5-2022

Caregiver Satisfaction of Telehealth Initiatives for Developmental Surveillance and Evaluation in Pediatric Autism Spectrum Disorder

Aashiyana Patel

Caregiver Satisfaction of Telehealth Initiatives for Developmental Surveillance and Evaluation in Pediatric Autism Spectrum Disorder

Aashiyana Patel

Eleanor Mann School of Nursing

College of Education and Health Professions

University of Arkansas

Dr. Michele Kilmer

April 20th, 2022

Introduction

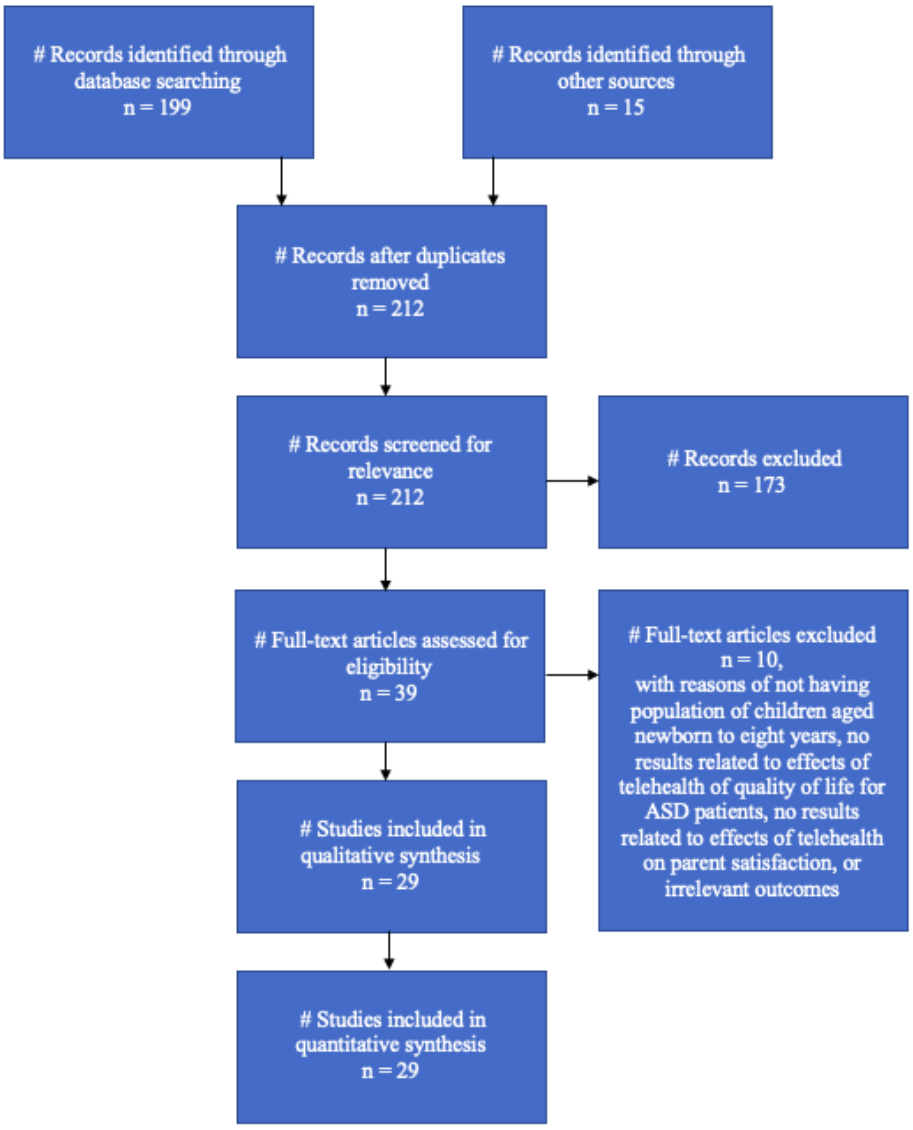
According to the Autism and Developmental Disabilities Monitoring Network, within the past 20 years, the prevalence of ASD has significantly increased from one in 150 to one in 54 children aged eight years (Maenner et al., 2020). Developmental surveillance is a continuous process utilized by healthcare professionals who perform skilled observations of children during wellness examinations. It includes attending to parental concerns about the child, analyzing the child's developmental history, and making accurate observations of the child during the examination. This form of surveillance along with anticipatory guidance helps diagnose ASD much earlier (Lipkin, 2020). Developmental monitoring is considered the first step in determining an ASD diagnosis followed by developmental screening and evaluation (Centers for Disease Control and Prevention [CDC], 2020). Early recognition of developmental delay can lead to timely implementation of interventions that improve health outcomes for these children (Baio et al., 2014). Poor health outcomes for children with ASD put them in a more vulnerable group in this country (Mammoser, 2018). The implementation of evidence-based care starts with identification of developmental delays at primary care visits (Kilmer, 2020).

With the recent augmentation of technology into the United States healthcare system due to the novel coronavirus SARS-CoV-2 (COVID-19), there has been an increased use in telemedicine visits to perform developmental surveillance for children aged from birth to two years (Demeke, 2021). In comparison to traditional on-site appointments, telemedical appointments can serve the same purpose in identifying developmental delay and diagnosing ASD in pediatric patients. The purpose of this Honors project is to explore how caregivers with children identified at risk for developmental delay and/or ASD perceive the use of telehealth for developmental surveillance compared to traditional in-person visits during the first 6 months after referral.

Review of Literature

A systematic review of research was conducted to determine the effects of telemedicine visits on developmental evaluations for pediatric ASD patients. This research review was guided by PRISMA guidelines and the CINAHL, PubMed, and MEDLINE databases were used to search for articles. Key words used in the search were “pediatric autism”, “developmental surveillance”, “telehealth”, and “monitoring”. The Boolean phrases “AND” and “OR” were used to further refine the results given. Search limiters used in all three databases included peer reviewed, human subjects, age limit of birth to eight years, and a publication data that was written in the English language and published between 2016 and 2022. Articles were excluded if they did not have a population of children aged newborn to eight years, did not contain results related to the effects of telehealth on quality of life for ASD patients or the effect of telehealth on parent satisfaction. Articles were included if the study was conducted on pediatric patients with ASD, incorporated developmental surveillance via telehealth visits or an online format, compared the utilization of the online developmental surveillance, and the outcomes measured included the effects on the diagnosis of ASD in pediatric patients and parent satisfaction of the telehealth format. The PubMed database produced the largest number of results despite having the same criteria as the other two databases. An initial search using the terms “pediatric autism” and “screening” yielded the results used for this systematic review as shown in Figure 1.

Figure 1
PRISMA 2.0 Flowchart



All 10 studies had a sample population of pediatric patients with ASD. The setting for these studies were wellness visits via telehealth methods or traditional on-site appointments. The patients were aged newborn to eight years throughout all the studies. These studies primarily featured systematic reviews and retrospective cohort studies. See Figure 1 for the PRISMA 2.0 flow chart.

Developmental Screening Practice Gaps in Care

Delays in ASD early identification, diagnosis, and enrollment in services continues despite efforts to improve primary care practice. The increase in ASD prevalence in the United States within the past few years is concerning. Although evidence-based interventions and treatment initiated by 3 years of age gives children with ASD the best possible health outcomes, analysis of current practices in pediatric ASD management reveals these patients are not receiving appropriate and timely care in primary care settings (Maenner et al., 2021). In general, time constraints, massive amounts of healthcare literature, and a non-supportive organizational structure are barriers to implementing evidence-based practices in primary care clinics (Majid et al., 2011). In addition to these common hindrances, inadequate developmental screening evaluations during well-child exams lead to delay in diagnosis. Limited use of evidence-based screening and treatment practices has been identified as a critical concern in the care of pediatric patients with ASD (Autism Speaks, 2018). Children with both high-functioning and non-verbal autism are not being accurately screened during well-child evaluations and subsequently experience a delay in receiving a diagnosis (Zablotsky et al., 2015). Numerous healthcare organizations stress the importance of performing developmental screenings on all children during each well-child evaluation (Baio et al., 2014). This includes specific developmental screening for ASD for preschool children, however, this practice does not regularly occur. Data collected in 2007 showed only 22.6% of children ages 10 to 35 months were screened for ASD. In many areas of the country, these rates have not improved in the past 10 years (Mammoser, 2018). Findings in a self-report survey highlighted this concern as it uncovered that approximately half of the participating pediatricians did not regularly use established screening tools for patients younger than 36 months (Radecki et al., 2011). Likewise, data from the 2016

National Survey of Children's Health revealed 30.4% of children between the ages of 9 and 35 months were reported by caregivers to have received developmental screening, 37.1% received developmental surveillance, and only 19.2% received both developmental screening and surveillance from a primary care clinician (Hirai et al., 2018). Additionally, the 2020 ADDM survey findings showed that children living in rural areas are at a disadvantage compared to children who live in areas geographically areas close to diagnostic centers and school districts who have increased resources to identify at-risk children (Maenner et al. 2020).

Efficacy of Telehealth

Telehealth can be used to increase access to care, especially for those living in rural areas (Tariq et al., 2018). The integration of the telehealth format in primary care clinics and via web portal allows for increased access to screening and evaluation for ASD, ultimately contributing to an increase in the quality of life for these patients (Tariq et al., 2018). The use of the telehealth format also contributes to better health outcomes from the earlier implementation of evidence-based care for ASD (Baio et al., 2014). Digital screening tools can be incorporated into a busy practice and can promote earlier detection of ASD in younger children (Schrader et al., 2020).

Developmental Screening

Developmental surveillance of ASD starts in the primary care clinics. The primary outcome identified was the effectiveness of telehealth methods on developmental surveillance and evaluation of ASD in pediatric patients. The integration of a digital screening tool improved accessibility to earlier care for children at risk for ASD due to more effective screening methods (Campbell et al., 2017). The most common screening tool utilized in diagnosing is the Modified Checklist for Autism in Toddlers, Revised, with Follow-Up (M-CHAT-R/F). The digital M-CHAT-R/F and the feed-forward artificial neural network (fANN) methods had the highest

success rate in preventing human error and negating the need for intensive follow-up appointments (Acheine et al., 2019). A digital format of the M-CHAT-R/F was successful in increasing surveillance from 25% to 85% in a rural health clinic (Campbell et al., 2017). The digital format of the M-CHAT-R/F and automatic scoring of the results helped healthcare clinicians make necessary referrals with more ease. The digital format also allowed for improved clinician attitudes towards the ASD screening process. The transition to a digital M-CHAT-R/F version led to an improved screening process for ASD which ultimately could facilitate earlier and more accurate diagnoses. The fANN technique is used to understand the relationship between independent and dependent variables in a study. Achenie et al. (2019) found that although the M-CHAT-R/F is commonly used and proven to be effective in screening, the follow-up questions and human scoring were error-prone which can lead to misdiagnosis or delayed diagnosis of ASD. Within this specific study, the 20 M-CHAT-R/F items were inputs, or the independent variables, while the ASD diagnosis after evaluation was the output, or the dependent variables. The fANN machine learning method helps more accurately analyze M-CHAT-R/F results leading to a better prognosis for an ASD diagnosis. With a 99.72% success rate of accurately diagnosing ASD in the total sample, it is evident that the utilization of technology produces faster and more reliable results in comparison to human analysis of the M-CHAT-R/F (Achenie et al., 2019). There is less room for error or missed cues for early diagnosis of ASD. It also offers an unbiased, automated way of scoring the M-CHAT-R/F.

The Ages and Stages Questionnaire, 3rd edition (ASQ-3) is another commonly utilized developmental screening tool for diagnosing ASD (Kilmer, 2020). It is used to screen children between the ages of one month and 66 months. This tool is a questionnaire completed by the caregivers that assesses five domains: gross motor, fine motor, communication, problem-solving,

and personal-social. This screening tool is popular in various clinics because it yields accurate, valid, and reliable results and is a cost-effective method (Ages and Stages, 2022).

Another method of conducting developmental screening via telehealth is through the implementation of the Smart Early Screening for Autism and Communication Disorders (Smart ESAC) tool. This digital tool begins with a brief 10-question general screen for communication delay, and if positive, is followed by a specific 20-question ASD screening. Following a one-year quality improvement project, the clinic found a 100% screening rate using the Smart ESAC indicating full integration of the tool in developmental surveillance (Schrader et al. 2020).

Telehealth Initiatives

While the results do not support an increase in diagnosis of ASD at a younger age due to this digital form of screening, it does support an increase in accessibility to care for underserved populations. In the Tariq et al. (2018) article, a mobile web portal was designed that allowed for the submission of home videos by caregivers to be screened and reviewed for ASD by the clinicians at the clinic. The videos were assessed for 30 behavioral features that are common to ASD by 3 blind raters. They measured each feature from eight independent machine learning models. The results indicated that all classifiers had accuracies above 90% in diagnosing ASD in the patients (Tariq et al., 2018). These short home videos provide a quick and more accessible method for initial developmental screening that can prompt further evaluation if needed.

Another parent-administered telehealth assessment that can help improve health outcomes for infants with ASD is the Telehealth Evaluation of Development for Infants (TEDI). The TEDI tool is a two-stage screening process that essentially provides instruction to caregivers on how to administer behavioral cues so patients can be screened and assessed virtually by providers. Two measures of this study were the Autism Observation Scale for Infants (AOSI)

and the Early Communication Index (ECI). The reliability of this format was measured by a benchmark criterion of greater than or equal to 0.75, or the excellent range. Both the AOSI and ECI measures were in the good to excellent range indicating appropriate reliability (Talbott et. al., 2020). The use of TEDI in rural communities allows for accessibility and convenience for caregivers and may lead better outcomes due to earlier referral for further evaluations.

Quality of Life

Another outcome identified was the effect telehealth has on the quality of life and care for these patients. Geographical location is one of the most common health disparities in our healthcare system as patients in rural communities are at a disadvantage when it comes to early screening for ASD due to lack of infrastructure in the area (Talbott et al. 2020). Also, some patients and their families may drive several miles for a wellness checkup where typical screening is usually performed, leading to higher percentages of missed appointments. Telehealth may be successful in reducing attrition and patients lost to follow-up by improving access to well-child visits, thus enhancing the care provided to and quality of life experienced by the caregivers and the child

Hindrances of Telehealth Use

It is important to note that technology is not immune to errors and problems may arise. Patients who live in remote areas may have connectivity issues that could impede the screening process for the healthcare professional (Talbott et al., 2020). Certain rural clinics might also not have the means to afford transitioning to a telehealth format for developmental screening (Talbott et al., 2020). Another method for preventing connectivity issues from arising is encouraging the parent or guardian to determine a location that provides good connection prior to the telemedicine appointments.

Telehealth Patient Satisfaction Survey

A cross-sectional study design investigated the validity and reliability of the telehealth patient satisfaction survey (TPSS) used in this project. The TPSS was found generalizable across all clinic settings and proved to be a valid and reliable tool to assess telehealth constructs of assurance, empathy, reliability, responsiveness, and usability (Lin et al., 2021). Three factors were for analyzed for internal consistency: Perceived Quality of Service ($\alpha = 0.93$), Telehealth Satisfaction ($\alpha = 0.83$), and Admission Process ($\alpha = 0.67$). Conceptual and operational definitions are subsequently detailed in this paper.

ASD in Arkansas

Arkansas continually ranks last in pediatric autism diagnosis and early intervention initiation in the states that are tracked by the CDC. The latest Autism and Developmental Disorders Monitoring Network (ADDM) 2020 report states that one in 44 children age 8 years who live in Arkansas have been diagnosed with ASD (Maenner et al., 2021). White children are 1.6 times more likely to be diagnosed with ASD than Hispanic children who live in Arkansas. The ethnic breakdown of 8-year-old children identified with ASD in Arkansas is as follows: White: 64%, Black: 26%, Hispanic: 10%, Asian or Pacific Islander: 1%, and Other: 1%. Of note, 65% of children with ASD in Arkansas have an Intelligence Quota score ≤ 85, which can lead to further delay in identification as behavior may be attributed to a misunderstanding about culture instead of ASD.

There are only two places in Arkansas that conduct developmental evaluations, and both have extensive waiting times for the appointments, leading to further delay in diagnosis and enrollment in early intervention. Only half of the children with ASD were identified by age 56 months (Maenner et al, 2021). Also, PCPs in NWA report that the COVID pandemic and travel

limitations for family members reduced attendance for well-child visits, thus further delaying in-depth developmental evaluations for children who live in communities in and surrounding NWA. Specific recommendations provided in the 2020 ADDM report for Arkansas include providing services and support to families who have a child with ASD, addressing disparities that exist for minority populations, and enhancing efforts for early and equitable identification of ASD and timely enrollment in services. The report specifically states that "sustained efforts are needed to reduce disparities and identify individuals in Arkansas with ASD as early as possible in order to provide support" (Maenner et al., 2021).

Problem Statement

The problem statement for this study is that children living in Arkansas are not being identified and diagnosed with ASD by age 2 years. Many children are not being appropriately screened during their well-child evaluations due to time constraints and individual provider practice.

Purpose Statement

The purpose of this study is to examine parental satisfaction of a telehealth program aimed to improve identification and diagnosis of pediatric ASD in northwest Arkansas. Caregivers referred to the Access for Autism clinic (A4A) will receive a satisfaction survey regarding the telehealth practices the clinic employs. This information will be essential in determining best practice for the clinic moving forward.

PICOT Question

In caregivers with children at risk for ASD or DD, how do telehealth initiatives, compared to traditional in-person assessments, affect satisfaction of perceived care within 3 months?

Methodology

Research Design

This Honors project utilized an exploratory research design. The project was designed to investigate caregivers' satisfaction with telehealth initiatives used by the Access for Autism clinic. Implementation commenced following the university's Internal Review Board approval, obtained in March 2022.

Conceptual definitions

The following conceptual definitions were used for this study:

- Assurance is defined by the knowledge and courtesy of staff and their ability to inspire trust and confidence.
- Empathy is defined by the caring, individualized attention the organization provides to its patients.
- Reliability is defined by the ability to perform the promised service dependably and accurately.
- Responsiveness is defined by the willingness to help patients and provide prompt service.
- Usability is defined by the technology acceptance model and is related to the perceived usefulness and perceived ease of use.
- Patient satisfaction is determined through questions about overall experience, as well as future service use intention and word of mouth recommendation (Lin et al., 2022).

Operational definitions

The following operational definitions were used for this study.

- Assurance is operationally defined by a 5-point Likert scale and measures the user's understandability of the plan of care and home care instructions, and the kindness of the staff.

- Empathy is operationally defined by a 5-point Likert scale and measures the ease of scheduling an appointment, inclusiveness in the health care decisions, and importance of the child's care to the staff.
- Reliability is operationally defined by a 5-point Likert scale and measures the provider's ability to diagnose and treat problems and comparison of the level of care received in an in-person visit versus a telemedicine appointment.
- Responsiveness is operationally defined by a 5-point Likert scale and measures the wait times of the user and promptness of attending to the child's needs.
- Usability is operationally defined by a 5-point Likert scale and measures the happiness of the check-in process, the satisfaction of the video connection quality, and overall access to health care services via telehealth.
- Patient satisfaction is operationally defined by a 5-point Likert scale and measures the user's overall experience with Access for Autism telehealth, use of video visits for future appointments, and recommendation of the Access for Autism Clinic to others.

Sample

The sample population included parents, caregivers, or guardians (henceforth caregiver) of children aged 18 months to 18 years who are enrolled in the A4A clinic. The convenience sampling method was used as only caregivers who attend the A4A clinic were invited to participate in the survey. Inclusion criteria for this study includes caregivers whose child has been enrolled in the A4A clinic for more than two months and who speak English, as the survey has not been analyzed for validity or reliability in other languages. Caregivers who were referred to the A4A clinic less than two months were excluded from the project as it is likely they have not attended more than one visit. Because the results of the study are broadly applicable to different situations, it indicates the study is generalizable.

Human Subjects

The survey was submitted to the IRB for review and received approval in March 2022. Patient confidentiality and anonymity were maintained throughout the entire data collection process because the study was developed without using participant identifiers in the questions and was sent to participants through an anonymous link via the university's Qualtrics online software system. The results of the survey did not display any identifying information from the participant and further contributed to the anonymous aspect of the survey.

Data Collection

A 13-question survey administered through the University of Arkansas Qualtrics survey system was used to collect data for this study. The survey contains six constructs in mind: assurance, empathy, reliability, responsiveness, usability, and patient satisfaction and uses a five-point Likert scale to rank different statements related to these constructs. The ranking scale was labeled as 1 being strongly disagree, 2 being disagree, 3 being neither agree nor disagree, 4 being agree, and 5 being strongly agree. The last six questions utilized a multiple choice and select all that apply format to address barriers, demographics, and information about the devices used for the appointment. Participants received a link to the survey via email on March 27, 2022. Approximately 15 surveys were sent to caregivers who met the inclusion criteria. The survey closed on April 4, 2022.

Data Analysis

Descriptive statistics were used to assess the six survey constructs as inferential statistics would not be appropriate on a sample of 12 participants. The values noted in the results are the mean and standard deviation of each survey question.

Results

Sample characteristics

This sample includes 12 caregivers of children identified at-risk for ASD or DD who have been referred to the Access for Autism clinic at the University of Arkansas. The six constructs evaluated were assurance, empathy, reliability, responsiveness, usability, and patient satisfaction. The questions utilized a 5-point Likert scale which causes the mean values shown in Table 1 to range from 0.00-5.00. As shown in Figure 2, the assurance construct did not have a standard deviation value greater than 1.00 for any of the three questions, indicating that this component was like well-structured in the study. As shown in Figure 3, there was one question related to scheduling that had a standard deviation value of 1.25, indicating a wide variance in the values recorded. As shown in Figure 4, the reliability construct seems to be well-structured based on the values recorded. As shown in Figure 6, the responsiveness construct had standard deviation values greater than 1.50 for both questions, indicating this component needs improvements for future studies. As shown in Figures 7 and 8, the standard deviation values for the usability and patient satisfaction constructs were deemed appropriate by the participants. Approximately 40% of participants of this survey indicated that the level of care received at the telehealth appointment was equal to the care received in the in-person appointment, as shown in Figure 5.

Table 1

Statistics Table for Six Constructs of Patient Survey

Variable	Mean	Std. Dev.
Assurance		
Question 1	4.80	0.40
Question 2	4.20	0.98
Question 3	5.00	0.00
Empathy		
Question 1	4.50	1.12
Question 2	4.60	0.80

Question 3	4.60	0.80
Reliability		
Question 1	4.40	0.80
Responsiveness		
Question 1	3.80	1.60
Question 2	4.00	1.26
Usability		
Question 1	5.00	0.00
Question 2	5.00	0.00
Question 3	4.25	0.83
Patient Satisfaction		
Question 1	5.00	0.00
Question 2	4.00	1.22
Question 3	5.00	0.00

Figure 2

Statistics Table for Assurance Construct

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance
1	I understand the plan of care, which includes why tests and procedures are needed.	4.00	5.00	4.80	0.40	0.16
2	I was given home care instructions and able to to ask questions.	3.00	5.00	4.20	0.98	0.96
3	The staff was polite and kind.	5.00	5.00	5.00	0.00	0.00

Figure 3

Statistics Table for Empathy Construct

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance
1	It was easy to schedule my appointment.	2.00	5.00	4.50	1.12	1.25
2	I feel that I was included in the health care decisions.	3.00	5.00	4.60	0.80	0.64
3	I know my care and/or my child's care is important to the staff.	3.00	5.00	4.60	0.80	0.64

Figure 4

Statistics Table for Reliability Construct

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance
1	The provider was able to diagnose problems and treat my or my child's condition.	3.00	5.00	4.40	0.80	0.64

Figure 5

Comparison of level of care received during an in-person visit and telemedicine appointment

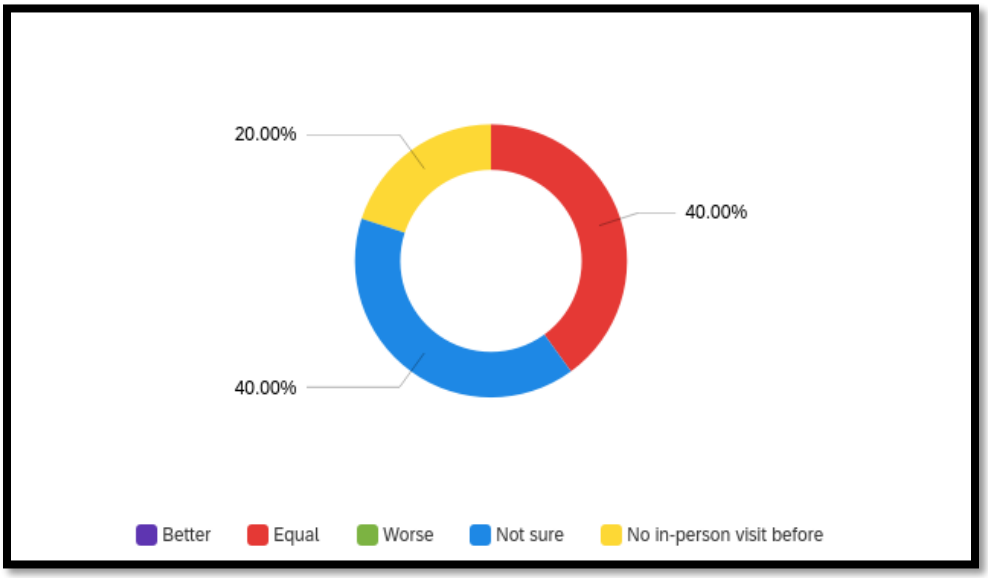


Figure 6

Statistics Table for Responsiveness Construct

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance
1	If I had a long wait time, I was kept informed of those delays during my visit.	1.00	5.00	3.80	1.60	2.56
2	My or my child's needs were met promptly.	2.00	5.00	4.00	1.26	1.60

Figure 7

Statistics Table for Usability Construct

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance
1	I was happy with the check-in process for my appointment.	5.00	5.00	5.00	0.00	0.00
2	I was satisfied with the quality of the video connection during the visit.	5.00	5.00	5.00	0.00	0.00
3	Telehealth improves my access to health care services.	3.00	5.00	4.25	0.83	0.69

Figure 8

Statistics Table for Patient Satisfaction Construct

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance
1	My overall experience with Access for Autism telehealth was good.	5.00	5.00	5.00	0.00	0.00
2	If given the option, I would use video visits for future appointments.	2.00	5.00	4.00	1.22	1.50
3	Overall, my needs were met. I would recommend others to Access for Autism Clinic.	5.00	5.00	5.00	0.00	0.00

Discussion

This study was conducted to determine how telehealth being utilized as an effective alternative to developmental screening of ASD affects parent satisfaction. The survey administered in this study aimed to study six different constructs that contributed to understanding the overall satisfaction of telehealth use for the participant. Based on the results

provided from the survey, the telehealth initiatives of this study appear to be mostly successful. The responsiveness construct provided results that indicated a need for improvements in future research. The standard deviation values were both greater than 1.60 indicating that more participants disagreed rather than agreed with the questions in this section and gave a score of 1 or 2 for the questions. Responding to caregivers in an appropriate time frame is clearly an important factor to remember when conducting clinical research. However, with wait times for appointments, it might be appropriate to ask about the caregivers' expectations related to these wait times. This can help health care providers be more reassuring towards the caregivers and be honest with them from the start about how long they believe the wait time might be. Within the empathy construct, the question related to scheduling appointments also had a wide standard deviation value indicating a need for improvement. This is a factor that can be solved by further researching what barriers exist that make scheduling these appointments more difficult. The usability construct had three questions with standard deviation values that ranged from 0.00-0.69 between the three questions. This finding indicates that the usability of telehealth certainly satisfies caregivers to some degree and can be utilized in the future for developmental and ASD screening practices.

Limitations

While there were several factors that contributed to the success of this study, there were still limitations that could be improved upon, particularly related to the sample population. This study needs a large sample to more accurately reflect how telehealth affects parent satisfaction. Within this study, there were size and language limitations as well as other inclusion criteria that limited who could participate. The sample population was limited significantly to 15 participants out of the 40+ participants in the A4A program. Participants were invited to take the survey if

they spoke English, had been in the program for more than three months, and had attended both an in-person and telehealth appointment.

Implications

The findings of this study allow for earlier diagnosis of ASD which leads to earlier implementation of interventions for these young children. As shown in Figure 5, the participants of the survey felt that telehealth appointments are equal to in-person appointments in regard to the level of care received for this child, which means that overall caregivers seemed to be satisfied with this method of developmental screening. This finding highlights that telehealth can continue to be used in the future to screen for ASD without compromising the quality of care given. This study's findings also help to break down barriers to accessing health care for young children. Low socioeconomic status is often a barrier to health care access and is often equated with having internet or smartphone issues. However, this study included participants from various socioeconomic statuses and access to the technology for video visits was not a problem that arose.

Recommendations

While this study included well-structured components, future changes can aide in improving how this study is conducted and provide more accurate results. The most important recommendation is to follow-up the survey with a larger sample size to obtain more precise results that allow for a greater understanding of the satisfaction level of the caregivers. It would also be appropriate to translate the survey into Spanish and Marshallese as patients who speak these languages are also part of the A4A program. Including participants in the survey from different racial backgrounds allows for more accurate results and can help determine trends that might exist between different ethnicities. Another recommendation would be to further

investigate the responsiveness construct which had the greatest variance of the six. It might be beneficial to determine the caregivers' expectations about wait times prior to completing the survey which can guide how to be more responsive to these caregivers.

Conclusion

This study aimed to discover how developmental screening in ASD patients via telehealth appointments affects parent satisfaction levels. By utilizing the patient satisfaction survey, it was determined that a majority of the caregivers believed the level of care received in telehealth appointments was equal to the care received in an in-person appointment. This finding supports the idea that telehealth integration in developmental screening practices is vital to providing care at an early age to aid with developmental delays. By further investigating problems or hesitations that caregivers might have with the telehealth format, health care providers are able to appropriately provide solutions that prompt a sense of ease. Telehealth helps to break down barriers to accessing and implementing interventions for these young children who have developmental delays.

References:

Achenie, L., Scarpa, A., Factor, R. S., Wang, T., Robins, D. L., & McCrickard, D. S. (2019). A machine learning strategy for autism screening in toddlers. *Journal of developmental and behavioral pediatrics: JDBP*, *40*(5), 369–376. https://doi.org/10.1097/DBP.0000000000000668

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). https://doi.org/10.1176/appi.books.9780890425596

ASQ-3. Ages and Stages. (2022). Retrieved from https://agesandstages.com/products-pricing/asq3/

Autism Speaks. CDC increases estimate of autism's prevalence by 15 percent, to 1 in 59 children. 2018. www.autismspeaks.org/science-news/cdc-increasesestimate-autisms-prevalence-15-percent-1-59-children

Baio J, Wiggins L, & Christensen DL, et al. Prevalence of autism spectrum disorder among children aged 8 years—Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2014. MMWR Surveill Summ. 2018;67(6):1-23

Broder Fingert, S., Carter, A., Pierce, K., Stone, W. L., Wetherby, A., Scheldrick, C., Smith, C., Bacon, E., James, S. N., Ibañez, L., & Feinberg, E. (2019). Implementing systems-based innovations to improve access to early screening, diagnosis, and treatment services for children with autism spectrum disorder: An Autism Spectrum Disorder Pediatric, Early Detection, Engagement, and Services network study. *Autism: the international journal of research and practice*, *23*(3), 653–664. https://doi.org/10.1177/1362361318766238

Campbell, K., Carpenter, K., Espinosa, S., Hashemi, J., Qiu, Q., Tepper, M., Calderbank, R., Sapiro, G., Egger, H. L., Baker, J. P., & Dawson, G. (2017). Use of a digital modified

checklist for autism in toddlers - revised with follow-up to improve quality of screening for autism. *The Journal of pediatrics, 183*, 133–139.e1. https://doi.org/10.1016/j.jpeds.2017.01.021

Centers for Disease Control and Prevention. (2020, March 13). *Screening and diagnosis of autism spectrum disorder*. Centers for Disease Control and Prevention. Retrieved from https://www.cdc.gov/ncbddd/autism/screening.html

Centers for Disease Control and Prevention. (2020). *What is autism spectrum disorder?* Centers for Disease Control and Prevention. Retrieved from https://www.cdc.gov/ncbddd/autism/facts.html.

Crowell, J. A., Keluskar, J., & Gorecki, A. (2019). Parenting behavior and the development of children with autism spectrum disorder. *Comprehensive psychiatry*, *90*, 21–29. https://doi.org/10.1016/j.comppsych.2018.11.007

Demeke, H. B. (2021). *Trends in use of telehealth among health centers during the COVID-19 pandemic - United States, June 26–November 6, 2020*. Centers for Disease Control and Prevention. Retrieved from https://www.cdc.gov/mmwr/volumes/70/wr/mm7007a3.htm

Guthrie, W., Wallis, K., Bennett, A., Brooks, E., Dudley, J., Gerdes, M., Pandey, J., Levy, S. E., Schultz, R. T., & Miller, J. S. (2019). Accuracy of Autism Screening in a Large Pediatric Network. *Journal of the American Academy of Pediatrics, 144*(4), e20183963. https://doi.org/10.1542/peds.2018-3963

Hirai AH, Kogan MD, Kandasamy V, Reuland C, Bethell C. Prevalence and variation of developmental screening and surveillance in early childhood. JAMA Pediatr. 2018;172(9):857-866.

Hodges, H., Fealko, C., & Soares, N. (2020). Autism spectrum disorder: Definition, epidemiology, causes, and clinical evaluation. *Translational pediatrics, 9*(Suppl 1), S55–S65. https://doi.org/10.21037/tp.2019.09.09

Kilmer, Michele. (2020). Primary care of children with autism spectrum disorder: Developing confident healthcare leaders. *The Nurse Practitioner Journal, 45*(5), p 41-47. doi: 10.1097/01.NPR.0000660352.52766.72

Levy, S. E., Wolfe, A., Coury, D., Duby, J., Farmer, J., Schor, E., Van Cleave, J., & Warren, Z. (2020). Screening tools for autism spectrum disorder in primary care: A systematic evidence review. *Journal of the American Academy of Pediatrics, 145*(Suppl 1), S47–S59. https://doi.org/10.1542/peds.2019-1895H

Lin, E. D., Guntu, M., Sezgin, E., McLaughlin, L., Ganta, R., Lee, J., Ramtekkar, U., Huang, Y., & Linwood, S. L. (2022). Rapid Development of a Telehealth Patient Satisfaction Survey Using a Multi-Stakeholder Approach. *Telemedicine journal and e-health: The official journal of the American Telemedicine Association*, 10.1089/tmj.2021.0371. Advance online publication. https://doi.org/10.1089/tmj.2021.0371

Lipkin, P. H., Macias, M. M., & Council on Children with Disabilities (2020). Promoting optimal development: Identifying infants and young children with developmental disorders through developmental surveillance and screening. *Journal of the American Academy of Pediatrics*, *145*(1), e20193449. https://doi.org/10.1542/peds.2019-3449

Maenner MJ, Shaw KA, Bakian AV, et al. Prevalence and Characteristics of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2018. MMWR Surveill

Summ 2021;70(No. SS-11):1–16. DOI: http://dx.doi.org/10.15585/mmwr.ss7011a1external icon.

Maenner MJ, Shaw KA, Baio J, et al. (2016). Prevalence of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States. MMWR Surveill Summ 2020;69(No. SS-4):1–12. DOI: http://dx.doi.org/10.15585/mmwr.ss6904a1

Majid S, Foo S, Luyt B, et al. Adopting evidence-based practice in clinical decision making: nurses' perceptions, knowledge, and barriers. J Med Libr Assoc. 2011; 99(3):229-236.

Mammoser G. Here's the big reason that autism rates have increased again. 2018. www.healthline.com/health-news/the-big-reason-autism-rates-increased-again#1

McNally Keehn, R., Ciccarelli, M., Szczepaniak, D., Tomlin, A., Lock, T., & Swigonski, N. (2020). A statewide tiered system for screening and diagnosis of autism spectrum disorder. *Journal of the American Academy of Pediatrics*, *146*(2), e20193876. https://doi.org/10.1542/peds.2019-3876

Radecki L, Sand-Loud N, O'Connor KG, Sharp S, Olson LM. Trends in the use of standardized tools for developmental screening in early childhood: 2002-2009. Pediatrics. 2011;128(1):14-19.

Schrader, E., Delehanty, A. D., Casler, A., Petrie, E., Rivera, A., Harrison, K., Paterniti, T., Sebastiany, L., Nottke, C., Sohl, K., Levy, S. E., & Wetherby, A. M. (2020). Integrating a new online autism screening tool in primary care to lower the age of referral. *Clinical Pediatrics*, *59*(3), 305–309. https://doi.org/10.1177/0009922819900947

Talbott, M. R., Dufek, S., Zwaigenbaum, L., Bryson, S., Brian, J., Smith, I. M., & Rogers, S. J. (2020). Brief report: Preliminary feasibility of the TEDI: A novel parent-administered

telehealth assessment for autism spectrum disorder symptoms in the first year of life. *Journal of autism and developmental disorders*, *50*(9), 3432–3439. https://doi.org/10.1007/s10803-019-04314-4

Tariq, Q., Daniels, J., Schwartz, J. N., Washington, P., Kalantarian, H., & Wall, D. P. (2018). Mobile detection of autism through machine learning on home video: A development and prospective validation study. *PLoS medicine*, *15*(11), e1002705. https://doi.org/10.1371/journal.pmed.1002705

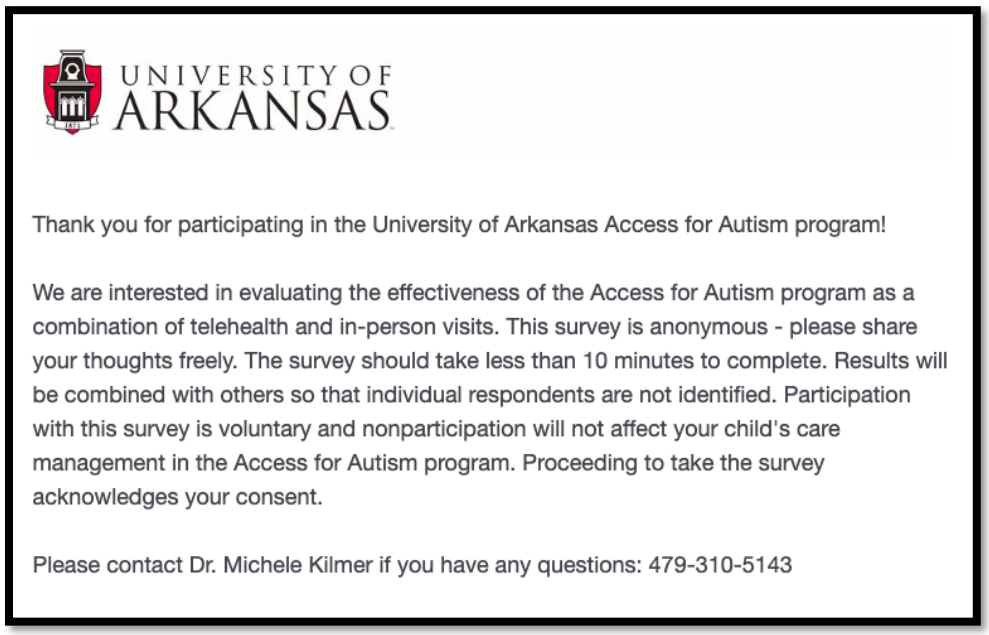
Wallis L. Barriers to implementing evidence-based practice remain high for U.S. nurses: getting past "We've Always Done It This Way" is crucial. Am J Nurs. 2012;112(12):15.

Zablotsky B, Black LI, Maenner MJ, Schieve LA, Blumberg SJ (a). Estimated prevalence of autism and other developmental disabilities following questionnaire changes in the 2014 National Health Interview Survey. Natl Health Stat Report. 2015;(87):1-20.

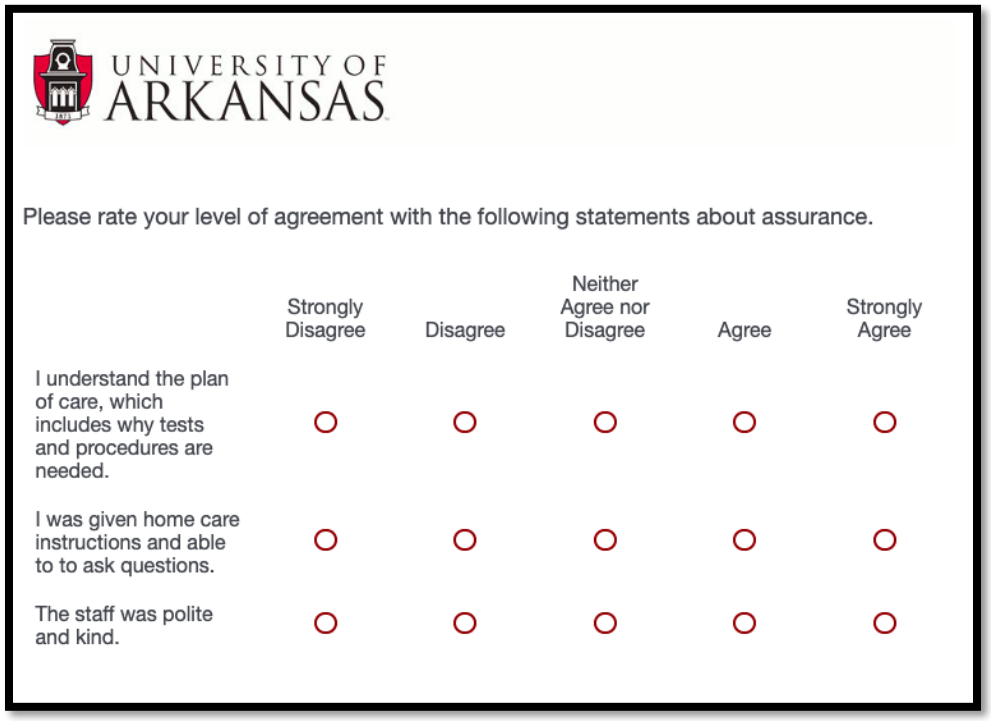
Appendix

This appendix consists of a 13-question satisfaction survey utilized in this study. The survey was sent through the University of Arkansas Qualtrics survey system.

Introductory Statement



Question 1

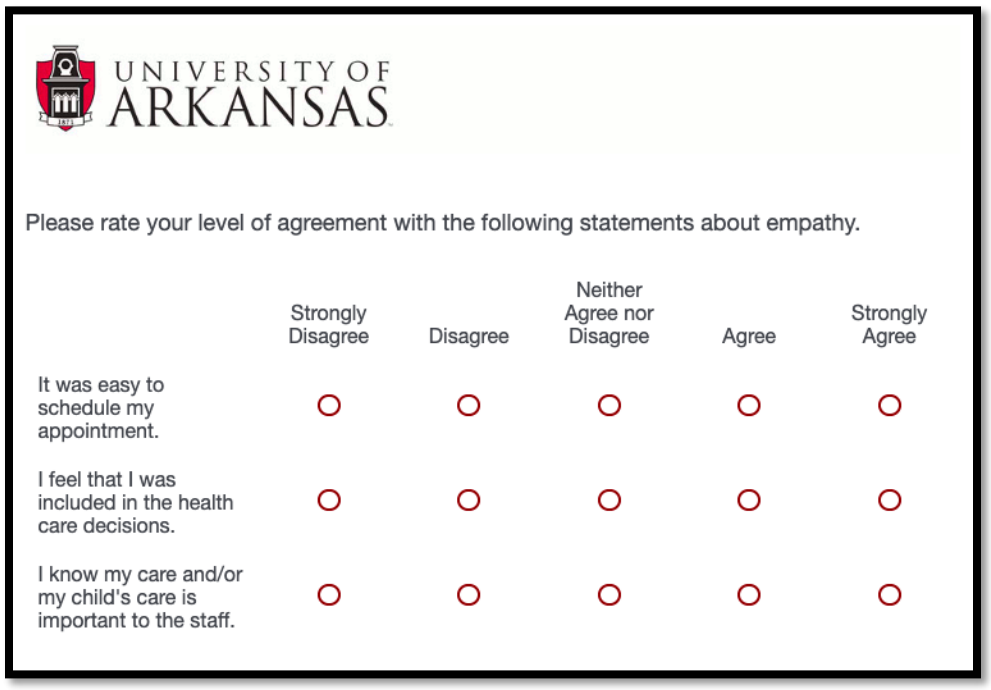


UNIVERSITY OF ARKANSAS

Please rate your level of agreement with the following statements about assurance.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I understand the plan of care, which includes why tests and procedures are needed.	○	○	○	○	○
I was given home care instructions and able to to ask questions.	○	○	○	○	○
The staff was polite and kind.	○	○	○	○	○

Question 2

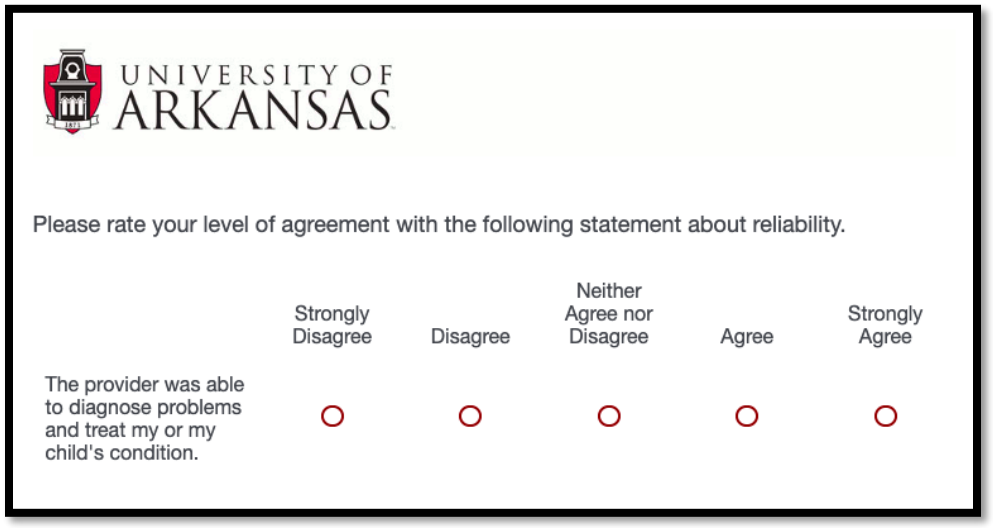


UNIVERSITY OF ARKANSAS

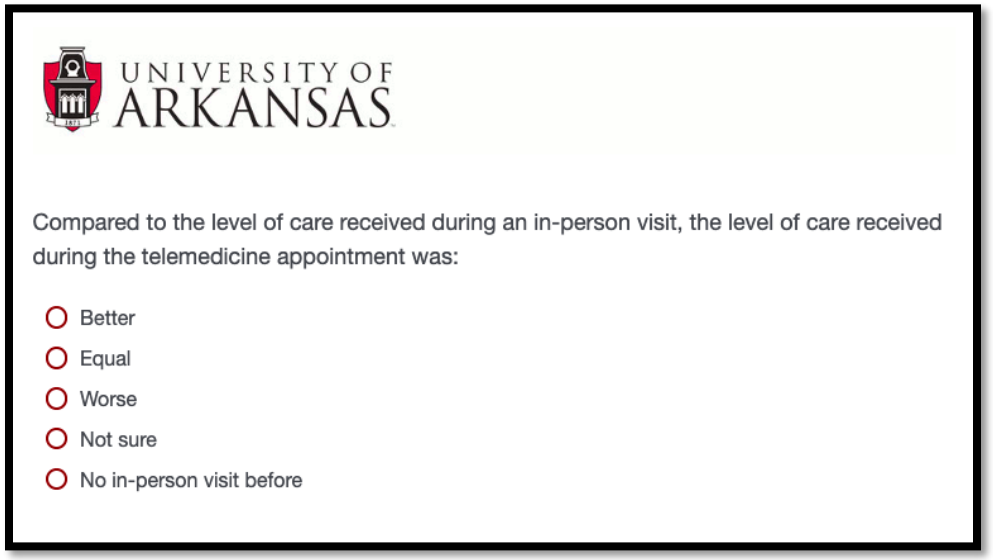
Please rate your level of agreement with the following statements about empathy.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
It was easy to schedule my appointment.	○	○	○	○	○
I feel that I was included in the health care decisions.	○	○	○	○	○
I know my care and/or my child's care is important to the staff.	○	○	○	○	○

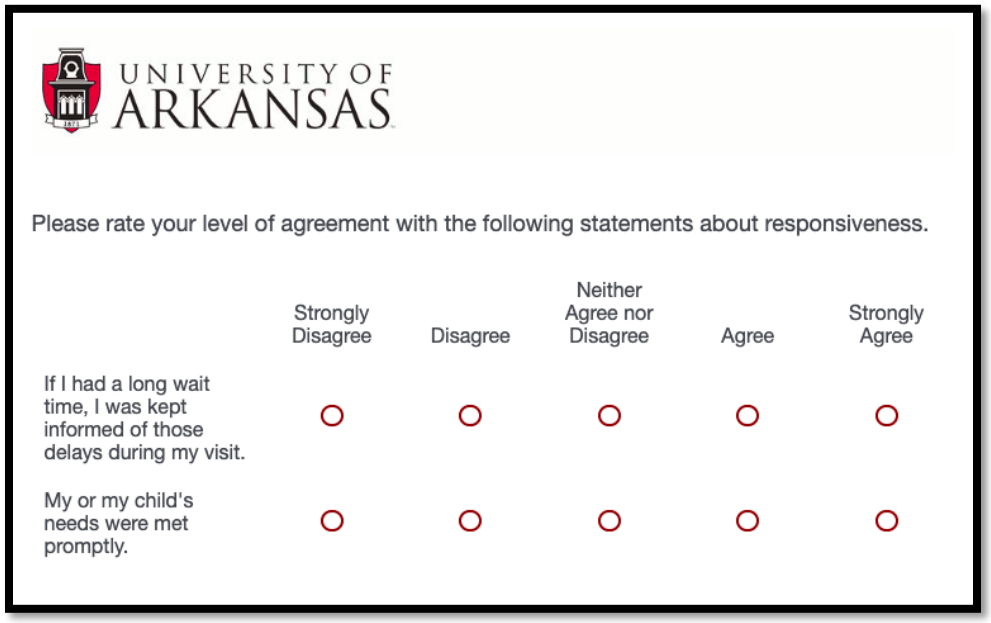
Question 3



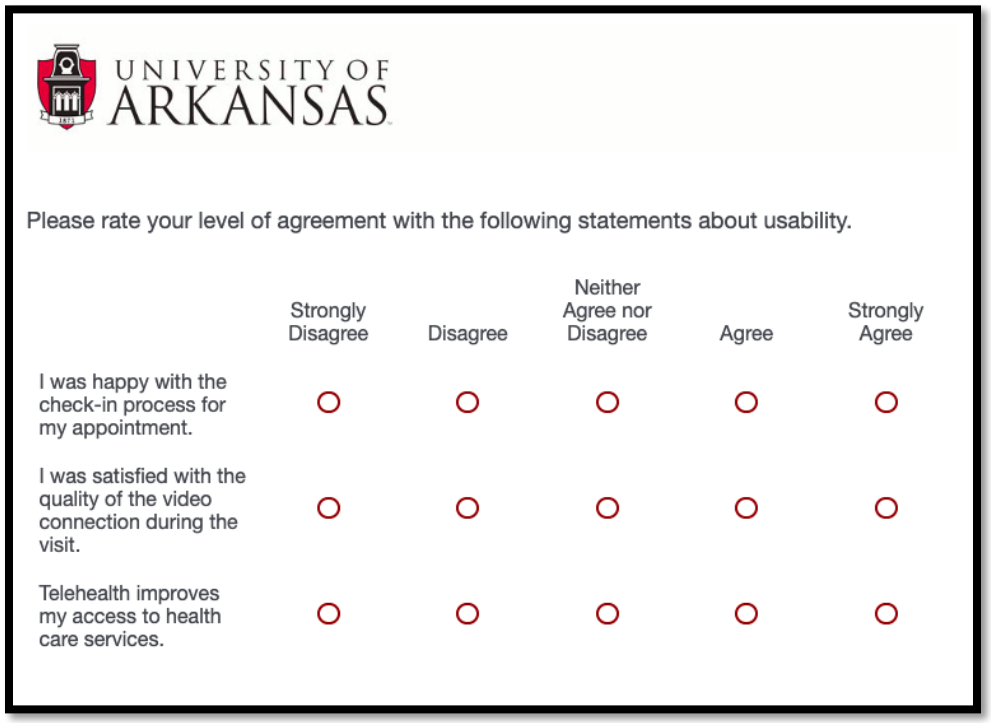
Question 4



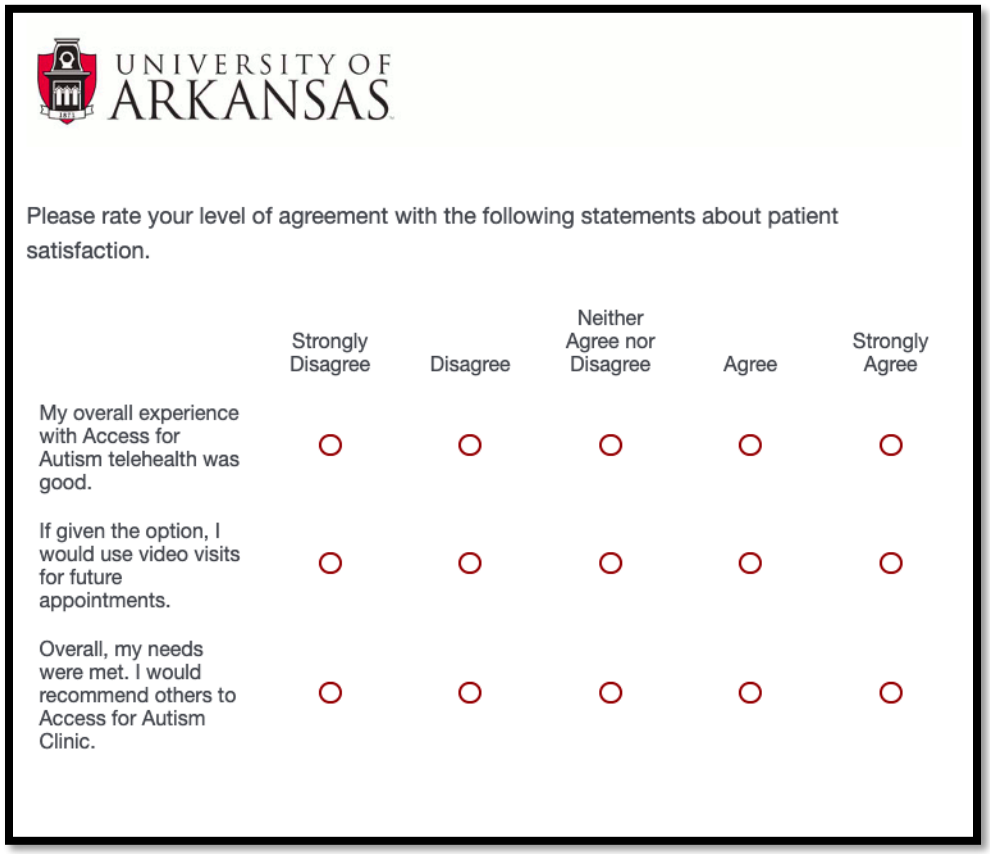
Question 5



Question 6



Question 7

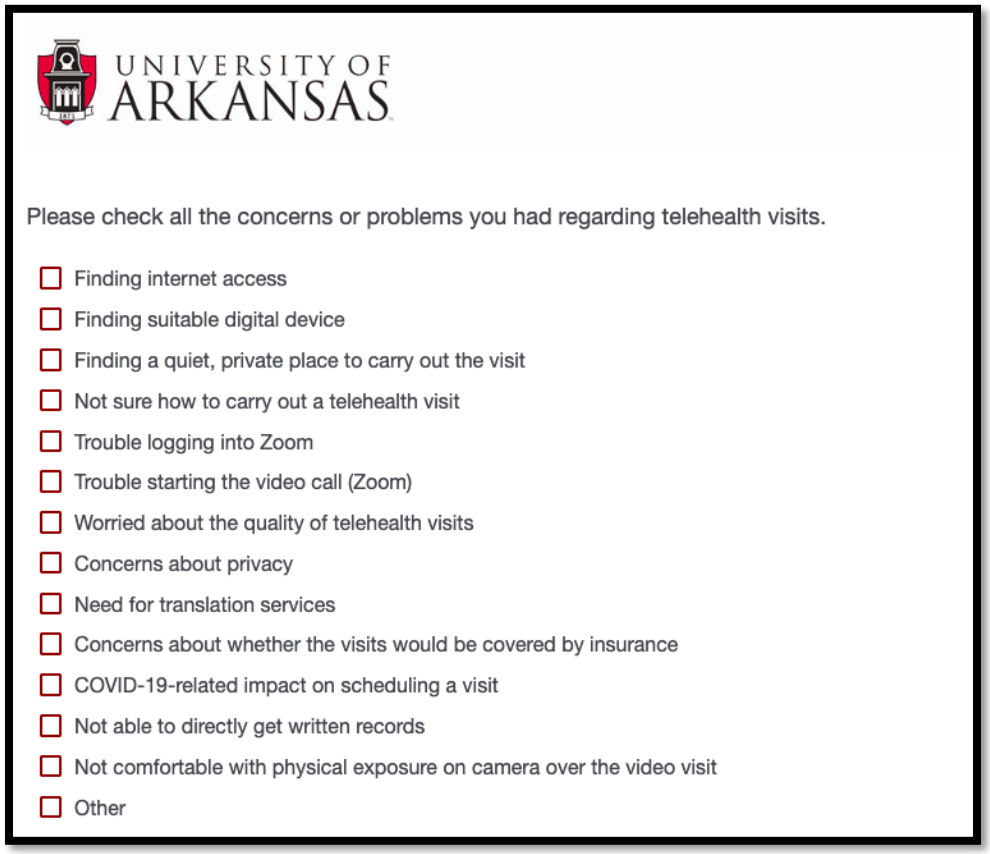


UNIVERSITY OF ARKANSAS

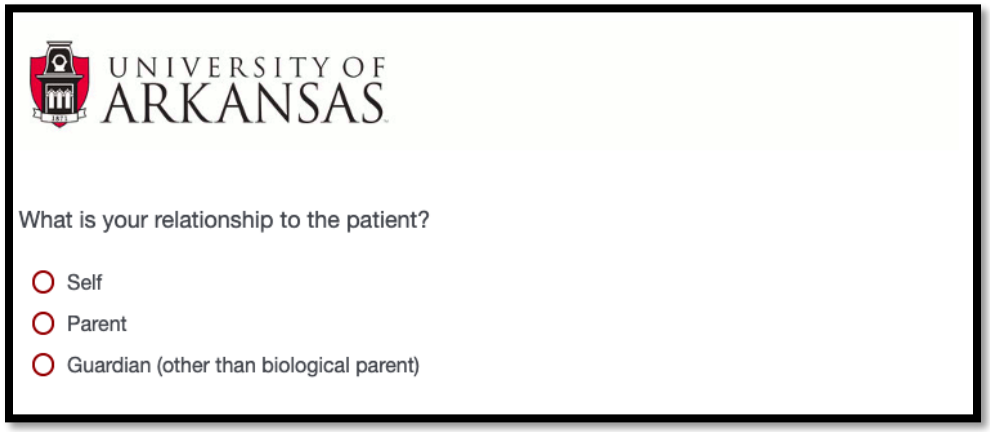
Please rate your level of agreement with the following statements about patient satisfaction.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
My overall experience with Access for Autism telehealth was good.	○	○	○	○	○
If given the option, I would use video visits for future appointments.	○	○	○	○	○
Overall, my needs were met. I would recommend others to Access for Autism Clinic.	○	○	○	○	○

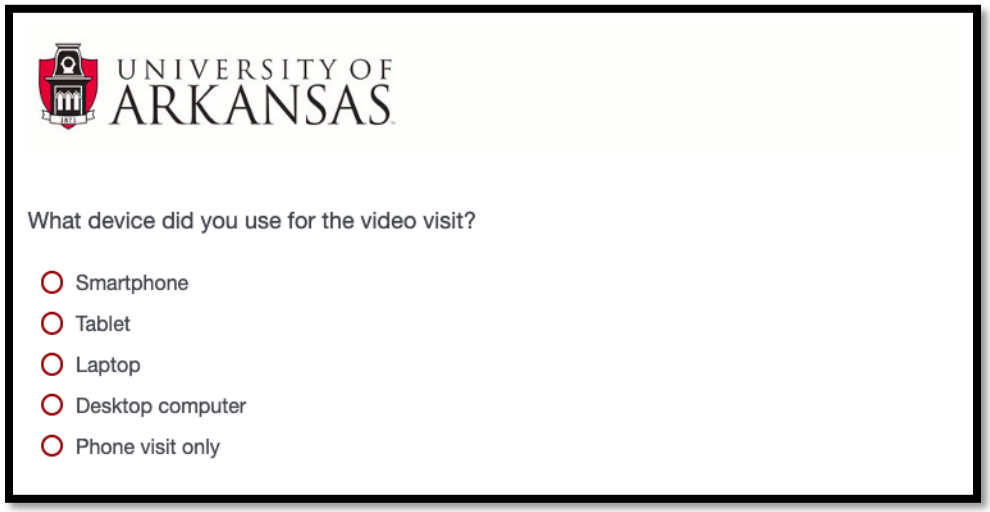
Question 8



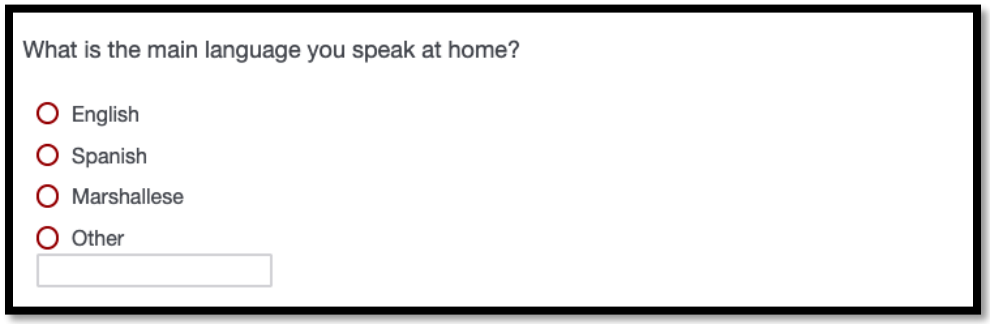
Question 9



Question 10



Question 11



Question 12

Question 13