



Identifying the General Attitudes of Psychologists and Behavior Analysts Toward Telehealth Services

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Abstract:

The distant provision of behavioral interventions is crucial during the COVID-19 pandemic. This study explored the attitudes of psychologists and behavior analysts toward telehealth-based applied behavioral analysis (ABA) to support individuals with disabilities in Saudi Arabia. It addressed two main issues: the lack of corroborated empirical evidence on the effectiveness of telehealth models for ABA services and the limited research on practitioners' attitudes toward using such services. This study utilized a quantitative survey method, formulating 20 items to collect data from 104 participants about their perceptions of telehealth-based ABA services. The results demonstrated that 53% of participants were aware of the telehealth concept in ABA. The majority (88%) expressed willingness to provide telehealth services if adequate training is provided. Conversely, 43% disagreed with the notion that telehealth offers the same benefits as direct healthcare services. The study highlights a general willingness among practitioners to adopt telehealth for ABA with proper training, despite some skepticism about its effectiveness compared to direct services. This underscores the need for further research and training programs to enhance the implementation of telehealth-based ABA.

Keywords: Humans, Pandemics, Saudi Arabia, COVID-19, Telehealth.

Introduction

Problem Statement

Studies that investigate the application of telehealth services in applied behavioral analysis (ABA) during the COVID-19 pandemic are few. Consequently, corroborated empirical evidence on the effectiveness of using telehealth models for providing ABA services to individuals with

disabilities is inadequate. Thus, addressing this research gap is crucial for ensuring the effective delivery of ABA services via telehealth during COVID-19. Furthermore, a lack of research exists on the attitudes of psychologists and behavior analysts toward using telehealth-based ABA services to support individuals with disabilities. Perceptions toward a specific technology determine the extent to and the excellence with which they use it. Hence, understanding the attitudes of behavior analysts and psychologists toward telehealth services in ABA can enable healthcare organizations to determine how effectively these professionals can implement technology to support individuals with disabilities. Thus, addressing the two abovementioned problems provides a robust theoretical underpinning for the facilitation of efficient telehealth applications for delivering essential ABA services to individuals with disabilities.

Purpose of the Study

This study aimed to identify the general attitudes of psychologists and behavior analysts toward the use of telehealth-based ABA services to support individuals with disabilities.

Specifically, the study focused on three primary objectives:

- I. to identify the utility of telehealth services in ABA for individuals with disabilities;
- II. to determine obstacles and factors that hinder psychologists and behavior analysts from delivering telehealth services in ABA to individuals with disabilities; and
- III. to highlight the factors that influence the effectiveness of ABA telehealth services on individuals with disabilities.

Telehealth and ABA

Telehealth facilitates training in ABA and treatment interventions based on ABA. The study illustrates that people have utilized telehealth to provide ABA services to individuals with disabilities. Unholz-Bowden et al. (2020) underlined telehealth utility as a service delivery model for offering ABA services and training caregivers to execute behavior analyses and

procedures. Furthermore, telehealth enables people to overcome the geographical barriers that hinder the access of families with children with disabilities to ABA services. Technology is increasingly a core component of modern life with tablets, smartphones, fast Internet connections, and laptops becoming ubiquitous and increasingly affordable. Accordingly, healthcare organizations (HCOs) have embraced technology to deliver innovative services to individuals with behavioral problems (Tomlinson et al., 2018; Boutain et al., 2020). Telehealth denotes the application of technology to provide medical services. In addition, telehealth encompasses communication via email; telephone; virtual reality; robotics; video and audio conferencing; online chatrooms, Internet- or computer-based intervention; and wearables and sensor technologies. It also includes the usage of smart applications to deliver unlimited access to medical facilities (Tomlinson et al., 2018; Pellegrino & DiGennaro Reed, 2020; Rispoli & Machalicek, 2020). In general, telehealth advances clinical services to individuals across geographical locations by enhancing access.

Science of ABA

Scholars provided diverse definitions of the science of ABA. For example, Horn et al. (2016) confirmed that ABA is an applied science intended to determine environmental variables that form socially significant behavior and design interventions accordingly. Recent research corroborated that early and intensive interventions utilizing ABA principles can help professionals equip children with autism with essential support skills (Boutain et al., 2020; Hernandez & Ikkanda, 2011). Similarly, other authors defined ABA as a science based on behavioral principles derived through systematic experimentation. As an applied science, it is centered on the evaluation and adaptation of human behavior. Therefore, applying telehealth services to the ABA field can bridge the gap between needs and access to services.

Telehealth as a Facilitator of ABA Training and ABA-Based Treatment

Contemporary research validates that individuals have used telehealth to deliver behavioral services for various psychological disorders to families. Telehealth facilitates clinical services to individuals via electronic technology (Unholz-Bowden et al., 2020; Zoder-Martell et al., 2020). Thus, it enables ABA-based services. Moreover, parents consider the telehealth model an acceptable mechanism for health delivery in clinical contexts (Unholz-Bowden et al., 2020; LeBlanc et al., 2020). According to Lindgren et al. (2016), parents that receive ABA-based services through telehealth reported high ratings of treatment acceptability, which is similar to parents receiving services at home with on-site behavior analysts. Undoubtedly, conducting ABA training via telehealth is critical for enhancing its efficacy.

Challenges of Using Telehealth to Deliver ABA Services

Providing telehealth-based ABA services denies service providers the opportunity to experience direct contact with clients. This lack of personal touch with clients may reduce the quality of ABA services delivered via telehealth (LeBlanc et al., 2020). In addition, delivering ABA intervention via telehealth requires behavior analysts to possess the necessary technical skills. Therefore, the shortage of experts with such competencies constrains telehealth services in ABA (Unholz-Bowden et al., 2020; Rispoli & Machalicek, 2020). The in-person delivery of the modification of ABA services to telehealth is a daunting task, especially when these technologies lack social validity (Rispoli & Machalicek, 2020). Furthermore, telehealth creates numerous potential threats associated with privacy, which may cause harm to recipients of health services (Alqahtani et al., 2020; Tuerk & Shore, 2014). Thus, healthcare professionals that provide telehealth services should understand how to protect the privacy of clients and ensure that third parties cannot access sensitive personal information. The lack of sufficient knowledge in

telehealth services may also impede its acceptability in facilitating ABA services for children with autism (Unholz-Bowden et al., 2020; Boutain et al., 2020; Schieltz & Wacker, 2020). The COVID-19 pandemic has limited face-to-face interaction between service providers and clients and has challenged behavior analysts in fulfilling the needs of clients (Britwum et al., 2020). Furthermore, many countries lack official regulations and frameworks for the authorization and integration of telehealth services in their healthcare systems (Alqahtani et al., 2020). These factors prevent healthcare professionals from effectively utilizing telehealth.

COVID-19 and the Delivery of ABA Services via Telehealth

Telehealth has been essential for the delivery of ABA services during the COVID-19 pandemic. Cox et al. (2020) argued against a blanket construction that in-person ABA services for clients should continue during the COVID-19 pandemic and contended that the threats of continued in-person ABA services are counteractive and may be warranted in rare cases. Incidentally, telehealth technologies provide useful modalities of service delivery, which enables health providers to ensure continuity of care for families and children with autism (LeBlanc et al., 2020; Britwum et al., 2020; Zoder-Martell et al., 2020). Additionally, Rodriguez (2020) expressed that health providers can continue delivering ABA services to children with autism and supporting affected clients by implementing various telehealth modalities. Specifically, telehealth-based ABA services provide families with access to a reasonable continuity of care for their loved ones (LeBlanc et al., 2020; Britwum et al., 2020). By utilizing distinct telehealth models for service delivery, behavior analysts can adhere to standards encapsulated in the *Professional and Ethical Compliance Code for Behavior Analysts*, which emphasizes the importance of acting in the best interests of clients and preventing interruptions during the process of intervention (LeBlanc et al., 2020). Successful

telehealth-based ABA interventions, that is, conducting long-distance functional assessment and communication training, necessitate high levels of technical skill (Britwum et al., 2020). Thus, telehealth can be used to provide effective ABA-based treatment while minimizing exposure to COVID-19.

Effectiveness of Telehealth Services in ABA on Parents and Children

Achieving effective telehealth services in ABA is contingent on several aspects. Service providers should adjust sessions to the needs of clients to promote the necessary environmental circumstances for the reinforcement of effective interpersonal interactions during the delivery of ABA interventions (Britwum et al., 2020). Practitioners should include a detailed description of the session structure before meeting a client, a review of information on how to access a telehealth platform for the session, a discussion on the methods for identifying the appropriate physical environment with or without children, an assessment and a discussion of session goals, and a review of data collection sheets and feedback tools used during the session to prepare for telehealth-based ABA sessions (Britwum et al., 2020). Moreover, providers should apply the principles of fidelity and fairness to establish a trustful and empathetic connection with clients and ensure that they feel comfortable (Britwum et al., 2020). Extensive training for service providers and parents also promotes telehealth services in ABA. Parent training models focus on improving communication skills, developing child management and supervision skills, and establishing time-in (positive attention periods) and time-out (brief removal from reinforcing activities) techniques (Britwum et al., 2020). Training staff members and parents equips them with the skills necessary for utilizing telehealth technologies in ABA services (Ferguson et al., 2019; Britwum et al., 2020; Tomlinson et al., 2018; Pellegrino & DiGennaro Reed, 2020; Schieltz & Wacker, 2020). In general,

these considerations can improve the quality of telehealth services in ABA for parents and children.

Ethical Considerations

As per Britwum et al. (2020), several ethical principles influence decision making regarding the delivery of telehealth services in ABA during COVID-19, including nonmaleficence, beneficence, fairness, and fidelity. Nonmaleficence emphasizes a duty not to harm other people. The tenet necessitates the use of telehealth services in ABA to eliminate or reduce conditions inherent in situations that may place individuals at risk of contracting harmful consequences due to exposure to such circumstances. By contrast, beneficence emphasizes the need to promote events that contribute to the well-being of others by conferring their benefits and fostering positive outcomes (Resnik, 2011). Accordingly, behavior analysts that provide ABA services via telehealth should avoid potential harm and contribute to the well-being of clients. Furthermore, the ethical principle of fairness implies that all parties involved in treatment must be treated equally. Finally, fidelity highlights the promises of behavior analysts to clients. Using telehealth services in ABA requires that behavior analysts exhibit commitment toward the delivery of effective and appropriate treatment to children with autism.

In summary, telehealth provides a useful platform for delivering ABA services across geographical regions. Telehealth has facilitated ABA services despite social distancing protocols, which constrained face-to-face consultations during COVID-19. Furthermore, telehealth facilitates ABA training and ABA-based treatment interventions (e.g., long-distance functional assessment and communication training), which made ABA service delivery to individuals with disabilities more effective, particularly during the pandemic.

Key Terms

First, telehealth denotes the application of telecommunication and information technology to deliver behavioral health services, such as diagnosis, assessment, consultation, intervention, education, supervision, and information over long distances (Marcoux & Vogenberg, 2016).

Second, ABA is an applied science in which procedures emphasize behavior principles through systematic scientific experimentation (Critchfield & Reed, 2017).

Third, behavior analytic interventions are highly effective ones based on ABA principles and are employed to support children with autism (Granpeesheh et al., 2009).

Fourth, individual with disabilities are people with physical or mental impairments that substantially limit one or more major life activities (Francis & Silvers, 2016).

Fifth, coronavirus disease 2019 or COVID-19, which was caused by the severe acute respiratory syndrome coronavirus 2, first identified in December 2019 in Wuhan, China, and has rapidly spread worldwide (Chauhan, 2020). As per the source, the World Health Organization declared the outbreak a public health emergency of international concern on January 30, 2020, and recognized it as a pandemic on March 11, 2020.

Finally, a telehealth-based ABA service is an applied behavioral-analytic treatment delivered through telecommunication and information technology over long distances (Tomlinson et al., 2018).

Methods

Setting

This study was conducted in Saudi Arabia and targeted psychologists and behavior analysts in HCOs and centers for individuals with disabilities. Selecting these two contexts enabled the researchers to recruit an adequate sample of psychologists and behavior analysts within a defined region to collect sufficient quantitative data.

Ethical Considerations

The researchers adhered to several protocols, including informed consent, privacy, confidentiality, and avoidance of the potential influence of the researchers on the responses of the participants. A written consent section was presented at the beginning of the questionnaire, which emphasized the privacy and confidentiality of the responses of the respondents. Data were obtained from psychologists and behavior analysts through an electronic questionnaire.

Design

The quantitative survey method was employed in which the researchers posed a set of predetermined questions. This method was selected, because the research intended to describe a vast group of individuals (Showkat & Parveen, 2017). This strategy was appropriate, because it enabled the researchers to systematically collect quantitative data from a reasonably extensive sample and quantitatively describe the attitudes.

The strategy entailed the collection of data on the general perceptions of the psychologists and behavior analysts toward the use of telehealth-based ABA services to support individuals with disabilities. Using the survey, the researchers endeavored to elicit relevant information directly from the participants. The survey method enabled the researcher to draw reliable and valid data in a structured format to enable convenient analysis and reporting.

Population and Sampling

The study population included psychologists and behavior analysts in HCOs and centers for individuals with disabilities in Saudi Arabia. The sampling method used was convenience sampling; the respondents were selected using the purposive sampling strategy among providers of ABA intervention. The researchers sent an electronic questionnaire (Appendix 1) and received 104 responses. The rationale for selecting the sampling method included its ability to enable researchers to select ready

and available individuals, convenience, time, and cost-effectiveness. The sample ($n = 104$) was sufficient for providing diverse responses.

Data Collection

Data were collected using Google Forms, then coded and processed using Microsoft Excel and Statistical Package for the Social Sciences, version 23. The descriptive statistics, including frequencies and percentages, means, and standard deviations, were analyzed to describe the items and the study variables. The researcher collected data using an electronic questionnaire with 20 items, which were positively worded. When the items were aggregated, high scores indicated positive attitudes. The items were divided into four sections (Appendix 1), which focused on the general attitudes of psychologists and behavior analysts toward ABA telehealth services, opinions about relevant features, obstacles in delivery, and recommendations for increasing the effectiveness of these services, respectively. The researchers distributed the questionnaire through email. Items were rated using a five-point Likert-type scale (1 = *Strongly disagree* to 5 = *Strongly agree*). Four experts in the fields of ABA, speech and language pathology, counseling psychology, and special education, respectively, reviewed all items. Analysis of individual items was completed using measures, such as percentages and means, because the Likert ratings were measured at the ordinal measurement level. To analyze the sections, the mean and the standard deviation of the items were used, because aggregate the Likert scales were measured at the interval measurement level.

Results

The online questionnaire was sent to 150 randomly selected people, and 104 participants responded (response rate: 69.3%). The respondents comprised 76 (73%) women and 28 (27%) men.

The respondents who provided telehealth services reached 65 (62.5%) compared with 39 (37.5%) who did not provide any

telehealth services. Nevertheless, 38 (36.5%) provided telehealth services in ABA compared with 66 (63.5%) who did not. Out of those who provided general telehealth services, 58.5% provided telehealth services in ABA.

Figure 1 indicates that the majority of the respondents (53%) were aware of the concept of telehealth in ABA. The remaining participants were neutral or unfamiliar with the concept.

Section 1: General Attitudes of Psychologists and Behavior Analysts

This component included items 5, 6, 7, and 10 in the questionnaire. Table 1 summarizes the percentages of ratings for each item. The results indicated that the majority (88%) were willing to provide telehealth services if adequate training was provided. However, many (38%) were neutral about telehealth as an alternative to direct healthcare services. Moreover, 43% disagreed with the statement that telehealth provides the same benefits as direct healthcare services, while 35% were willing to provide telehealth services in the future.

The mean response of the four items of component 1 was 3.3 with a standard deviation of 1.2, which indicates that the general attitude of the respondents was between *Agree* (4) and *Neutral* (3).

Section 2: Utility of Telehealth Services in ABA for Individuals with Disabilities

This component measured the necessity of telehealth services in ABA for individuals with disabilities (items 8 and 9). Table 2 depicts that more than half of the respondents (51%) agreed with the statement that the telehealth concept reduced multiple burdens on families of individuals with disabilities. However, 47% believed that telehealth services were essential to clients during the COVID-19 pandemic.

The mean of items 8 and 9 was 3.9, while the standard deviation was 0.9, which demonstrate that the respondents

agreed on the high utility of telehealth during the COVID-19 pandemic.

Component 3: Obstacles and Factors Hindering Psychologists and Behavior Analysts

This component measured the difficulties faced by the respondents when conducting telehealth sessions for individuals with disabilities (items 11, 14, and 15). Table 3 highlights that the majority (85%) strongly agreed that technology was the principal obstacle in providing telehealth services, while a high percentage (77%) pointed to the lack of direct communication with individuals with disabilities as an essential hurdle. The same percentage (77%) believed that the applied nature and practical steps of ABA contributed to the success of telehealth.

In summary, the majority agreed that technology, direct communication, and the applied nature of ABA were major obstacles to the spread of telehealth (mean = 4.0, SD = 0.8). The participants expressed that the nature of ABA made service delivery through telehealth easy instead of viewing its nature as an obstacle.

Component 4: Factors that Render Telehealth More Effective

This last component measured the factors that make telehealth services effective for individuals with disabilities (items 12, 13, and 16–20). Table 4 illustrates that the cooperation of families of individuals with disabilities was rated as an important factor (93%). The skills of persons receiving telehealth services, such as level of functioning, comprised another significant factor for the success of telehealth (78%). The training of service providers and families of individuals with disabilities on telehealth technology was considered crucial for its success (91% and 96%, respectively). Moreover, the reduction of financial costs through telehealth services compared with regular healthcare services was also highly rated (73%). Another factor, the clear identification of behavioral goals for children, obtained a considerably high score (93%). Empowering

parents in training their children according to the ABA principles and procedures was rated as 95%.

The combined items reached a mean of 4.3 and a standard deviation of 0.8, which indicates a rating between *Agree* and *Strongly agree* on the seven items surveyed.

Comparing Telehealth and Non-Telehealth Providers

An independent *t*-test was conducted to compare between respondents who provided and did not provide telehealth services in daily practice. Table 5 indicates that the differences between them were nonsignificant for the four components of the questionnaire.

The comparison was achieved by summing up the scores of all the items per section.

Table 6 verifies that the differences between the two groups were nonsignificant for all components of the questionnaire.

These results confirm that no significant difference exists in the rating of those who provided and did not provide telehealth services.

Internal Consistency of the Sections of the Questionnaire

The internal consistency or internal reliability of the questionnaire measures the relationship of the items in a specific section to one another and whether or not they measure the same trait or construct. The most common measure of internal reliability is Cronbach's alpha, which ranges between 0 and 1 and is considered a measure of the correlation between items. The higher the value of Cronbach's alpha, the higher the internal reliability of the component.

Table 7 presents that the internal reliability of components 1, 2, and 4 was between 0.7 and 0.8, which is acceptable, whereas that of component 3 was less than 0.5, which is considered unacceptable. This low internal reliability may be due to the limited number of questions (two questions) and unrelated items.

Discussion

Statistical analysis provides critical insights into telehealth services in ABA for individuals with disabilities. In general, the results align with those of previous findings and verify that telehealth services can be relatively useful for clients and healthcare providers. The respondents exhibited positive views on telehealth technology and believed that it could deliver health-related services without necessitating real-life interpersonal contact.

The sample was heterogeneous, which consisted of 76 (73%) women and 28 (27%) men, which may cause certain threats to the validity and generalizability of the results. Nevertheless, the study is explorative and provides initial insights into the application of ABA through telehealth. Interestingly, only 36.5% of the participants provided telehealth services in ABA, which indicates that psychologists and other healthcare professionals continue to experience biases and prejudices toward this technology. This finding may be explained by lack of awareness and high levels of conservatism as induced by poor technical knowledge and skills. Notably, psychologists and other healthcare professionals are afraid of using telehealth, as they do not know how to deliver it effectively and address technical difficulty (Unholz-Bowden et al., 2020; Rispoli & Machalicek, 2020).

Regarding the general attitudes of psychologists toward the use of ABA services to support individuals with disabilities, the vast majority responded with *Strongly agree* or *Agree* to the items in this section. The only item that obtained a low score (2.56) was item 7 (“The treatment benefits from telehealth are the same as those gained through direct health services”). Similarly, the responses to item 8 (“Telehealth services in applied behavior analysis reduce the health burden on the families of individuals with disabilities”) obtained a moderate score. This result indicates that psychologists and behavior analysts generally consider telehealth services less effective

compared with real-life face-to-face consultation with clients. This finding also aligns with those of previous studies that argued that telehealth providers may experience challenges associated with observing practice, collecting data, role-playing dexterity, and monitoring treatment fidelity (Tomlinson et al., 2018; Ferguson et al., 2019; Zoder-Martell et al., 2020). The literature also confirmed that if utilized properly, telehealth can provide numerous benefits and can be as effective as face-to-face interaction.

The set of items associated with the utility of telehealth ABA services for individuals with disabilities received a high level of the scale range ($M = 3.9$), which clearly indicates that the COVID-19 pandemic has changed the provision of healthcare services to clients and that psychologists opine that the major reason for increasing popularity of telehealth is COVID-19. This finding is interesting, because it validates the fact that COVID-19 has stimulated psychologists and behavior analysts to shift from the paradigm of the traditional delivery of healthcare services to a new one (Britwum et al., 2020). Although the pandemic has posed numerous challenges and problems for healthcare professionals and clients, it has also stimulated healthcare service providers to learn and adapt to a new reality. COVID-19 is seemingly one of the strongest factors that contributed to the popularization of telehealth worldwide.

Telehealth technology applications connect clients. This approach integrates and conveys client information conveniently and enables clients to engage with care providers. The findings also confirmed that the telehealth model could decrease the burden of families of individuals with disabilities. The respondents agreed that technological challenges constituted the primary obstacles in using telehealth. Therefore, healthcare facilities must establish measures for ensuring that psychologists and behavior analysts are skilled in using technological systems to boost their confidence in using specialized instruments, which

could enhance quality care. Clients must also be educated on communicating effectively via such channels. Without proper communication, the objective of the telehealth system, that is, to provide remote healthcare services, cannot be attained. Many respondents mentioned that the applied nature of ABA and its practical steps could positively influence telehealth success. The findings also demonstrated that telehealth is essential, particularly for cooperation between the families and caregivers of clients. The other advantages of this technological system include enhanced level of control and understanding of client conditions and care adjustment as needed. The system is also beneficial for psychologists and behavior analysts, because it enables them to become a part of the client care process. The specialists can also gradually monitor changes and offer timely intervention.

Conclusions

The present study focused on addressing a twofold problem, that is, the effectiveness of using telehealth models to provide ABA services to individuals with disabilities and the lack of research on the attitudes of practitioners toward the use of telehealth-based ABA services. Few studies have been conducted on the application of telehealth services to ABA, particularly during the COVID-19 pandemic. Consequently, insufficient empirical evidence exists regarding the effectiveness of telehealth in offering ABA services to individuals with disabilities. Addressing this shortage of reliable evidence is vital in ensuring the effective delivery of ABA services through telehealth during the COVID-19 pandemic. The research objective was to identify the general approaches of psychologists and behavior analysts in using telehealth-based ABA services to support people living with disabilities. In recent decades, mental and behavioral disorders have been categorized as costly conditions. Therefore, providing care services to people with these conditions has been challenging. Furthermore, distant

regions with inadequate care providers encounter problems in delivering essential services to clients with disabilities. Thus, using telehealth systems offers clients stress-free access to efficient healthcare services. As such, telehealth has become a standard system of information and communication to provide and support distant care services, particularly because the COVID-19 pandemic has made social distancing essential. In summary, the pandemic has compelled the healthcare industry to shift toward technology-supported therapy and instructional videos.

Limitations

First, a lack of physical contact occurred between the researchers and respondents; the questionnaires were sent electronically in compliance with the COVID-19 protocols to maintain social distance. This lack of personal contact could have compromised authentic communication and responses. Second, the research involved respondents from Saudi Arabia alone; therefore, whether or not the findings can be generalized to the support systems of other nations remains unclear.

Recommendations

Despite the abovementioned limitations, this study highlighted numerous areas that require additional examination. Future studies should address the methodological constraints observed in this investigation and should be conducted in various geographical contexts to validate the global applicability of telehealth to ABA support. Further investigation is also required on a broad target population to determine the applicability of such technology across contexts. Moreover, the specific element of the assessment of telehealth training is essential and would contribute to the existing evidence by ascertaining the necessary or adequate training components for behavioral change.

Supporting Information

Additional supporting information may be found in the online version of this article.

Data statement

The data that supports the findings of this study is available from the corresponding author upon reasonable request. The data is not publicly available due to privacy and ethical restrictions.

Author contributions

(Insert you name) led the research project, including conceptualization, methodology, data analysis, and writing the manuscript. (Insert co-writer name) contributed to the data collection, provided critical revisions, and helped in the interpretation of the results.

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