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The Immediate and Long-Term Impact of Free Glasses Clinics in the Los Angeles Area

Anna Heur[1] and Cindi Yim[#]

[1]La Canada High School, La Canada Flintridge, CA, USA
[#]Advisor

ABSTRACT

While glasses are essential to proper vision for millions, more than 250,000 Los Angeles residents in need of glasses have failed to obtain them. To combat this issue, three free glasses clinics utilizing donated glasses were implemented at Los Angeles County + University of Southern California Medical Center (LAC+USC) from November 2021 to March 2022. The objective of this study was to determine the impact of free glasses on patients. Patients who received free glasses completed primary surveys, which determined the cause behind the inaccessibility to glasses and the difficulty of life without glasses. Secondary surveys were conducted 90 days (Group 1), 150 days (Group 2), or 210 days (Group 3) after the clinic to determine the longer-term impact of free glasses. Of the 320 respondents, cost prevented 68% of patients from obtaining glasses, and patients' daily activities without glasses were significantly harder as a result (difficulty of 3.63 out of 5). Upon receiving glasses, patients reported an improvement of 4.51 out of 5 in vision. After the allotted period, 83% of Group 1, 69% of Group 2, and 65% of Group 3 reported continue glasses use. Across all three groups, patients reported an improvement of 4.72 out of 5 in improvement of daily activities. While donated glasses did not always match patients' prescriptions exactly, they increased ease of basic tasks (reading, walking and driving) for patients. This model could be adopted in hospitals serving patient populations where cost is a barrier.

Introduction

Uncorrected refractive error is the leading cause of visual impairment globally [1], an issue that can be addressed with a pair of glasses. There are a multitude of barriers barring people from accessing glasses, including out-of-pocket expenses and limited access to eye care [2]. Especially susceptible to these barriers are those who face more socioeconomic barriers [3], as an average pair of new prescription glasses costs $200 [4]. The objective of this study was to eliminate these barriers via free glasses distribution and determine whether they would adequately address the basic needs of those suffering from refractive error.

While free glasses were offered to all Los Angeles residents, most participants were also patients of Los Angeles County + University of Southern California Medical Center (LAC+USC) medical center. Sixty-five percent of the hospital's patient population are of Hispanic ethnicity [5]. The median income of Hispanic households was $55,321 in 2020, compared to the $67,521 median income of all US citizens [6]. Additionally, 17% of the Hispanic population was under the poverty line in 2020, based on the 2020 US census [6].

Within the Los Angeles County Department of Health Services, 23% of patients were unsured, 65% were covered by Medi-Cal, 6% were covered by Medicare, and 6% were covered by third party groups [5]. As of 2020, Medi-Cal beneficiaries can get one pair of free glasses every 24 months [7]. However, glasses may break, prescriptions may change, or the patient may want a back-up pair during that timeframe. Patients under Medicare have spotty glasses coverage and uninsured patients that must pay for glasses out of pocket.

Previous studies [8,9] have determined the impact of free glasses on students using the participant's prescription, with glasses production costs covered by the study. While a positive correlation was shown between glasses use

and academic performance [8], the application of this model presents a barrier for those who can't afford to obtain new glasses made for their prescription. The use of donated glasses in this study makes glasses distribution more widely applicable and accessible.

A previous pilot study [10] has also assessed the immediate impact of free donated glasses clinic on 30 Los Angeles residents. Most patients (70%) indicated that cost was the most prevalent barrier. After receiving glasses, patients experienced an improvement in ease of daily activities (3.96 out of 5). After 30 days, patients were asked about their experience wearing the glasses. Patients reported a wear frequency of 3.81 out of 5, yet it is not known if this rate dropped after 30 days, as the study did not track the impact of glasses beyond 30 days after receiving them from the clinic. This study aims to address the gap in the literature on the long-term impact of receiving free donated glasses on a low-income population.

Methods

Pre-Clinic Methodology

Glasses collection boxes were dispersed in local businesses and schools three months before the first glasses clinic in order to establish a stock of at least 500 pairs of glasses. Before each glasses clinic, donated glasses were collected from collection boxes and sanitized. The prescription of each pair was measured with a Nidek Automatic Lensometer. To catalog the glasses, a database was built using WordPress software and the BeRocket search plugin. This allowed for the simultaneous search of the sphere, cylinder, and axis modalities of the donated glasses stock. This algorithm matches a patient's unique prescription with the closest donated pair. The database is available on any cellular device, increasing accessibility among providers. The glasses and their corresponding prescriptions were cataloged into this database for future reference.

Primary Survey Methodology

Free glasses were offered to Los Angeles residents over the age of 18, regardless of socioeconomic status at three separate free glasses clinics between November 2021 and March 2022 in front of LAC+USC Medical Center. To ensure glasses remained free for patients, glasses were not created using a patient's unique prescription; rather, patients were fitted with donated glasses. Because there are 80.6 million possible prescriptions, donated glasses do not always match a patient's prescription exactly. At most, patients were given a pair of glasses within half a diopter (+0.50 or -0.50) of their prescription. Patients were required to bring their glasses prescription in order to search the database.

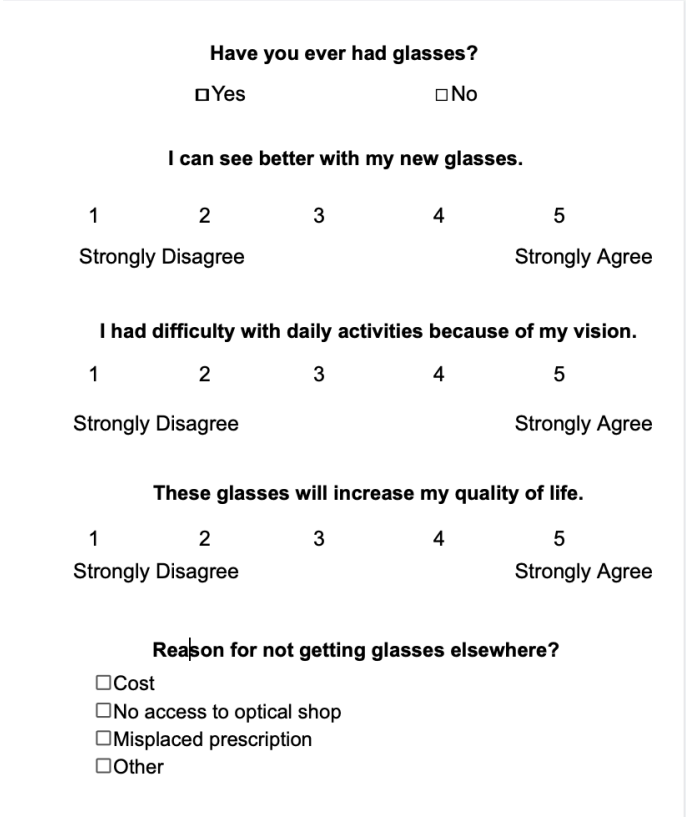

Figure 1. Primary Survey.

If a close or matching pair was found and deemed satisfactory by patients after trying them on, patients were given a survey (fig 1) immediately after receiving the glasses. The purpose of the primary survey was to determine the root cause behind the inaccessibility of glasses and the immediate impact of the glasses. Patients were surveyed based on convenience sampling and the sample size was determined by the number of patients who agreed to take the primary survey. In the survey, patients were asked if they had ever worn glasses before. The Likert scale was used to measure improvement in vision, difficulty prior to the glasses clinic, and perceived increase in quality of life. Patients selected the reason for not obtaining glasses elsewhere from a predetermined list. All questions were verified by a previous free glasses clinic study [10].

Patients had the option to opt into a secondary survey after completing the primary survey. Patients were not required to opt into the follow up survey or complete the immediate survey in order to receive free glasses. Surveying methods adhered to the Declaration of Helsinki and no sensitive patient information was collected throughout the surveying process. The purpose and implications of the survey were explained to patients and surveys were dispensed after signed consent was obtained.

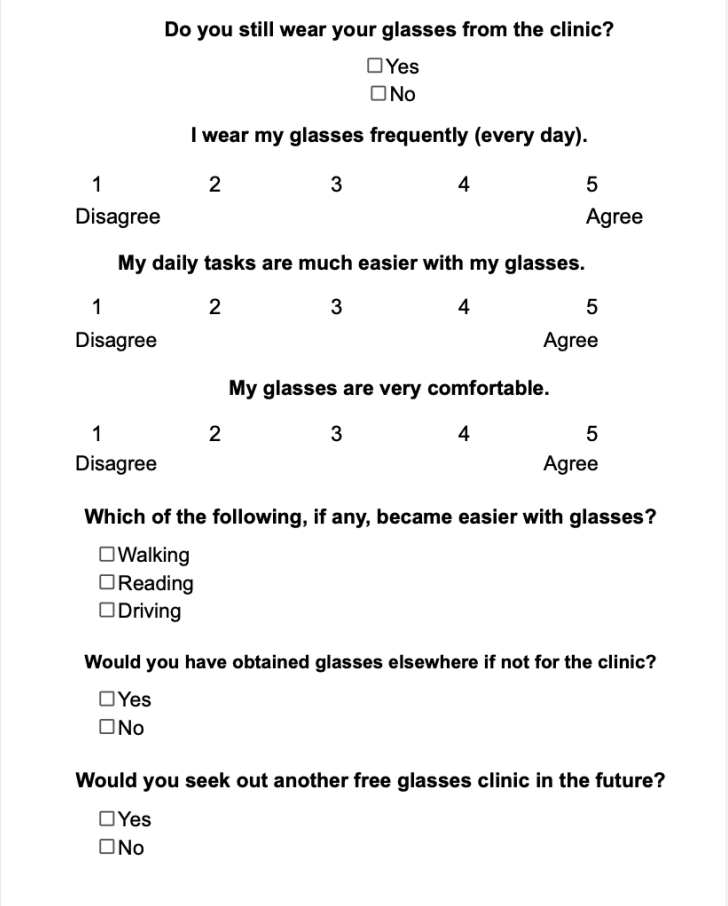

Figure 2. Secondary (Follow-Up) Survey

Secondary (Follow-Up) Survey Methodology

Patients who attended the 3/12/22 clinic and opted into the follow-up survey represented Group 1, patients who attended the 1/18/22 clinic and opted in represented Group 2, and patients who attended the 11/23/21 clinic and opted in represented Group 3. Group 1 continued glasses use for 90 days, Group 2 continued use for 150 days, and Group 3 continued use for 210 days. Secondary surveys (fig 2) were administered over the phone on 6/10/22 (Group 1), 6/17/22 (Group 2), and 6/11/22 (Group 3). The purpose of the secondary surveys as to determine the longer-term impact of glasses over multiple time intervals. Patients were first asked whether they still were wearing their glasses. The Likert scale was used to estimate the frequency of glasses wear, improvement in ease of daily activities, and comfort of glasses. To report what activities were easier, patients were asked yes or no questions about which activities were aided by glasses. If patients discontinued glasses use prior to the secondary survey, they were asked an open-ended question to determine why.

Data Analysis

Once data was collected, descriptive statistics, including the average and standard deviation of each characteristic were calculated. Characteristics analyzed from the primary survey included difficulty of tasks prior to glasses, immediate improvement of vision, and perceived increase in quality of life. Characteristics analyzed from the secondary

survey included frequency of wear, improvement in completion of daily tasks, and comfort. Graphs were created using Excel.

Patients received glasses as an extension of normal optometry checkup routine, as optometrists and ophthalmologists would refer patients to the clinic for free glasses after their appointment. The County of Los Angeles Department of Public Health IRB does not require IRB approval, exemption, or application for studies that are part of routine clinical care.

Results

Primary Survey Results

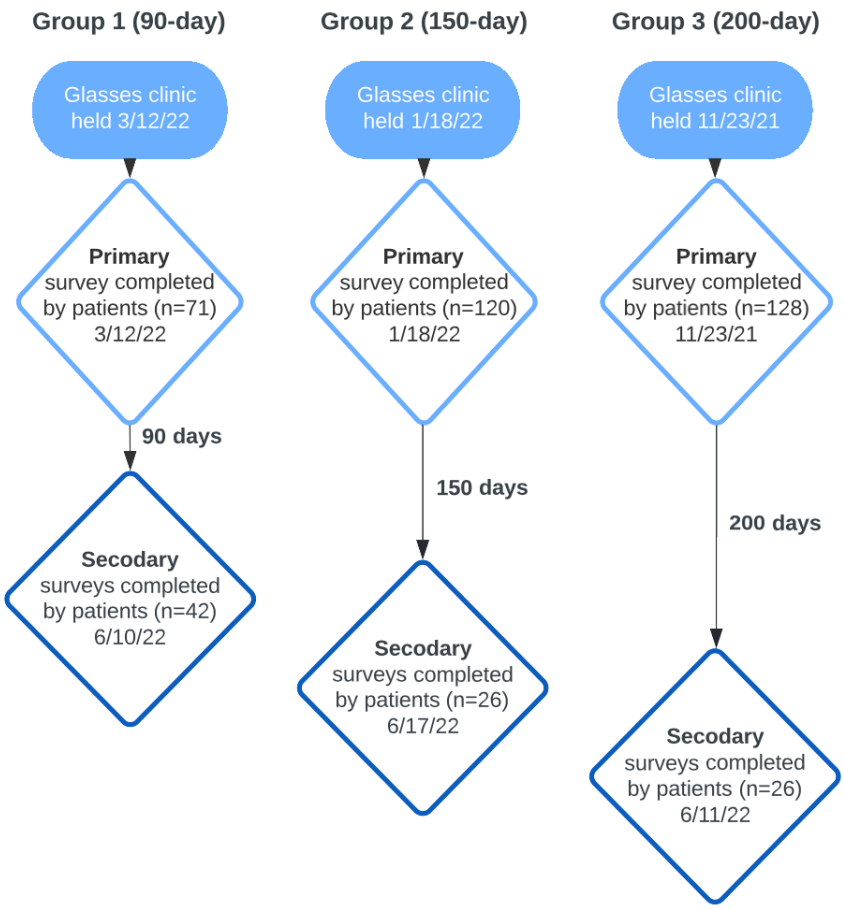

Figure 3. Clinic and Survey Sequence.

Seventy-two respondents from the clinic on November 23rd, 120 respondents from the clinic on January 18th, and 128 respondents from the clinic on March 12th completed primary surveys (fig 3).

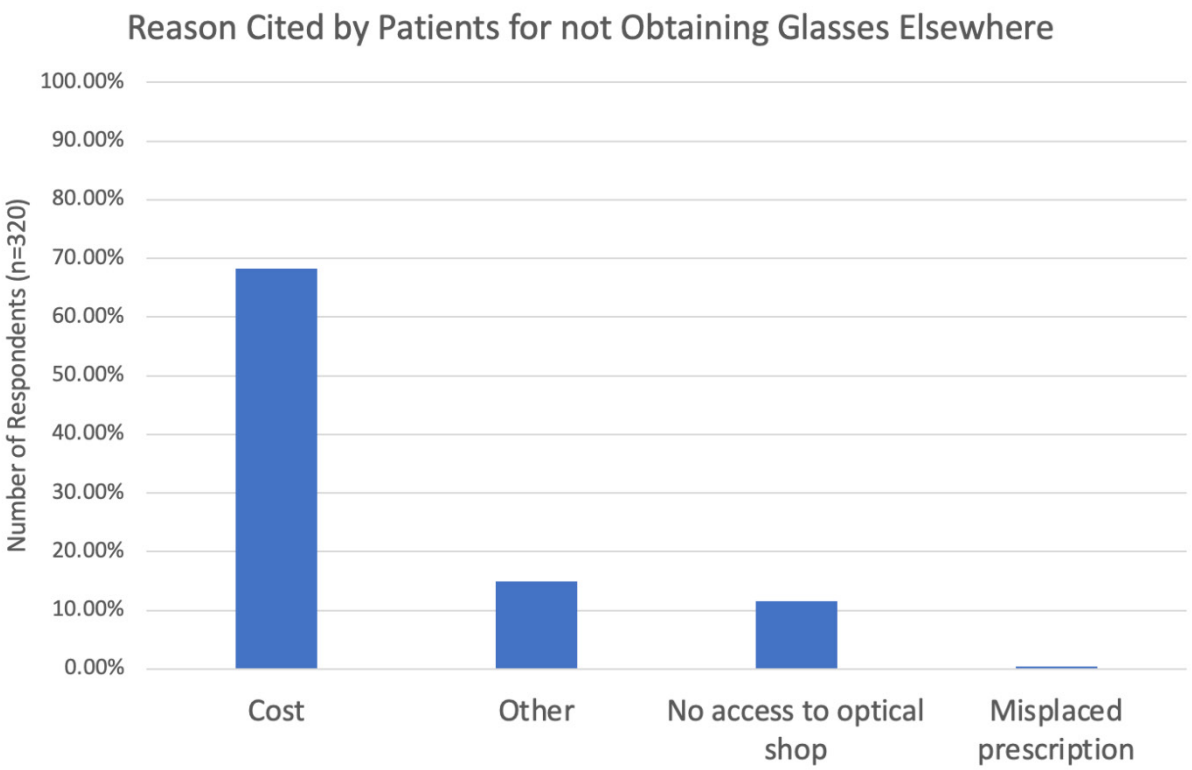

Figure 4. Reason Cited by Patients for not Obtaining Glasses Elsewhere.

Table 1. Primary survey results

Characteristic	**Average (SD)**	**Number of Respondents (90-day, 150-day, 210-day)**
Difficulty of completing daily tasks before glasses clinics (scale of 1-5, 5 being most difficulty)	3.63 (1.31)	320
Immediate improvement of vision after receiving glasses (scale of 1-5, 5 being most improvement)	4.51 (0.84)	320
Perceived increase in quality of life after receiving glasses (scale of 1-5, 5 being most improvement)	4.55 (0.84)	320

Out of the whole sample, 29.4% (92/320) had never worn glasses prior to the glasses clinic. Patients reported an average difficulty of 3.63 out of 5 when completing daily tasks prior to receiving glasses, as displayed in Table 1. Patients had an immediate improvement of 4.51 out of 5 in vision after receiving glasses. After receiving glasses, patients perceived an improvement of 4.55 out of 5 in quality of life 5. Lastly, 68% (218/320) of patients indicated that cost was the primary barrier preventing them from obtaining glasses (fig 4).

Secondary Survey Results

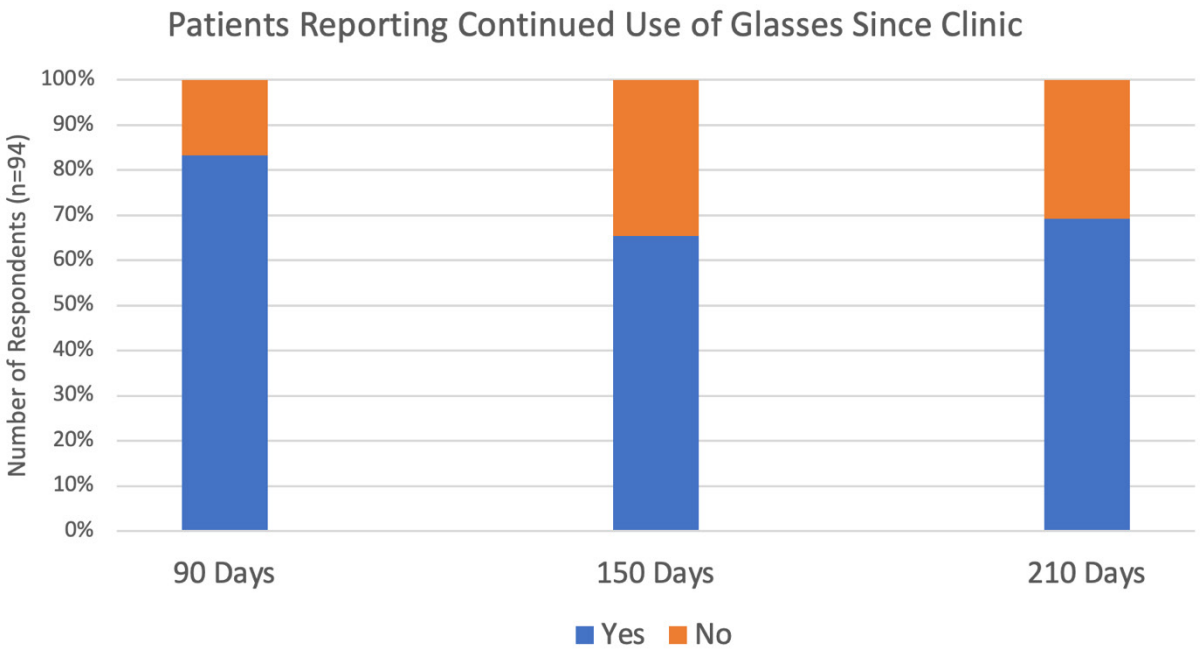

Figure 5. Patients Reporting Continued Use of Glasses Since Clinic.

Of primary survey respondents, 29.4% (94 respondents) opted into the follow up survey after the allotted amount of time. Group 1 was comprised of 42 respondents, Group 2 of 26 respondents, and Group 3 of 26 respondents (fig. 3). Notably, the 210-day and 150-day groups showed similar continued glasses use rates (fig 5). Sixty-five percent of the 210-day group (17/26) and 69% of the 150-day group (18/26) still wore their glasses at the time of the secondary survey. The highest continued use rate came from the 90-day group, with 83% (35/42) still wearing the glasses.

Table 2. Secondary Survey Results

Characteristic	**Average (SD)**	**Number of Respondents (90-day, 150-day, and 210-day patients who still wore glasses)**
Frequency of glasses wear (scale of 1-5, 5 being every day)	4.49 (0.81)	70
Improvement in ease of daily task completion (scale of 1-5, 5 being most improvement)	4.57 (0.80)	70
Comfort of glasses (scale of 1-5, 5 being most comfortable)	4.26 (1.16)	70

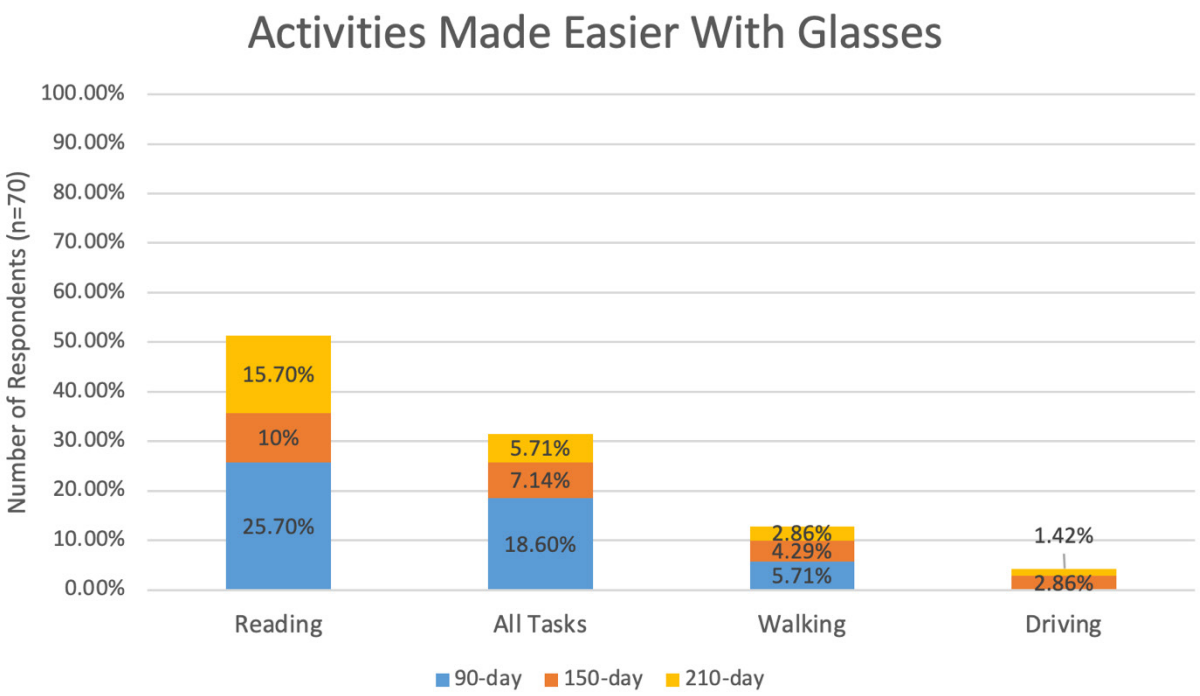

Figure 6. Activities Made Easier with Glasses.

Only respondents who still used glasses at the time of the secondary survey were asked to rate characteristics in Table 2 and Figure 6. Results displayed include all three glasses clinics, as these characteristics were independent of length of time since the glasses clinic. Respondents had a wear frequency of 4.38 out of 5, with 5 representing everyday use and 1 representing no use. Patients had experienced an improvement of 4.72 out of 5 in ease of daily task completion. Such tasks (fig 6) included reading, as indicated by 51.4% of respondents (36/70); walking, as indicated by 12.9% of respondents (9/70); driving, as indicated by 4.28% of respondents (3/70); and all three tasks, as indicated by 31.5% of respondents (22/70). While wearing glasses, patients rated the comfort of the glasses a 4.39 out of 5.

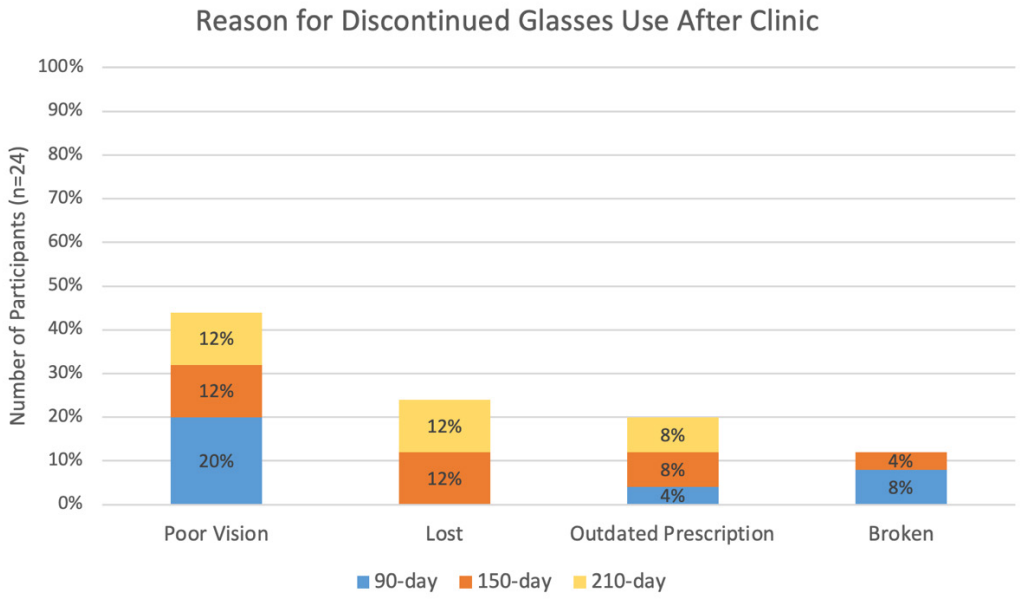

Figure 7. Reason Cited by Patients for Discontinued Use of Glasses After the Clinic.

Of follow-up patients, 25.5% (24/94) reported discontinued use of glasses across all three clinics. 44.0% of patients discontinued use of glasses due to poor vision, 24.0% due to lost glasses, 20.8% due to the patient bringing an outdated prescription to the glasses clinic, and 12.0% due to frame breakage (fig 7).

If not for the free glasses clinic, 59.6% (56/94) patients would not have obtained glasses. In the future, 97.8% (92/94) of patients would seek out the free glasses services again.

Discussion

The free glasses clinics were shown to be impactful on the immediate and long-term lives of patients. Patients' moderate difficulty of living without glasses combined with the barrier of cost affirmed the need for free glasses. In the primary survey, patients reported highly improved vision using the pairs of donated glasses found using the database search algorithm. Thus, the search algorithm sufficiently matched patients' prescriptions with donated glasses.

Though immediate improvement in vision was rated higher than difficulty of life before receiving glasses, perceived improvement in quality of life was rated the highest of the three characteristics. A possible explanation for this is that patients who had never worn glasses or hadn't worn them recently may have become accustomed to poor vision, artificially deflating their perceived difficulty of life. The lower pre-clinic difficulty rate may pertain solely to simple daily tasks including walking, reading, and driving, also possibly deflating perceived difficulty of life. An increase in vision also increases the ability to more easily perform these basic tasks and therefore facilitates a general increase in independence. While most patients had glasses before the clinic, they also exhibited moderate difficulty prior to visiting the glasses clinic. Additionally, the percentage of patients who would not have otherwise obtained glasses was about 30% higher than the percentage of those who had never worn glasses before. Thus, having glasses prior to the clinic did not determine need for free glasses. The high rate of improvement in ease of activities afterwards shows positive impact, regardless of prior glasses wear.

While the 90-day post clinic group had the highest continued glasses use rate, the rate remained similar between the 150-day post clinic and 210-day post clinic groups, suggesting the rate levels out to approximately 65% after 90 days. Thus, greater time elapsed after clinic doesn't seem to have a large effect on usage.

Of the 24 patients who reported discontinued use across all three clinics, most patients cited poor vision or frame breakage as the reason. This presents the drawback of the distribution of donated glasses. Due to the vast number of prescriptions and low chances of perfectly matching a patient's prescription, patients may be dissatisfied with their vision. This problem is compounded on the rare occasion a patient has an uncommon prescription a spherical error greater than +5.00 or less than -5.00, according to the American Optometric Association [11]. In addition, donated glasses may be fragile and prone to breakage. These challenges, however, are most directly addressed by having a sizable stock of donated glasses (~3,000 pairs), when there is a wider range of prescriptions. An even larger stock of available glasses and higher quality control would minimize these challenges further.

While the discontinuation of wear due to patients bringing outdated prescriptions to the clinic does not discredit the viability of donated glasses clinics, patients should be encouraged to get fitted for a new prescription every two years [12] to prevent this problem. Ideally, their most recent prescription is used find a donated pair with a similar prescription. Notably, only patients from the 150-day and 210-day groups lost glasses. The number of patients who cite this reason for discontinued use can be minimized by holding glasses clinics multiple times throughout the year.

The vast majority indicated they would seek out the free glasses clinic again. Overall, donated glasses present a cost efficient and widely applicable way to distribute free glasses.

Conclusion

The objective of this study was to measure the impact of free glasses on patients' lives. Free glasses, and more specifically, the distribution of donated glasses, were shown to increase the general quality of patients' lives. Patients displayed a need for free glasses due to the high cost of a pair of glasses and their moderate difficulty of living with decreased vision. In the short term, patients' vision immediately improved and they perceived a high increase in quality of life. The positive impact was further proven by the staggered follow up of the three groups that give further insight into the longer-term effects of free glasses. The high continued glasses use rate and improvement in ease of activities showed donated glasses could have a positive longer-term impact. Between the three follow-up groups, the continued use rate remained stable. On the other hand, the patients who stopped wearing glasses present the weaknesses of distributing donated glasses. However, these weaknesses can be addressed by having a large stock of donated glasses and holding glasses clinics frequently. Patients had a largely positive experience with the glasses clinics, as the vast majority indicated they would seek out the clinic again. Overall, this donated glasses model merits minimal expenses by eliminating glasses manufacturing costs. Because donated glasses also improve the life of patients in the short and long term, free glasses clinics present a promising way to distribute glasses.

With the relative success of the Los Angeles based clinic and prior free glasses clinics, it would be beneficial for other glasses clinics to serve similar populations in different areas. Other hospitals may wish to start similar glasses clinics by collecting glasses, measuring them using a lensometer, cataloging them in a database, and holding bimonthly glasses clinics in areas where cost is a barrier preventing patients from obtaining glasses.

Limitations

There is a potential selection bias in the surveys, as not all patients who received free glasses also took the primary survey. In many cases, this was due to patients walking away before they were notified to take the survey, but it's not known if opting into the study was differential to any variables. Further, only 29.4% (94/320) out of the group of 320 opted into the secondary survey, which limits the accuracy of the longer-term results (frequency of wear, improvement in ease of daily tasks, comfort) of the study. Additionally, patients could only be contacted once after the glasses clinics. The follow up results of the 90-day, 150-day, or 210-day groups may not represent the experience of other patients in the other two groups at the same time points. Patient insurance and income information was also not collected, meaning assumptions about this patient data was based on general hospital demographic data. Lastly, patients who had never worn glasses before could not compare vision with donated glasses to that of a pair of glasses made specifically for their prescription, which may have led to artificially elevated improvement in vision averages.

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