		"For the daily life of a normal person ... it has improved a lot. To read. I saw double before, and I see perfectly now"	Man, 75, secondary studies

performance of some tasks. Several examples were referred to feel safer walking on the street due to the possibility of seeing well uneven surfaces or steps. A few patients related that they had enjoyed watching the TV again because they could read the subtitles and see images. Nevertheless, it was easier for them to use the public transport because they could clearly read the numbers of the buses or the names of the stations, while others expressed their joy due to the



possibility of recognizing faces, which was considered very important for social interaction. Additionally, several participants mentioned that they had gained additional comfort because they only needed to wear glasses for few tasks at a near distance. Finally, some patients implanted with the enhanced IOL made comments explicitly referring to the quality of life they have recovered after the surgery, because they did not need to accommodate the vision or wear glasses all the time, they could see clearly along different visual ranges or even help other people with vision limitations.

## Discussion

This study was aimed to explore intermediate vision-related quality of life of patients before and after cataract surgery with a standard IOL and an enhanced IOL. Particularly, we identified limitations to perform vision-dependent tasks in the near, intermediate, and distant visual ranges, and assessed the degree of difficulty and importance of activities of daily living, before and after the surgery with both IOL. Furthermore, we tried to establish vision-related quality of life relevant issues for the future development of patient-reported outcomes measures of visual function, and to provide evidence of content validity for the design of future scales that assess visual tasks or functions occurring in the intermediate visual range. We used phenomenology as a valid qualitative theoretical framework to carry out the study, which has been widely used in the field of ophthalmology to explore patients' quality of life.<sup>37–39</sup> Data were collected through 19 semi-structured interviews conducted with patients in the waiting list for cataract surgery, implanted with a standard IOL and an enhanced IOL. Our findings showed that patients from waiting list reported difficulty in performing daily tasks related with near, intermediate, and distant visual ranges. Patients after surgery with either standard or enhanced IOL reported improvement in performing activities in the near and distant visual ranges, and the need for a better communication with clinical staff to adjust own expectations. However, only patients implanted with the enhanced IOL reported major satisfaction and improved visual function in performing daily living activities related to the intermediate and extended-intermediate visual range. Several studies have reported the same visual acuity at near and distant range and better outcomes at intermediate distance range.<sup>23–27</sup> Visual function in patients affected by cataract has been traditionally assessed using visual acuity instruments. However, these measures do not reflect the major effects that cataract have in vision-related quality of life, caused mostly by difficulty in performing daily and meaningful tasks.<sup>40</sup> Some researchers have evidenced how self-reported measures of vision-related quality of life can be helpful to assess the subjective wellbeing and visual disability of patients when they perform common activities in daily life<sup>41</sup> and hence, several questionnaires examining vision-related quality of life have been developed with research purposes.<sup>42,43</sup> Two of the questionnaires mostly used with this aim are the National Eye Institute Visual Functioning Questionnaire-25 (NEI VFQ-25)<sup>44</sup> designed to assess quality of life in patients with visual problems, and the Visual Function Index-14 (VF-14) designed to measure functional impairment on patients due to cataract and largely used in the Spanish population.<sup>45</sup> However, several researchers<sup>46,47</sup> have reported problems with the utilization of both instruments, such as measurement redundancies and measurement voids, suggesting a low ability to differentiate among participants with higher levels of visual function, and concluding that neither the NEI VFQ-25 nor VF-14 is optimal for the assessment of vision-related quality of life in patients with cataract surgery.<sup>29</sup> During last years, researchers have also focused their efforts on the development of cataract patient-reported outcome measures with enough characteristics in terms of brevity, precision, and responsiveness to be used in clinical practice.<sup>48</sup> Among them, the Catquest-9SF<sup>49,50</sup> and the most recent CAT-PROM<sup>34</sup> have shown to be short, psychometrically robust instruments. Both have been validated in English-speaking contexts and Catquest-9F has also been validated in other languages including Spanish.<sup>51,52</sup> The use of qualitative research to establish the basis of task-based content for patient-reported outcomes of visual function have been explored previously by other researchers<sup>36</sup> who identified several gaps in task content and distance-specific constructs associated with visual function, including the lack of scales to assess visual tasks for the intermediate visual range, as well as to assess the use of technological devices, and the fact that there were only found two measures to assess ambulatory accident risks.

## Strengths and Limitations of the Study

Our study has several limitations. First, the COVID-19 pandemic has dramatically affected the development of the study. Recruitment and availability of patients was compromised by successive outbreaks, and the final round of interviews had to be completed by phone. This is an important point to consider when it comes to interpreting the results. Secondly, the relevance of tasks and activities highlighted by patients may be considered with caution due to the diversity of profiles, the specific pandemic context, and the fact that the sample was limited, and thus socio-demographic characteristics of the participants (sex, age, educational level) may influence the kind of tasks or activities reported. For example, six of the seven patients in the waiting list group included in the study were women, and due to the generational context, examples of activities mentioned may be subjected to bias. Otherwise, the educational level achieved by participants may also influence the type of activities performed. Previous research has suggested the use of Ecological Event Monitoring methodology to identify routine tasks, which may be affected by poor vision, as well as keeping a daily event register of specific difficulties.<sup>53</sup> Data collection and analysis were performed along six months (June 16th, 2020-December 28th, 2020) for several reasons. First, the epidemiological context due to the COVID-19 pandemic conditioned the possibility of doing interviews with patients. Second, fear of infection and workload of the clinical staff influenced the recruitment. Third, interviews with patients from Group 2 were conditioned to the availability of enhanced IOL. However, we believe that the results of our qualitative research provide rich and detailed information about the importance and meaningfulness of daily tasks influencing several domains of life. In particular, we point to the tasks performed in the intermediate visual range as potential items to consider when designing instruments to improve vision-related quality of life. Moreover, our findings provide support for the inclusion of technology tasks and task safety content in future measures of cataract patient-reported outcomes. Further research is required to examine the relationships between the visual distances required for task performance and their associations with established clinical measures of visual acuity and vision-related quality of life.

## Conclusion

Our exploratory qualitative study found that patients after cataract surgery with an enhanced IOL reported a better performance of activities that require the intermediate visual range. Further research aimed to develop scales assessing vision-related quality of life in these visual ranges should prioritize outcomes according to patients' daily and meaningful activities. In particular, our findings provide support for the inclusion of technology tasks and task safety content in future measures of cataract patient-reported outcomes.

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## Disclosure

Dr Ignacio Salvador-Miras reports personal fees from Johnson and Johnson Vision, outside the submitted work; Dr. Sergi Blancafort Alias and Dr Antoni Salvà Casanovas report grants from Johnson and Johnson Vision Surgical, during the conduct of the study. The authors declare no other conflicts of interest in this work.

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