Title of the paper

Social Media Use and Vision Impairment in Adults between the Ages of 18 to 35 Years in India: Enablers and Barriers

Short title

Social Media Use and Vision Impairment

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INTRODUCTION

Social media use is popular with an estimated 4.48 billion people using it in one form or the other.[1] Social media ‘*’are Internet-based channels that allow users to opportunistically interact and selectively self-present, either in real-time or asynchronously, with both broad and narrow audiences who derive value from user-generated content and the perception of interaction with others*’’.[2] There are several types of social media with the most popular channels being networking sites (e.g. Facebook) and communication platforms (e.g. WhatsApp). Previous studies have demonstrated the positive impact of social media on the overall quality of life of adults in the general population. For example, using Facebook has been associated with increased self-esteem,[3] improved social support,[4,5] and life satisfaction.[6] However, studies have also highlighted the adverse impact of social media such as social pressure and stress. [7,8]

Although there is widespread use of social media in the general population, some groups may struggle to use social media due to their disabilities.[9] This could be particularly problematic for the 2.2 billion people globally with a vision impairment because the use of social media happens predominantly through electronic devices such as smartphones and tablet computers;[10] some individuals with vision impairment may not have access to these devices.[11] Access issues could be as a result of financial barriers brought about by higher unemployment in vision impaired individuals [12], level of vision impairment, the accessibility functions of the device [13], and the screen size of the device. Previous researchers have shown that people with vision impairment use social media despite accessibility issues.[14,15] This is largely as a result of in-built accessibility options such as text-to speech, screen readers and written descriptions of photo content which can be read aloud via text-to-speech allowing even those with very poor levels of vision to access content via audio description.

Several previous studies have investigated platform accessibility or the use of specific platforms such as Facebook[15,16] but very few have investigated which social media platforms individuals with vision impairment use, what they use these platforms for, and the benefits of

social media use for this group of people.[17,18] More importantly, a majority of studies have been conducted in high income countries and very few have been conducted in lower- and middle-income countries, such as India.[17,18] In addition, studies carried out in lower- and middle-income countries are limited by their sample size.[15,19] With rapid improvements in technology, it is important to update the literature on social media use in adults with vision impairment. Although some studies have compared social media use in adults with vision impairment to findings from the general population,[19,20] no studies have addressed the comparison of social media use among adults with vision impairment and age-matched groups with normal vision from a similar environment.

Understanding social media use among individuals with vision impairment is important given the potential benefits offered by social media such as improved wellbeing,[21] and life satisfaction all of which can be impacted for individuals with vision impairment. [6,22-24] Thus, data on social media use in individuals with vision impairment in India was gathered as part of a larger cross-sectional study investigating the effects of social media and social networks on loneliness in adults between the ages of 18 to 35 years with vision impairment. Loneliness may be a concern for individuals with vision impairment, as vision is an important sensory modality for interpersonal interactions and social communication. In this report, we present the demographic profile and patterns of social media use among adults with vision impairment aged 18 to 35 years and compare it to an age-matched normally sighted group. In addition, we explored the barriers to use of social media among adults with vision impairment. We envisage that the results from this study will contribute to a more accurate understanding of the use of social media in individuals with vision impairment.

METHODS

Included participants were adults aged 18 to 35 years with vision impairment, users and non-users of social media, and were able to converse in English or one of the local languages (Hindi, Telugu). Participants with known additional disability (such as hearing, motor,

intellectual) were excluded. In addition, we recruited age-matched normally sighted healthy peers (self-reported normal vision) in the control group. Individuals with vision impairment were recruited from the Institute for Vision Rehabilitation at the L V Prasad Eye Institute (LVPEI), Hyderabad, India. The centre provides multidisciplinary care for individuals with vision impairment. Age and gender matched participants with normal vision (control group) were recruited from the caregiver population attending the Institute for Vision Rehabilitation along with individuals with vision impairment and from the staff at LVPEI.

The study was approved by the Institutional Review Board at the LVPEI, Hyderabad, India, and the research adhered to the tenets of the Declaration of Helsinki. Written informed consent was obtained from all participants. Participants answered a questionnaire which was produced in three languages (English, Hindi and Telugu) to make it as inclusive as possible to the potential recruitment pool. The questionnaire was developed by the research team after reviewing the literature and in consultation with a visually impaired service user who regularly used social media. A pilot version of the questionnaire was trialled on six representative participants and minor changes (in wording) were suggested that were incorporated into the final version. The questionnaire could either be completed by the participants themselves (normally sighted group) or with the help of a research assistant who read the questionnaire out aloud and recorded responses (vision impairment group). The administration of the questionnaire took about thirty minutes. The questionnaire data was collected between August 2021 to November 2021.

The initial part of the questionnaire collected demographic data such as age, educational level, employment status, and duration of vision loss (only applicable to the vision impairment group). Following on participants were asked which electronic devices they owned, for example, a computer and whether they had access to the internet. Participant's use of social media platforms was then examined. They were asked which social media platforms they used and how often they used them for, for example, once a day. To qualify as a non-user of social media participants had to answer 'None' to all 4 questions which enquired about the use of

various social media platforms. Where applicable, participants were also asked how long they spent on these platforms daily, for example, less than 30 minutes and what they used them for, for example, obtaining information. Finally, they were asked about barriers to using social media, for example, costs associated with data usage. This question applied to all users even if they did not use social media. A copy of the questionnaire (Appendix 1) is available at http:/links.lww.com/OPX/.

It should be noted that the term accessibility as used in our study relates to individuals being able to visually access the content of social media or access to internet/Wireless-Fidelity (Wi-Fi)/devices. It does not refer to access related to psychosocial factors, such as depression, loneliness and isolation.

Statistical Analyses

All data was entered into an excel spreadsheet. Differences between the group with vision impairment and the normally sighted control group for users of social media, and between the two vision impairment groups (social media users; non-social media users) were explored using the independent t-test or Chi-square test. No formal statistics were carried out to check for differences between the groups that did not use social media as the numbers were small particularly in the normally sighted group (vision impairment =39; normally sighted=4). Statistical significance was set at $P<.05$.

RESULTS

Demographic data

In total, 422 individuals (201 visually impaired; 221 normally sighted) participated, of whom 379 (89.8%) used social media (162 visually impaired; 217 normally sighted). Participant characteristics and social media usage are listed in Table 1. No statistically significant differences were found the two groups who were social media users in terms of their age (vision impairment group= 24.5 ± 4.89, control group 25.2 -± 4.67; $P=.16$), socioeconomic status ($P=.47$), or educational qualifications ($P=.17$) Social media users with vision

impairment were less likely to be in employment (n=93; 57% unemployment) when compared to the control group (n=58; 27% unemployment) (*P*<.001). Interestingly in the vision impairment group that were not social media users, the unemployment rate was lower (n=12; 30.7% unemployment).

Normally sighted individuals (n=217; 98%) were more likely to be social media users when compared to individuals with vision impairment (n=162; 80.6%) (*P*<.01). Gender differences in social media use were also found, but only for the group with vision impairment. There was a male preponderance in the visually impaired social media user group (n=137; 85%). However, there was no such difference in the control group (n=109 male; 50% and n=108 female; 50%). Also, there were no gender differences between the visually impaired individuals (54% male; 46% female) and control group (50% male; 50% female) who were not social media users.

The duration of sight loss in the groups with vision impairment (social media user and non-social media user) ranged from less than one year to greater than ten years. Approximately half of each group had vision impairment since childhood and no significant differences were found between the two groups (*P*=.33). The level of vision impairment in these groups ranged from mild to profound loss. Significant differences were found in visual status between the vision impairment group that were social media users and those who were not (*P*<.001). Figure 2 shows the distribution of the level of vision impairment among social media users and non-users. As can be seen from the figure, social media users were more likely to have moderate vision impairment. By comparison, non-users were more likely to have severe or profound vision impairment.

Individuals in both social media user groups had access to a variety of technology including desktop and laptop computers. Smartphones were the most popular device used (vision impairment = 161; 99%; control= 206; 95%) with tablet PC/iPad being the least popular (vision impairment = 5; 3%; control= 12; 6%). No significant differences were found between device usage in both groups (*P*=.55), however, the control group was more likely to own multiple

devices (two or more; *P*=.009). Although formal analysis was not conducted about device usage on the groups that were not social media users, it was interesting to note that all controls had access to some form of technology, 38.5% of individuals with vision impairment had no access to technology.

Social media users had access to either Wi-Fi at work or at home or both or 3G/4G internet and no significant difference in access were found between these groups (*P*=.79).

No significant differences were found between the frequency (*P*=.24), duration (*P*=.38) and reasons (*P*=.34) for using these platforms. Nearly 80% of all individuals across both groups used these platforms either between 2-5 times/day or greater than 5 times/day. The duration of use varied with one-third of participants across both groups spending between 30-60 minutes/day, whilst the other third spent greater than 2 hours/day.

Barriers to use of social media

Approximately one-third of individuals across both groups who used social media reported barriers to use (vision impairment =48, 29.6%; control=74, 34%) and this was statistically significant between the groups (*P*<.001). Individuals with vision impairment were more likely to cite accessibility issues of having to rely on audio rather than vision to navigate social media, whereas the control group were more likely to report having to share a phone with another family member (Figure 1).

Social Networking and video/photo sharing platform

Table 2 presents the usage of social networking and video/photo-sharing platform by the visually impaired and normally sighted group. No significant differences were found either in networking (*P*=.15) or video/photo sharing (*P*=.17) platform usage between the two groups. Facebook was the most commonly used networking platform (vision impairment = 133; 82%; control= 131; 60%) followed by Twitter (vision impairment = 35; 22%; control= 53; 24%). YouTube was the most commonly used media/video/photo sharing platform (vision impairment = 161; 99%; control= 203; 94%) followed by Instagram (vision impairment = 109;

67%; control= 134; 62%). Across both groups a majority of individuals (greater than 80%) used these platforms to watch videos or movies. The second most common reason for using these platforms (approximately 65%) was to obtain information. Individuals were less likely to use these platforms for dating or peer support.

Social media communication platform usage

Table 3 presents the usage of social media (communication platform) by the visually impaired and normally sighted group. Statistically significant differences were found between the communication platform usage (*P*=.001) between the groups. Although the majority in both groups used WhatsApp (97% or greater) to communicate, the differences were largely due to other platforms that were also used in conjunction with WhatsApp. Vision impaired individuals were more likely to use Google hangouts (vision impairment = 44; 27%; control= 39; 18 %), whereas the control group were more likely to use Zoom (vision impairment = 51; 31%; control= 99; 46%). No significant differences were also found in the reasons for using communication platforms (*P*=.99). Unsurprisingly, a majority of individuals (85% or greater) across both the groups used these platforms to keep in touch with friends and family.

DISCUSSION

The current study reports on the profile of social media users among visually impaired adults aged 18 to 35 years in comparison to a normally sighted control group in India. To the best of the author's knowledge this is the first time that control groups have been used.

Findings are in line with previous research which found that there is good uptake of social media amongst users with vision impairment. In the current study, 81% of individuals with vision impairment used social media. Brady et al. found a higher proportion (92%) but their study was carried out in the United States and used a broader age range which may account for the differences.[14] Although the proportion of individuals with visual impairment using social media was high in the current study, it was still not as high as the normally sighted control group where almost everyone surveyed (98%) used social media. This proportion of usage is

187 substantially higher than the 33.4% reported for the general Indian population.[25] This is
188 unsurprising since India is a large country and there is likely to be significant variation across
189 the country. Our study sample was recruited from a large tertiary eye care centre and
190 consisted of caregivers of individuals with vision impairment and staff members working at the
191 institution. The findings suggest that there is still some ground to be covered before visually
192 impaired users reach the same level of social media penetration as their normally sighted
193 counterparts.

194 There were gender differences in social media use. Whilst no gender differences were found
195 for the control groups, there were substantially more males (85%) than females (15%) in the
196 visually impaired group that used social media. These findings are similar to those of Bashir
197 et al. whose study had 90% male participants.[19] However, the findings are in contrast to that
198 of Brady et al. whose study had more female survey respondents (56%).[14] The differences are
199 likely attributable to several factors: Firstly, the regional differences. While Brady et al's study
200 was carried out in the United States, the current study and that by Bashir et al were carried
201 out in the Indian subcontinent. Secondly, the source of participant recruitment. Our study
202 recruited visually impaired participants from a large tertiary eye centre and it is well established
203 that women are less likely to seek eye care than men,[26] and this may have resulted in a male
204 preponderance. Finally, the age group that was studied. Brady et al. recruited a wide age
205 range including adults over the age of 50, whereas we recruited adults aged 18-35 years and
206 Bashir et al. recruited university students.

207 There were some interesting findings regarding the employment status of participants with
208 vision impairment. Taken as a whole and combining groups, unsurprisingly, visually impaired
209 participants were less likely to be in employment when compared to their normally sighted
210 peers. This is in agreement with previous studies that have reported lower rates of
211 employment for vision impairment individuals compared to that of the general population. [12]
212 However, when individuals with vision impairment were separated into users and non-users
213 of social media, the number of unemployed visually impaired individuals in the non-user group

decreased to 30% which was similar to the 27% unemployment reported for the normally sighted group. Given that the non-user visually impaired group was small (n=39) it is difficult to understand why this might be the case; nonetheless, it was interesting to note that despite being in a working environment at least some individuals with vision impairment did not use any form of social media. Individuals with vision impairments who did not use social media were more likely to have a severe or profound vision impairment when compared to visually impaired individuals who used social media and were more likely to have a moderate vision impairment. Although social media accessibility has been improving issues remain, for example, in interpreting pictures and it is likely that as a result some individuals with vision impairment do not use social media. [27] Some of the reasons for not using social media included lack of access to Wi-Fi, 92% of visually impaired individuals did not have Wi-Fi; non-ownership of appropriate devices: 38% of visually impaired individuals did not own a device; 49% had a keypad phone which would be unsuitable for browsing the internet and 10% owned a smartphone but it is possible that screen size was a constraint limiting its use.

Both visually impaired individuals and normally sighted controls used social networking and video/photo sharing sites in a similar way. Similar to previous research, Facebook was the most popular networking site.[14] The use of Twitter varies across studies in the literature. For example, Brady et al found that 52% of their sample used Twitter, whereas Bashir et al found that only 2% of individuals used Twitter. In our study, 22% of visually impaired adults reported using Twitter. [14,19] The differences in the usage rates of specific platforms are likely as a result of differences in the populations and geographic regions studied, and the penetration of Twitter in these countries. Unsurprisingly, YouTube was the most commonly used photo/video sharing platform followed by Instagram. YouTube is considered to be the largest video platform in the world with over one billion viewers and across both groups a majority of individuals reported using these platforms either for obtaining information or for watching videos and movies. [28]

Some differences were found in the way in which individuals with vision impairment and normally sighted controls use social media communication platforms. Although WhatsApp which has a large market penetration in India was by far the most popular communication platform used across both groups with over 97% of individuals using the platform to communicate, differences were found in other platforms used. [29] Individuals with vision impairment were less likely to use Zoom but more likely to use Google hangouts. However, it should be noted that we did not collect data regarding the accessibility of individual platforms or devices, so it is difficult to know if the lack of use of particular platforms was due to issues of accessibility by the visually impaired group, Zoom has reduced functionality when available at no cost, whereas Google hangouts has full functionality (also available at no cost) and this may account for differences in popularity particularly as individuals with vision impairment are less likely to be employed and may find the latter more economical.

It is interesting to note from our study that individuals in the vision impairment group were not using any of the platforms for peer support, for inspiration, for dating, to meet new friends, or to find employment. Given this, it is difficult to know if they were using other means to obtain those goals or not, or if the platforms as currently designed are not able to provide visually impaired adults a means to obtain those goals.

Both groups cited barriers to using social media. The visually impaired group unsurprisingly were likely to cite accessibility barriers linked to using voice over to access social media. Interestingly, the normally sighted group cited device sharing as a barrier. Although this group was more likely to have multiple devices it would seem that at least some individuals had to share devices with others. A recent study highlighting the impact of COVID-19 on visually impaired children found that one of the barriers to device use was that families tended to share the device which meant that the device was not always available for use.[30] In the current study, only 1% of individuals with vision impairment mentioned device sharing as a barrier. Despite a significant level of unemployment in the visually impaired group cost was not cited as a barrier perhaps suggesting that individuals had other means of financial support.

There are some shortcomings. Firstly, the study did not recruit an equal number of subjects across all groups. This meant that statistical analysis was not performed on the groups that did not use social media in comparison to groups that did. Secondly, the sample was recruited from patients and their caregivers attending a single tertiary eyecare centre located in South India or staff working at the centre. Although this group is unlikely to be representative of the general population of India, LVPEI is a tertiary care referral centre and patients from all over the country access the services. Moreover, about 50% of the services are provided at no cost to those from economically underprivileged backgrounds so patients from different strata of the society avail the services making the sample relatively representative of the socioeconomic distribution across the population. Thirdly, we did not assess the traditional measurement properties of the survey instrument in terms of its internal consistency and test-retest reliability. However, we assessed the content (face) validity of the instrument and found it to be reliable given that the item generation included the views of an individual with long standing vision impairment who used the services of the Institute for Vision Rehabilitation at LVPEI and was an avid social media user. Lastly, our study investigated accessibility of social media in terms of only being able to visually access content and access to the internet/Wi-Fi and suitable devices. We did not investigate lack of access due to issues such as psychosocial factors (depression, loneliness and isolation), and the limited use of social media by peers who are also visually impaired, thereby making it less important for visually impaired individuals to socialize or communicate using social media. It will be important to differentiate between these factors in future studies.

In conclusion, young adults with vision impairment who were social media users were predominantly male, had moderate vision impairment and were less likely to be in employment as compared to a normally sighted control group. Both the visually impaired and normally sighted adults used WhatsApp as the most common communication platform, and Facebook followed by Twitter as the most commonly used networking platform. Those with vision impairment cited accessibility issues of having to rely on audio rather than vision to navigate

social media, whereas the control group reported the need to share a phone with another family member as the barrier to use of social media. Given some of the benefits of social media use, there is potentially a case to encourage more visually impaired individuals to use social media in addition to the industry continuously striving to make platforms more accessible.

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CONFLICTS OF INTEREST

There are no conflicts of interest

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Legend for Figures:

Figure 1. Distribution of barriers to use of social media among young and emerging adults with vision impairment and normally sighted control group.

Figure 2. Distribution of the levels of Vision Impairment among social media users and non-users

APPENDIX: Copy of the questionnaire administered to gather demographic and social media use data

Table 1 Demographic data collected for all groups (social media users: vision impaired and normally sighted; non-social media users: vision impaired and normally sighted).

	Social media user		Non social media user	
Variable, n (%)	**Vision Impaired**	**Normally Sighted**	**Vision Impaired**	**Normally Sighted**
Sight loss category	162 (81)	217 (98)	39 (19)	4 (2)
Gender, n (%)				
Male	137 (85)	109 (50)	18 (46)	2 (50)
Female	25 (15)	108 (50)	21 (54)	2 (50)
Age				
Mean Age +/- SD	24.5 ± 4.89	25.2 ± 4.67	26.9 ± 5.27	28.9 ± 4.04
Socio economic status n (%)				
Upper	32 (20)	36 (17)	2 (5)	1 (25)
Middle	83 (51)	106 (49)	9 (23)	2 (50)
Lower	47 (29)	75 (35)	28 (72)	1(25)
Education, n (%)				
No formal education	4 (2)	5 (2)	15 (38)	1 (25)
10th standard/GCSE equivalent	24 (15)	16 (7)	12 (31)	3 (75)
12th standard/A level equivalent	25 (15)	61 (28)	7 (18)	0 (0)
Higher qualifications	109 (67)	135 (62)	5 (13)	0(0)
Employment, n (%)				
Paid employment	69 (43)	159 (73)	27 (69)	3 (75)
Not in paid employment	93 (57)	58 (27)	12 (31)	1 (25)
Technology used, n (%)				
Desktop computer	36 (22)	63 (29)	1 (3)	0 (0)
Laptop computer	49 (30)	65 (30)	0 (0)	0 (0)
Smartphone	161 (99)	206 (95)	4 (10)	1 (25)
Tablet PC/ iPad	5 (3)	12 (6)	0 (0)	0 (0)
Keypad phone	1 (1)	2 (1)	19 (49)	3 (75)
Not using any technology	0 (0)	0 (0)	15 (38)	0 (0)
WiFi access, n (%)				
At home only	55 (34)	92 (42)	1 (3)	0 (0)
At work only	51 (31)	78 (36)	1 (3)	0 (0)
Both home and work	33 (20)	61 (28)	1 (3)	0 (0)
Neither at home or work	0 (0)	0 (0)	36 (92)	4 (100)
Internet, n (%)				
3G/4G	128 (79)	130 (60)	2 (5)	0 (0)

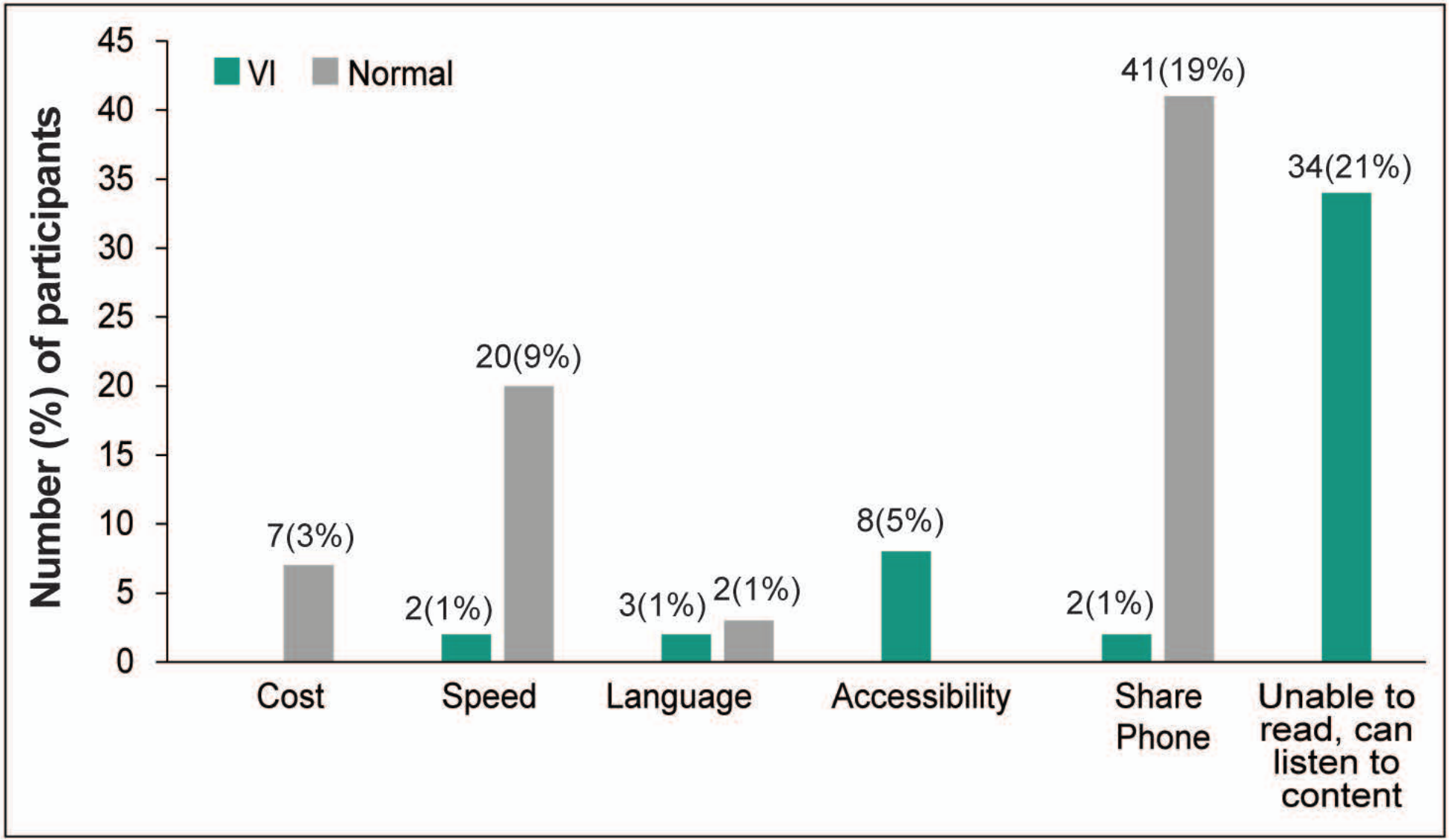
Some users used more than one piece of technology

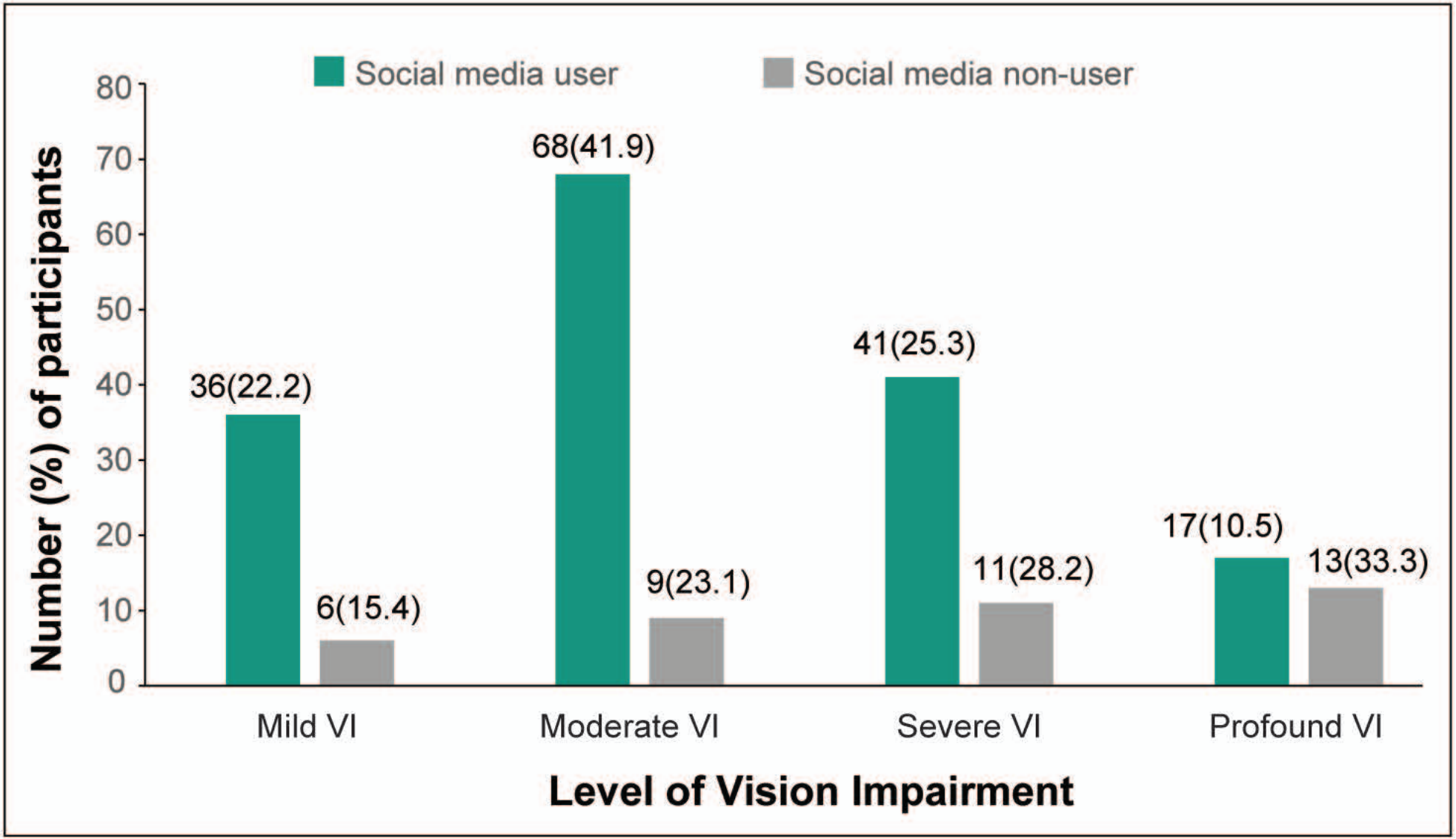
Table 2 Information about social networking and video/photo-sharing platform usage by vision impaired and normally sighted users

Variable	Vision Impaired	Normally Sighted
Networking platforms usage n (%)		
Facebook	133 (82)	131 (60)
Twitter	35 (22)	53 (24)
LinkedIn	15 (9)	27 (12)
Others	10 (6)	10 (5)
Video/photo-sharing platform use n (%)		
Snapchat	31 (19)	62 (29)
Pinterest	8 (5)	16 (7)
You tube	161 (99)	203 (94)
Vimeo	0 (0)	3 (1)
Instagram	109 (67)	134 (62)
Others	10 (6)	10 (5)
Reasons for using social networking/video/photo-sharing platforms n (%)		
Obtaining information	106 (65)	137 (63)
Online Discussion	6 (4)	40 (18)
Picture sharing	38 (23)	70 (32)
Watching video or movies	144 (89)	176 (81)
Attending social events	6 (4)	45 (21)
Attending educational events	45 (28)	75 (35)
Peer support	3 (2)	15 (7)
Keeping in touch with friends and family	81 (50)	116 (53)
Event planning	6 (4)	31 (14)
Buying and selling	10 (6)	54 (25)
Inspiration	5 (5)	41 (19)
News	100 (62)	113 (52)
Dating	2 (1)	4 (2)
To meet new friends	6 (4)	44 (20)
To find employment	9 (6)	41 (19)
To browse / pass time	69 (43)	52 (24)
Others	3 (2)	2 (1)

Table 3 Information about social media (communication platform use) by vision impaired and normally sighted users

Variable	Vision Impaired	Normally Sighted
Communication platform usage n (%)		
Mobile phone messenger	71 (44)	110 (51)
Skype	9 (6)	20 (9)
WhatsApp	158 (98)	211 (97)
FaceTime	3 (2)	16 (7)
Zoom	51 (31)	99 (46)
Teams	7 (4)	10 (5)
Google hangouts	44 (27)	39 (18)
Any others	19 (12)	14 (6)
Reasons for using communication platforms n (%)		
Obtaining general information	40 (25)	118 (54)
Peer support	3 (2)	10 (5)
Keeping in touch with friends and family	148 (91)	188 (87)
Event planning	2 (1)	28 (13)
Buying and selling	3 (2)	41 (19)
Inspiration	4 (2)	44 (20)
News	12 (7)	73 (34)
Dating	0 (0)	5 (2)
To meet new friends	2 (1)	45 (21)
To find employment	5 (3)	37 (17)
Others	8 (5)	4 (2)


VI
Normal
Number (%) of participants
45
40
35
30
25
20
15
10
5
0
7(3%)
2(1%)
20(9%)
3(1%)
2(1%)
8(5%)
2(1%)
41(19%)
34(21%)
Cost
Speed
Language
Accessibility
Share Phone
Unable to read, can listen to content


Social media user
Social media non-user
Number (%) of participants
80
70
60
50
40
30
20
10
0
36(22.2)
6(15.4)
68(41.9)
9(23.1)
41(25.3)
11(28.2)
17(10.5)
13(33.3)
Mild VI
Moderate VI
Severe VI
Profound VI
Level of Vision Impairment