Smartphones and Generational Differences… Are Smartphones a Barrier to Successful Patient Interactions in the Physical Therapy Clinic?

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Introduction. This study aimed to identify perceptions of older adults toward technology usage, as well as to examine the amount and purpose of smartphone usage by clinicians during practice.

Literature Review. Current research in the area of smartphone usage in health care focuses on novel applications or programs, which may improve how students learn or clinicians practice. Studies have investigated smartphone use by physicians, nurses, and medical students; however, there is little research on how physical therapists (PTs) and physical therapy assistants (PTAs) use these devices.

Subjects. This study involved the survey of 29 adults older than 50 years, observation of 11 PTs in various outpatient clinics, and a survey of 190 PTs and PTAs.

Methods. Phase 1 consisted of the distribution of a paper survey to older adults (age ≥ 50), with the purpose of measuring their perceptions toward smartphones, both in general and in a health care setting. Phase 2 involved direct observations of PTs during practice to identify current patterns of technology usage in the clinical setting. Phase 3 was completed through the distribution of a nationwide electronic survey to PTs and PTAs with the purpose of determining perceptions, demographics, and usage behaviors of clinicians regarding smartphone usage during practice.

Results. The results of this study showed that older adults are not comfortable with their health care providers using smartphones during their appointments. Observations revealed that clinicians are using their technology for personal reasons (61% of uses) more often than professional reasons (8%). A national survey found most clinicians report using their smartphone for personal reasons in a typical day and primarily during lunch breaks. When asked whether workplaces had formal policies/rules/guidelines regarding cell phone use at work, 47% said "yes," 38% said "no," and 15% said "I don't know." Of those who said "yes" or "I don't know," 80% said that the rules were not strictly enforced.

Discussion. The clash between perspectives of older adults toward technology use and the usage patterns of clinicians is an issue that is likely to persist in the coming years as technology continues to grow in popularity and scope within our personal and professional lives. It is vital that clinicians, educators, and students are aware of these concerns so that we may communicate more effectively and optimize personal, academic, and professional interactions.

Conclusion. Physical therapists and PTAs should be cautious when using their smartphone with older adults during their treatment sessions because older adults may not feel comfortable with this practice. Further research is needed to determine how smartphone use in physical therapy may be impacting patient care. In addition, future studies examining the benefits and effectiveness of specific clinic guidelines and policies on technology use in the workplace may help to ensure that PTs and PTAs are maximizing technological utility and limiting negative effects.

Key Words: Technology, Smartphone, Professionalism.

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INTRODUCTION

Technological advances over the past decade have made it increasingly practical, affordable, and convenient to use smartphones, tablets, and laptops in both clinical and educational settings. In physical therapy education programs, the acceptance and popularity of these devices have created unique opportunities for educators to develop new and innovative teaching strategies, and numerous academic programs have benefited from the inclusion of technologies in their classrooms.[1-4] The misuse of these devices by students also creates the potential for distractions for users, their peers, and their professors.[1,5] Although the potential positive and negative effects of technology usage in the classroom have been well studied, there is a gap in knowledge regarding technology usage by physical therapists (PTs) in clinical practice.

In physical therapy, as with other health care professions, having access to such advanced devices provides clinicians with the opportunity to enhance patient care through the use of readily available reference tools and applications.[6-8] As younger generations of students in physical therapy education programs enter clinical practice, they are likely to hold different views on technology usage and interact with technology in different ways than their coworkers, supervisors, and perhaps most importantly, their patients. If

current workplaces lack formal policies regarding the use of technologies, there may be the potential for new graduates and therapists to exhibit unprofessional behaviors and misuse technology. Previous research has examined technology usage behaviors among physicians and nurses, as well as the overall effect on patient care.[6-13] However, there is little research that investigates how their patients perceive the usage of these devices in a clinical setting, especially older adults older than 65 years, the age according to the World Health Organization that is the accepted chronological age for an older person.

This study was designed to shed light on the topic of technology usage by PTs in outpatient practice with direct observation, as well as all rehabilitation settings through surveys. In addition, attitudes and perceptions of older adults toward smartphone usage in health care were examined. Therefore, this study was conducted in 3 phases:

Phase 1 consisted of the distribution of a paper survey to older adults with the purpose of measuring their perceptions toward smartphones, both in general and in a health care setting.

Phase 2 involved direct observations of PTs during practice to identify current patterns of technology usage in the clinical setting.

Phase 3 was completed through the distribution of a nationwide electronic survey to PTs and physical therapy assistants (PTAs) with the purpose of determining perceptions, demographics, and usage behaviors of clinicians regarding smartphone usage during practice.

Questions that this study has attempted to answer include the following: what are older adults' perceptions of smartphone use in health care settings? And another question was to determine whether smartphones are a potential barrier to successful patient interactions by examining how clinicians are using smartphones in the clinic, both with direct observation and self-report. Greater knowledge on this topic may help to ensure that PTs and PTAs are using these devices in the most beneficial, productive ways possible while limiting potential negative impacts on patient interactions.

Most research that currently exists on the topic of smartphone usage in a health care setting was performed for the purpose of determining usefulness of novel applications, devices, or programs for nurses, medical students, and physicians. A 2011 study conducted by Wu and colleagues gathered quantitative and qualitative data on smartphone usage by physicians and nurses who were given smartphones in an internal medicine ward.[10] The authors identified positive outcomes such as increased efficiency and ease of multitasking; however, there were also several negative outcomes identified, such as increased number of interruptions and unprofessional use (answering calls and/or texts during rounds). This study highlights the benefits of examining smartphone usage by clinicians to frame both positive and negative effects for clinical practice.

Recent studies by Lo and colleagues and Johansson and colleagues also aimed to obtain useful information regarding smartphone usage by nurses and physicians.[9,12] They noted benefits in increased ease of interdisciplinary communication and retrieval of drug and other medical information; however, the authors did not examine potential for distraction. Several studies examined the survey data looking at whether clinicians owned smartphones, as well as which applications were accessed using these devices, showing evidence of the increased popularity, presence and utility of these devices, especially in a health care setting.[6-11,13]

McBride and colleagues in 2015 aimed to use concept analysis to create a standardized definition of distraction in the health care setting for the purpose of increasing reliability and validity of future studies.[14] The study defined clinician as "licensed persons who work within a clinical setting"[14] and produced the following definition of clinician smartphone distraction in a hospital setting: "The interruption of a hospital clinician's primary task by the internally or externally initiated use of their smartphone or other mobile device."[14] Although it was designed to describe distraction in a hospital setting, the definition provides a concise, objective description of how distraction may be measured and can be applied in other health care settings, such as outpatient physical therapy environments.

A recent study by Gill and colleagues identified various ways in which smartphone use in a health care setting could negatively impact patient outcomes.[15] This study identified four critical concerns of smartphone usage: impact on patient care, safety and hygiene, legal compliance, and data safety and access.[15] The authors suggested a framework for implementing guidelines to limit the negative effects of smartphones. Example guidelines include creating designated areas for smartphone use; provide employees with phones with access to only professional-related applications; and regulation of access to social media. The authors conclude, "…It is clear that smart devices, including smartphones, form an integral part of our connected lives. However, they compromise security and privacy, quality of patient care, and efficiency, and are a source of distraction."[15] Although the guidelines could prove valuable in optimizing the use of technology in the clinic, the impact of these guidelines has not yet been studied in rehabilitation settings.

A 2016 study by Gordon and colleagues further examined differences between populations of older adults, showing that adults older than 75 years were significantly less likely than younger seniors (age 65–69) to own a smartphone, use internet or email, and use digital technology to perform tasks related to their health care.[16] Past research has examined age-related differences in how people interact with technology. A 2013 survey revealed that 55% of all adults owned a smartphone compared with only 18% of those older than 65 years.[17] In addition, only 18% of adults older than 65 years said that they would be comfortable learning how to use a new technology such as a tablet or a smartphone.[17] The conclusions of these studies highlight age-related differences in comfort with interacting with technology, however do not directly examine the perceptions of older adults toward the use of these devices by their health care providers.

Greater knowledge of current smartphone and tablet usage in the clinic may benefit clinic directors by increasing awareness of the potential for distraction and enabling them to provide realistic technology usage guidelines. Furthermore, awareness of the negative impacts of technology in the field of physical therapy may aid present and future clinicians in developing responsible and professional technology usage habits.

METHODS

Subjects

Phase 1. After receiving approval for the study from the Georgia State University Institutional Review Board, subjects for the initial survey of older adults (age $\geq$ 50) were selected from a sample of convenience by asking all students in the entry-level physical therapy education program to provide paper copies of the survey to any adults older than 50 years. Surveys were distributed, and 29 were completed and returned. Most of these participants were relatives of students in the physical therapy education program, with a mean age of 69.24 years.

Phase 2. Student researchers reached out to various physical therapy clinic directors through email and phone to request the opportunity to observe PTs for the purpose of collecting data for research. Ten outpatient orthopedic clinics accepted the request. From these clinics, student researchers were able to observe 11 PTs. All observed subjects were PTs working in an outpatient setting, and all clinics were located in the Southeastern region. Demographic data of the

Table 1. (Phase 3) Shows the Breakdown by Ethnicity of Respondents for the Nationwide Electronic Survey

Ethnicity	No. of Respondents N (% of Respondents)
White	162 (85%)
Black or African American	11 (6%)
Asian	7 (4%)
Latino/a or Hispanic	2 (1%)
American Indian or Alaska Native	1 (1%)
Native Hawaiian or other Pacific Islander	1 (1%)
Other	6 (3%)

observed clinicians were not collected. To prevent any changes in typical behavior, observed clinicians were not told the purpose of the observations or the nature of the research until after the observations were completed, at which point they were debriefed, asked to sign informed consent documents, and provided the option to decline participation.

Phase 3. For the last phase of this study, subjects were asked via email to participate in a short survey regarding smartphone usage in physical therapy. The survey was distributed to the university's clinical education contacts and posted to the American Physical Therapy Association (APTA) education section listserv (general-list@aptaeducation.org). Researchers used online Qualtrics software to create, distribute, and analyze the survey. Emails were sent inviting recipients to complete the survey using an anonymous link, thus the identity of those who completed the nationwide survey is unknown. Of 196 completed surveys, 6 were discarded because the participant was not a PT or PTA. All participants provided informed consent before completing the survey. The sample for this survey comprised 37 men (19%) and 153 women (81%). Ages ranged from 25 to 67 years, with a mean of 41.98 years. The ethnicity breakdown of subjects is displayed in Table 1. The ethnic breakdown of subjects is similar to that of APTA's membership according to the Physical Therapist Member Demographic Profile from 2013.[18] A representative sample bolsters the generalizability of the results reported. Of the survey respondents, 184 identified the region of current employment; 109 subjects (59%) in the South, 35 subjects (19%) in the Northeast, 20 subjects (11%) from the West, and another 20 subjects (11%) from the Midwest.

Design

Phase 1. A novel survey instrument was developed and approved by the Georgia State University Institutional Review Board to assess perceptions of older adults (age > 50) toward the usage of smartphones, both in general and in a health care setting (Appendix A, Supplemental Digital Content 1, http://links.lww.com/JOPTE/A16 for complete survey instrument). Psychometric properties of this instrument were not evaluated. This survey contained questions regarding demographic information and smartphone usage, as well as five questions with Likert scale response choices. All Likert responses were entered numerically into SPSS (strongly agree = 1, agree = 2, neutral = 3, disagree = 4, and strongly disagree = 5). Likert questions with negative polarity were reversed when entered so that a lower number for any given Likert response always indicated a positive perception toward smartphones. The Likert response data were treated as ordinal data, and therefore Spearman's correlation was calculated, as opposed to Pearson's correlation, using SPSS to determine any relationships among all survey items.

Phase 2. For the next phase of this study, 2 student researchers performed observations of clinicians in 10 outpatient physical therapy clinics. To perform the observations, student researchers attempted to maintain a close proximity with the subjects as they worked to maintain sight of the amount and purpose of smartphone usages. The student researchers recorded the number of times each clinician used their smartphone devices over the span of an approximately 2-hour time period, resulting in a total of 1,320 minutes over 10 observation periods. In addition, observers documented whether the device was used for professional or personal purposes, as well as whether it was used during patient treatment time. Smartphone usage was categorized as "professional" if it clearly aided the clinician in treating their current patient or whether it was for the purpose of scheduling, documenting, or researching medical information related to their patient. Smartphone usage was categorized as personal if it did not directly impact the care of the current patient or if it did not involve scheduling or business related to the clinic. Given the inherent difficulty in maintaining eyesight of a clinician's smartphone, observers also recorded smartphone uses as "unknown" for instances when direct observation of the screen was not possible. The amount of time each clinician used their smartphone for a specific purpose was also recorded. A McNemar test using SPSS[19] was run on the clinical observation data to determine whether clinicians were more likely to use their smartphone for personal reasons when compared with professional reasons in this study.

Phase 3. After all observations were completed, a web-based cross-sectional survey was created using the Georgia State University Qualtrics platform. The survey contained 25 questions covering topics of demographic information, workplace characteristics, and general questions regarding smartphone usage patterns and perceptions in the clinical setting (Appendix B, Supplemental Digital Content 2, http://links.lww.com/JOPTE/A17 for complete survey instrument). Question format for the survey varied, including "select all that apply," multiple choice, and open answer questions. The Qualtrics platform allowed for only one submission for each invitation to complete the survey (Figure 1).

RESULTS

Phase 1

Likert responses from the survey of older adults are summarized in Figure 2.

Figure 1. Visual representation of the phases of the study

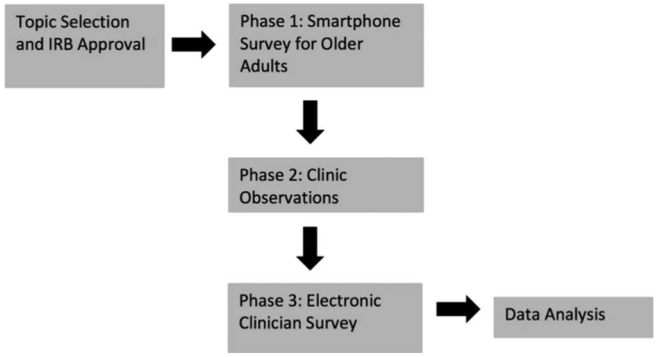
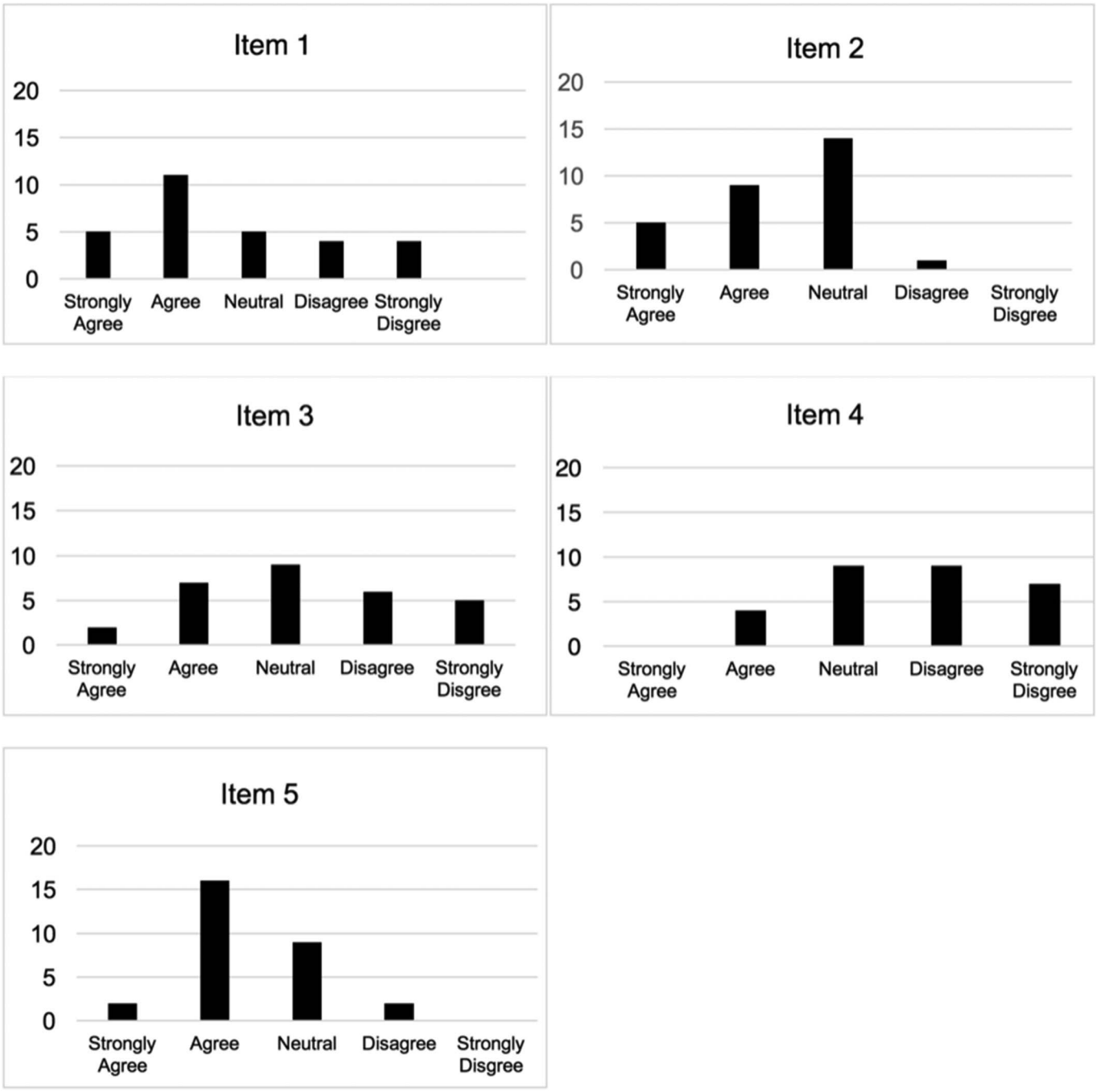


Figure 2. (Phase 1) Frequency distribution for the five survey items that used a Likert scale response choice. 1 = I feel comfortable using my smartphone. 2 = I feel annoyed when someone answers a smartphone during a conversation we are having. 3 = I feel annoyed when someone has a conversation on a smartphone near me while in a public place. 4 = I feel comfortable when my healthcare provider uses a smartphone during my appointment. 5 = In general, I feel like smartphones have more of a positive impact on society than a negative one



Spearman's rho correlations are displayed in Table 2. No notable correlations were found between the survey items and race or sex. For this reason these categories were not included in Table 2. The analysis revealed that lower age and higher income are moderately correlated with increased comfort using a smartphone (r (27) = .514, P = .004 and r (21) = −.583, P = .003, respectively). For the statement "I feel annoyed when someone answers a smartphone during a conversation we are having," higher income level was moderately correlated with greater annoyance (r (26) = .601, P = .004). Higher level of education was moderately correlated with more positive views of the impact of smartphones on society in general (r (26) = −.532, P = .004), as was owning a smartphone (r (27) = .397, P = .033). For the statement, "I feel comfortable when my healthcare provider uses a smartphone during my appointment," no respondents selected "strongly agree," and only 4 of 29 selected "agree." However age, education level, retirement status, and owning a smartphone were not correlated with this statement (r (27) = −.120, P = .536; r (26) =

Table 2. (Phase 1) Shows Spearman's Correlations Cross-Table Between Demographic Responses and six Survey Items, Including five With Likert Scale Response Choices

	1	2	3	4	5	6
Age						
Spearman's rho	.252	.514[a]	−.160	.094	−.120	−.240
P	.188	.004	.406	.626	.536	.209
N	29	29	29	29	29	29
Education						
Spearman's rho	−.215	−.356	.269	.024	−.109	−.532[a]
P	.272	.063	.167	.905	.582	.004
N	28	28	28	28	28	28
Income						
Spearman's rho	−.151	−.583[a]	.601[a]	.192	.240	−.171
P	.491	.003	.002	.381	.269	.436
N	23	23	23	23	23	23
Retired						
Spearman's rho	−.194	−.292	.019	−.258	−.121	.291
P	.323	.131	.923	.185	.541	.132
N	28	28	28	28	28	28
Own						
Spearman's rho	1.00	.526[a]	−.291	.004	−.131	.397[b]
P		.003	.126	.982	.499	.033
N	29	29	29	29	29	29

[a]Correlation is significant at the .01 level (2-tailed).
[b]Correlation is significant at the .05 level (2 tailed).
Columns 2–6: negative correlations on these items indicate more agreement with the statement as demographic variable increases, except for items 3 and 4, for which polarity was reversed (Figure 4).
1 = Do you currently own and use a smartphone? 2 = I feel comfortable using my smartphone. 3 = I feel annoyed when someone answers a smartphone during a conversation we are having (polarity reversed so lower value = less annoyed). 4 = I feel annoyed when someone has a conversation on a smartphone during my appointment. 5 = I feel comfortable when my health care provider uses a smartphone during my appointment. 6 = In general, I feel like smartphones have more of a positive impact on society than a negative one.

−.109, *P* = .577; r (26) = −.121, *P* = .541; and r (27) = −.131, *P* = .499, respectively).

Phase 2

The clinic observations resulted in a total of 36 observed interactions between clinicians and their smartphone (Figure 3). During this time, it was observed that the clinicians used their smartphone for personal reasons 22 times (61%), 11 times the intent was unknown (31%), and three interactions (8%) were for professional use. Just examining then known personal versus professional usage, there was more than a 7-fold increase in favor of personal use. Clinicians were observed using their smartphone for personal or for unknown reasons 33 times, 21 of which were during a treatment session with a patient. The student researchers observed three professional smartphone interactions, all three of which were during a treatment session with a patient. This equates to 66.7% of all smartphone interactions that occurred during patient treatment. The McNemar test found that it was significantly more likely for clinicians to use their smartphone for nonprofessional reasons (personal or unknown) when compared with professional reasons in this study (sig ≤ .0001). The most commonly observed reason for using a smartphone was for text messaging. Other uses included email, video camera, social media, health care apps, camera, phone call, and internet. Clinicians used their smartphone for a total of 7 minutes for professional reasons and 26.5 minutes for personal or unknown reasons of a total of 1,320 observation minutes.

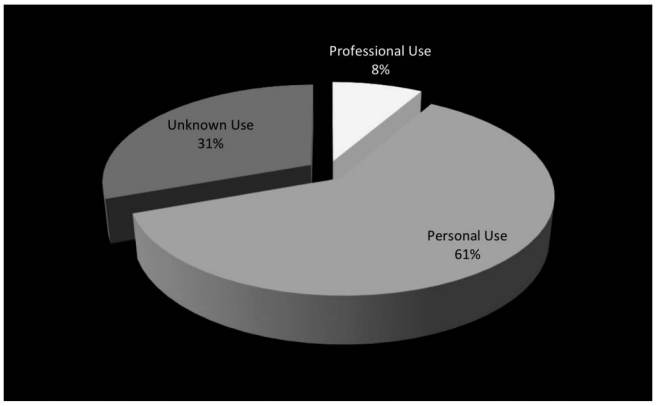
Phase 3

The web-based survey distributed via email collected 196 responses. There were six completed surveys that were discarded because the participant was not a PT or PTA. Table 3 shows the distribution of responses for clinicians' reported smartphone utilization while in the clinic.

Information was gathered on how much time clinicians reported spending on their smartphone throughout the day. The most common response was 11–30 minutes (N = 69, 36.51%). These results are cross-tabulated with the various reported types of physical therapy settings in Table 4. When asked whether their current workplace had formal policies/rules/guidelines regarding cell phone use at work, 47% (N = 89) said "Yes," 38% (N = 72) said "No," and 15% (N = 29) said "I don't know." Of those who said "yes" or "I don't know," 80% (N = 94) said that the rules were not strictly enforced. The breakdown of respondents by work setting is presented in Table 5.

When asked what times during the day clinicians use their smartphone (multiple response), the most common responses were

Figure 3. Number of observations (36 total)



"during lunch breaks" (88%, N = 162), followed by equal number of responses for "before treatment starts for the day" and "between treatment session" (69%, N = 127) (Figure 4).

When asked whether they believed smartphones were a distraction from their job, 84% (N = 156) reported no. When asked how they believed their smartphone use affected the quality of care they provided to their patients, 34% (N = 62) said that it increases the quality of patient care, 3% (N = 6) said decreases, and 56% (N = 103) said that it does not affect the quality of patient care they provide.

DISCUSSION

Phase 1 of this study was intended to provide information on perceptions of older adults toward the use of smartphones in general and in a health care setting. The results of the survey for older adults indicated that higher age was moderately correlated with decreased comfort using a smartphone device. Few respondents agreed with the statement, "I feel comfortable when my healthcare provider uses a smartphone during my appointment." However, the survey found that older adults tend to believe that smartphones have more of a positive impact on society than a negative one (Figure 2). This suggests that the older adult may accept clinicians continued use of smartphones in the clinic, so long as these devices are used professionally.

Phase 2 of this study was meant to provide data on current smartphone usage patterns of clinicians during practice. As shown by the clinical observations, clinicians comfortably use their smartphone devices during work and primarily choose to use them for personal reasons. Even more concerning is that 67% of observed smartphone uses were during treatment time. This phase of the study was not intended to draw direct or indirect conclusions regarding quality of patient care or how it is impacted by technology usage; however, the results of these observations indicate that there may be some value in further studying how technology usage impacts interactions between clinicians and patients.

Phase 3 of this study was meant to gather data on demographic information, self-reported technology usage behaviors, and clinicians' perceptions toward technology usage in their workplace. The electronic survey found that a small percentage (3%) of respondents believed that their smartphone usage decreases the quality of care they provided for patients, and 16% believed that their smartphone was a job distraction. However, a large percentage (69%) of respondents reported using their smartphone between treatment sessions, and 40% reported using their devices while documenting, potentially impacting productivity and quality documentation. The low percentage of respondents reporting smartphone use as a distraction potentially suggests that clinicians may be underestimating the impact smartphones have on their overall job performance.

Personal usage appears to be common, and many clinicians are also currently taking advantage of the capabilities of smartphones by using them to access the internet for professional reasons, access medical/clinical applications, and use photo and video for patient education. Additional research may be beneficial to determine how to best implement such professional use of technology to produce the most successful patient interactions and outcomes, especially with those less comfortable with newer technology.

Gill and colleagues proposed specific guidelines to limit distraction and maximize the benefits of technology.[15] The results of this study indicate that only 47% of subjects reported that their workplace had formal guidelines regarding smartphone usage, and of these, 80% reported that the rules were not strictly enforced. Perhaps more formal guidance on professional usage of technology in the clinic is needed, and clinic directors must be proactive in helping to ensure that technology is being used in the most responsible ways possible.

Past research has shown that older adults are slower to adopt new technology and less comfortable using smartphones and tablets than younger generations.[14] The results of our phase 1 survey showed that older adults are

Table 3. (Phase 3) Distribution of Responses for How Clinicians Use Their Smartphones in the Clinic

	Response N (% of Participants Who Selected Response)
Clock/calculator	153 (83)
Sending/receiving personal text messages	150 (81)
Accessing the internet for professional use	141 (76)
Making/receiving calls related to work	116 (63)
Making/receiving personal calls	113 (61)
Sending/receiving text messages related to patient care or scheduling	91 (49)
Using medical/clinical apps for treatment purposes	81 (44)
Accessing the internet for personal use	77 (42)
Photo/video for patient education	72 (39)
Accessing social media (Facebook, Twitter, Instagram, etc.)	70 (38)
Using apps for personal purposes	40 (22)

Rows with white shade indicates professional usage.
Rows with gray shade indicates personal usage.

Table 4. (Phase 3) Amount of Time Respondents in Each Setting Reported Spending on Their Smartphones Throughout the Day

Setting	Fewer than 5 min	5–10 min	11–30 min	31–60 min	More than 1 hr	Total
Outpatient, *n* (%)	11 (13.41)	17 (20.73)	24 (29.27)	15 (18.29)	15 (18.29)	82 (100)
Inpatient, *n* (%)	8 (20.51)	6 (15.38)	15 (38.46)	3 (7.69)	7 (17.95)	39 (100)
Acute care, *n* (%)	8 (16.33)	7 (14.29)	20 (40.82)	7 (14.29)	7 (14.29)	49 (100)
Sub-acute, *n* (%)	3 (30)	2 (20)	4 (40)	0 (0)	1 (10)	10 (100)
Skilled nursing facility, *n* (%)	2 (12.5)	3 (18.75)	6 (37.5)	3 (18.75)	2 (12.5)	16 (100)
Home health, *n* (%)	1 (9.09)	0 (0)	3 (27.27)	2 (18.18)	5 (45.45)	11 (100)
Academic/education	6 (11/32%)	10 (18.87%)	22 (41.51%)	10 (18.87%)	5 (9.43%)	53 (100%)
School setting, *n* (%)	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)
Health/wellness/women's health/fitness, *n* (%)	0 (0)	0 (0)	2 (66.67)	0 (0)	1 (33.3)	3 (100)
Other, *n* (%)	1 (6.67)	2 (13.3)	8 (53.3)	0 (0)	4 (26.67)	15 (100)
Total, *n* (%)	19 (10.05)	36 (19.05)	69 (36.51)	36 (19.05)	29 (15.34)	189 (100)

not comfortable with their health care providers using smartphone devices during their appointments. The results of observations in phase 2 and the clinician survey in phase 3 highlights that smartphone usage does occur in the physical therapy clinic. The clash between perspectives of older adults toward technology use and the technology usage patterns of clinicians is an issue that is likely to persist in the coming years as technology continues to grow in popularity and scope within our personal and professional lives. It is vital that clinicians, educators, and students are aware of these concerns so that we may communicate more effectively and optimize personal, academic, and professional interactions. As young clinicians enter the field of physical therapy, they must be equipped with the knowledge and ability to interact with technology responsibly. In order for this to occur, educators must be proactive in establishing concrete guidelines, policies, and expectations regarding the usage of these devices in the classroom. In addition, clinicians must take responsibility for their own usage habits and maintain awareness of how technology is impacting their work. Finally, clinic directors and managers should consider promoting these professional behaviors, with more rigid workplace policies regarding smartphone usage. Further research is needed to determine how smartphone use in physical therapy may be impacting patient care. In addition, future studies examining the benefits and effectiveness of specific clinic guidelines and policies on technology use in the workplace may help to ensure that PTs and PTAs are maximizing technological utility and limiting negative effects.

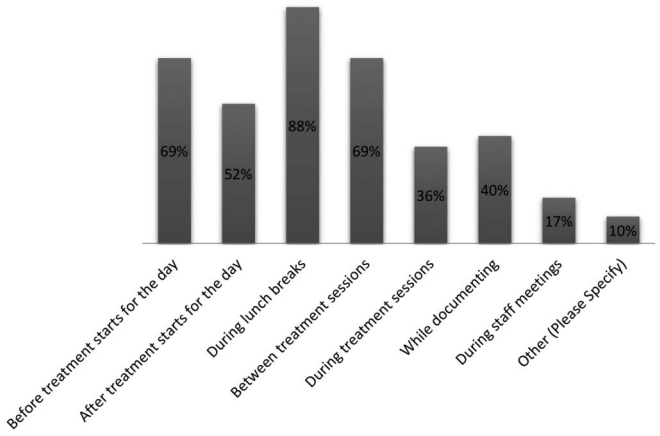
Table 5. (Phase 3) Distribution of Respondents by Work Setting

Setting	Responses N (% of Participants Who Selected Response)
Outpatient	85 (45)
Academic/Education	53 (28)
Acute care	50 (26)
Inpatient	39 (21)
Skilled nursing facility	16 (8)
Other	14 (7)
Home health	11 (6)
Sub-acute	10 (5)
Health/wellness/women's health/fitness	3 (2)
School setting	2 (1)

Note item instructions were "select all that apply," so total number of responses exceeds the number of total subjects.

There were several limitations to this study that should be noted. The older adults who completed surveys of smartphone perceptions were a convenience sample of predominantly relatives and friends of students in the physical therapy program. Therefore, the sample may not accurately represent older adults in the general population because of likely differences in educational level, income, and other demographical characteristics. Efforts were made to perform clinical observations in various physical therapy settings, including inpatient, acute care, and skilled nursing facilities. However, because of extensive regulations and strict policies on research being conducted at inpatient institutions, student researchers were unable to obtain any observation sites of this nature. For this reason, all observations took place at outpatient orthopedic clinics. In addition, all observations took place in the Southeastern United States, so geographical differences in technology usage were not accounted for. Although student researchers attempted to accurately distinguish between personal and professional smartphone usage by clinicians, it should be noted that there is inherent difficulty in determining the exact purpose of smartphone usage, and it cannot be stated with certainty that all observations were categorized properly. Construct validity has not yet been established for the nationwide electronic survey because of the fact that it was a novel instrument. Finally, the nationwide electronic survey that was distributed via email could potentially show a geographical bias because it resulted in a large percentage of subjects

Figure 4. (Phase 3) Percentages of participants who reported using their smartphones during various times throughout the day. (N = 188)



residing in the Southern United States (59%), the area from which the survey originated. In addition, respondent bias could have occurred if the electronic survey was sent to a work email address, and thus the clinicians might have not answered questions accurately about personal smartphone use during patient care time.

CONCLUSION

This study provided preliminary evidence on how technology is currently being used in the outpatient physical therapy clinic, as well as how older adults may perceive the usage of these devices. Physical therapists and PTAs should be cautious when using their smartphone with older adults during their treatment sessions because older adults may not feel comfortable with this practice. Clinicians were observed using their smartphone for personal use far more frequently than for professional use, and the results of the nationwide survey support that personal smartphone use is prevalent.

Smartphones, tablets, and laptops have provided present and future clinicians with unique opportunities to advance the field of physical therapy. The benefits these devices provide have been thoroughly documented; however, the evidence shown by this study indicates that more research is needed on the potential negative impact. As the field of physical therapy progresses through an increasingly technologically advanced health care landscape in the coming years, this knowledge will help to ensure that PTs and PTAs are able to interact with technology in the most beneficial ways possible while limiting potential barriers to successful patient interactions, productivity, and professionalism.

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