Psyment: advancing digital transformation in psychological assessments and diagnosis for healthcare facilities and organizations

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Abstract

This project analyses and discusses the current methodologies employed by mental health professionals in using cognitive assessment tools within clinical settings, presenting a comparative analysis of traditional and modern approaches. The study aims to address the evolving needs of healthcare professionals by exploring innovative digital solutions. Through interviews with four healthcare professionals, we sought to identify the challenges and opportunities associated with existing cognitive assessment practices. Participants highlighted the overwhelming nature of traditional paper-pencil methods and expressed interest in digital tools that could facilitate psychological testing processes. Healthcare professionals emphasized the need for a supportive platform to aid in the application and management of cognitive assessments. Based on these insights, our primary objective is the development of *Psyment*, a user-centered web-based platform designed to streamline the creation, administration, and evaluation of cognitive assessment tools. The introduction of *Psyment* is expected to equip healthcare professionals with adaptable resources that enhance patient communication and optimize workflow efficiency in dynamic clinical environments. Our overarching goal is to drive digital transformation within psychology and healthcare organizations. *Psyment* aims to significantly improve patient outcomes by providing healthcare professionals with intuitive digital tools tailored to their needs. This study emphasizes the importance of user-centered design in addressing the evolving demands placed on mental health professionals. In conclusion, this project underscores the exploration and development of user-centric digital solutions to support mental health professionals in their daily practices. The creation of *Psyment* represents a step towards enhancing clinical efficiency and patient care through innovative technology.

Keywords: Digital Media; Digital Transformation; Technological Innovation; Technology.

Introduction

The amount of mental health problems is increasing in our society, and more people are displaying symptoms of different diseases (Pinto-Meza et al., 2013). Assessing and resolving these problems is the responsibility of mental health experts, who use a variety of tools and tests for diagnosis and treatment planning (Silva et al., 2022). However, many of these assessment instruments continue to be paper-based. Although these are methods that have been used for many years and have proven results, this process can be time-consuming (Zadikoff et al., 2008). Thus, there is an opportunity for modernization and enhancement of evaluation techniques.

Technology is increasingly present in people's daily lives and facilitates countless tasks of various natures. Health stands out among various dimensions as an area where the impact can be particularly significant. Semantha et al., claimed that *"In this digital age, we are observing an exponential proliferation of sophisticated hardware- and software-based solutions that can interact with the users at almost every sensitive aspect of our lives (…)"* (Semantha et al., 2020, p. 1). The rapid growth of technology has opened the door to novel solutions in mental health care, providing the opportunity to shorten assessment processes and improve patient care.

Also, according to Thimbleby, *"Technology drives healthcare more than any other force, and in the future, it will continue to develop in dramatic ways."* (Thimbleby, 2013, p. 160). It is unquestionable how much technology helps and drives the evolution of areas such as healthcare (Bardhan & Thouin, 2013; Heathfield et al., 1998); it provides several advances in the provision of services, new equipment, education, communication, and management (Aceto et al., 2018; Alloghani et al., 2018; Guo et al., 2016; Yao et al., 2012). Therefore, the lives of health professionals and patients are made more seamless and supported by the functionalities offered through technological evolution (Heathfield et al., 1998).

Following the COVID-19 outbreak, the healthcare landscape observed a flow in the adoption of information and communication technology (ICT), making its adoption into our daily routines more prevalent (Paul et al., 2023). These technologies are designed to enhance patient interactions, improve healthcare workflows, and change with the needs of the user. However, few platforms exist to help mental health professionals (HP) reduce their workload related to cognitive evaluation processes such as PsyPack (*Online Psychometric Testing Software for Behavioral Health Professionals—PsyPack*, n.d.) and Therasoft (*Practice Management Software for Therapists | Therasoft*, 2021); most of the technologies available are for scheduling appointments with health professionals and to reach and communicate with patients easily. They mainly facilitate the healthcare practitioner-patient interaction like PsicoReg (PsicoReg, n.d.), BetterHelp (*BetterHelp - Get Started & Sign-Up Today*, n.d.) and TalkSpace (Talkspace, n.d.).

Therefore, there is an opportunity for the digitalization of mental health professionals' methodologies. We found some technologies designed to assist psychologists during the assessment procedure such as PsyPack (*Online Psychometric Testing Software for Behavioral Health Professionals - PsyPack*, n.d.), Psytoolkit (Stoet, 2017) and PsicoReg (PsicoReg, n.d.). These can be used by healthcare professionals (HP) in daily practice. Nevertheless, the utilization of these tools is selective, presenting a potential constraint for HP. For example, one of the tools (Psytoolkit) requires some understanding of technology, as users are required to know programming. This technical requirement may serve as a barrier for individuals who lack coding skills. Another identified obstacle is the challenging transition and adaptation phase from traditional paper-and-pencil-based methods to technology-driven materials. Health professionals may face barriers due to their entrenched familiarity with conventional assessment techniques (Jarva et al., 2022; Konttila et al., 2019).

The inability of mental health practitioners to effectively use a digital tool or instrument hampers the realization of its maximum potential benefits. The level of competence is directly associated with it as reinforced by Konttila et al., stating that *"(…) In the healthcare sector, it is important to recognize the impacts of competence in digitalization, as insufficient competence of healthcare can (…) increase the incidence of errors (…)" and "(…) insufficient competence can lead to negative experiences of technology usage, which will influence attitudes towards the adaptation of other technologies (…)"* (Jarva et al., 2022; Konttila et al., 2019, p. 6).

Konttila et al. also stated that professionals' experience with digital tools has a direct impact on their willingness and motivation to use technology. Also, HP require extensive knowledge and skills to incorporate digital methods into their clinical process to maximize patient care (Konttila et al., 2019; van Gils et al., 2024). One possible solution to mitigate the potential consequences of a lack of competence is to integrate a systematic education program that prioritizes the development of individual skills alongside the digitalization process (Jarva et al., 2022; Konttila et al., 2019).

Additionally, collaborative design with multidisciplinary teams is key. By engaging health professionals, designers, and developers throughout the software development lifecycle, organizations can ensure that digital tools are user-centric, intuitive, and aligned with clinical needs. This inclusive approach not only enhances adoption but also fosters innovation and drives meaningful advancements in healthcare technology.

Examples of collaborative software developments can be seen in Berry, N., et al, who developed an application to deliver cognitive behavior therapy-based interventions by inviting several participants from different fields such as computer scientists, clinicians, software engineers, and academics (Berry et al., 2020). Further instances of collaborative efforts in software development are evident in (van Gils et al., 2024). The authors performed a usability study of a digital tool that supports the diagnostic work in a clinical context, employing both quantitative and qualitative data analyses to draw conclusive findings. Another important aspect to consider is privacy and cyberattack-related issues when developing digital applications for HPs. The impact of cyberattacks can be devastating, resulting in significant financial losses for affected companies and damaging their reputation and credibility. These incidents undermine essential values such as reliability and trustworthiness. (Kamiya et al., 2018; N, 2018; Whitler & Farris, 2017).

This article presents insights gathered from interviews with four HP, shedding light on the primary challenges and requirements they encounter when utilizing conventional assessment tools and to gather initial software requirements for the development of *Psyment*.

Methodology

Participants

We gathered qualitative data through three semi-structured interviews at the University of Madeira and one at Casa de Saúde São João de Deus to understand the current methodologies applied during clinical cognitive evaluation as well as to gather a better understanding of the main issues faced by them in this area of mental healthcare. The sample was a convenience sample as these participants were readily available to participate in this study. All the psychologists interviewed still apply or have applied cognitive tests at least once in their professional experience. All of them have different years of experience and specialties, which can affect their point of view regarding the usage of technology in their daily work. The demographic information is shown in Table *1.*

Table 1: Participants demographics.

Psychologists Identification	Years of Experience with Testing	Background of Application of Tests	Main Field of Experience	Institution
P01	4	Applying tests to children	Criminal psychology (justice) and research	Madeira University
P02	13	Applying tests to general people	Clinical psychology and research	Madeira University
P03	3	Applying tests to general people	Neuropsychology	Madeira University
P04	10	Applying tests to elderly people	Clinical psychology	*Casa de Saúde São João de Deus*

Procedures

The experimental setup of the interviews consisted of three semi-structured interviews at *Madeira University* that followed a script and one informal interview performed at *Casa de Saúde São João de Deus*. All psychologists

interviewed consented to their participation in this study, which allowed the team to record the interview audio. Photo-taking was also allowed if necessary. However, the psychologists' identity is protected and confidential. During the interviews, we took notes on some topics considered important that were mentioned by the interviewees. Regarding the questions asked, within the script, they were created to specifically answer some doubts regarding the psychologists' methodology when applying paper-pencil-based assessment tools. We outline questions such as *"(...) In a real appointment, instead of using paper and pencil, do you think that it would be beneficial for psychologists to use a computer or a tablet?", "(...) Do you think the state of the technology used in psychology is still antiquated or is technology already well-established in the psychology area during tests*?" After analyzing the interviews, we divided all answers into four themes: *1) Problems with psychological test assessments, 2) Psychologists' methodologies, 3) Technologies used by psychologists,* and *4) Awareness about data security and security requirements.*

Results

Each of the four participants responded to the questions posed during the interviews. Regarding theme *1) Problems with psychological test assessments,* participants mentioned that some cognitive assessment tools (CAT) are too complex *"BSI analysis is complex because it has many scales (…)"* They also said that "*(…) paper-based psychological tests are too much work (…)"* and "(…) (they) would like apps to calculate the tests for us (…)". Also, they drew our attention that "*Test results (e.g., WMS, MoCA, MMSE) are relative (*to *interpretation)".* Regarding the theme *2) Psychologists' methodologies,* participants said that they normally share their tests with colleagues and/or compare the same test applied at different timings. As for *3) Technologies used by psychologists,* participants mentioned using *Microsoft Word, Excel,* and *Google Drive* as their choices for daily work. Finally, regarding *4) Awareness of data security and security requirements,* it is important to ensure the confidentiality and robust protection of patients' data and cognitive test results. While maintaining strict privacy standards, there may be instances where the exchange of information between healthcare providers is necessary. From a general point of view, the interviews conducted with HP indicated that there is a potential gap in the health industry to build an application capable of creating, managing, and assessing health-related tests since all participants in the interviews clearly showed interest in this idea.

Discussion

As previously outlined, we conducted three semi-structured interviews at the University of Madeira and one field study at *Casa de Saúde São João de Deus* to understand the current methodologies applied during clinical cognitive evaluation as well as to gather a better understanding of the main issues faced by them in this area of mental healthcare. All the psychologists interviewed still apply or have applied cognitive tests at least once in their professional experience. All of them have different years of experience and specialties, which can affect their point of view regarding the usage of technology in their daily work. Although they use some kind of technology (e.g., Excel, Google Drive) to support their paper-based assessments, there is currently no dedicated software in their workflow that comprehensively meets all their requirements. Depending on the institution they are affiliated with, mental health professionals employ various approaches to calculate test results. Common methods include manual calculations, inputting responses into an Excel file for analysis, and utilizing a projector with an acetate sheet overlaying correct answers on test sheets to expedite and streamline the assessment of correctness. This exacerbates the challenge for mental health professionals who rely on paper-and-pencil methods for test administration, as it renders their testing processes more intricate, necessitating numerous steps. Additionally, the requirement to employ various software solutions during the test application process can potentially lead to more tiresome procedures.

If we think about the fact that psychologists apply tests on paper, then they have a logical process of scanning the document (mentioned in the interviews), registering the results for each question or domain in a spreadsheet (*Excel*) or manual calculation, and finally storing the results in a *Google Drive* folder. It can be inferred that it is a laborious, time-consuming process and that it is based on several external and independent systems, which could lead to increases in human error (Sameera et al., 2021). Consequently, the psychologists claimed that there is a

necessity for the creation of an application of this type stating, *"(...)* what we would like in tests, is for computer applications to automatically score them *(...)".* Still according to them, *"(...) technology professionals have an opportunity to help us (...)"* and *"(...) steps need to be taken towards having the majority of the tests computerized (...)".* These instructions highlight, again, the need for psychologists to have their work methods more computerized, following a digitalization trend that is seen in so many other areas.

Despite this, another fact that has been debated by psychologists is the fact that the lack of digitalization is costly for patients. According to the interviews, the time-consuming process of correcting a test means HPs are unable to provide an immediate evaluation in front of the patient. Therefore, they are forced to reschedule more sessions to complete a possible diagnosis. As stated by P01, *"(...) As we cannot rate the tests in front of the patient, we send the patient home, and we schedule another session (...)".* This approach is inefficient and more expensive. The same psychologist mentioned that since they need to schedule another session, the patient needs to pay for the new appointment. Regarding Portugal law, the private health sector is paid while the public is free. As so, psychologist P01 specifically mentioned the private sector as *"(...) regarding the private sector, (...) they get more money in the second session (...)".*

The transition process to digitalization in healthcare is not a straightforward one. The transition has a lot of specificities and particularities that need to be addressed. Additional barriers highlighted in the literature include factors such as high working hours and limited clinic time, which can hinder HP from effectively learning and integrating new tools into their daily routines (van Gils et al., 2024). While existing software solutions, provide useful functions for assessment and treatment planning, they may pose usability challenges for healthcare workers, particularly those with low technical skills. For example, the *Psytoolkit* (*PsyToolkit on the Web Server*, n.d.) requires users to program surveys which can be overwhelming for users with low technical skills. Furthermore, some tools lack integration with the Electronic Health Record (EHR) system, necessitating users to log in to a separate platform and duplicate data entry—once in the EHR and again in the tool which is time-consuming (van Gils et al., 2024).

Another arising concern with the adoption of technology for digitizing the testing process and its evaluation is the ownership of copyrights for most tests held by private organizations or associations. For psychologists to use these tests, they need to pay for each time they use them or pay for a right-to-use license, depending on whether the organization allows it or not. Hence, it incurs a financial cost, which must either be provided by the health professionals who wish to use the materials or sourced from their workplaces. This condition can be an inhibitor of the digitalization process, as organizations might not have the financial resources to acquire all the tools requested by the professionals, especially in some specific circumstances and/or realities (e.g., organizations led by governments).

Furthermore, given the variations in evaluation processes across institutions and among health professionals, the newly developed digitalization materials must exhibit a high degree of flexibility and adaptability. Divergent work methodologies reflect distinct perspectives on work, leading to disparities in knowledge and skills. However, developing a tool of this nature is intricate, involving the consideration of various levels of complexity and demanding a deep understanding of psychologists' methodologies. As mentioned in the interview with psychologist P01, *"(...) the analysis of each test depends a lot from test to test (...)"* and *"(...) the tests that evaluate more valences may be more challenging to be introduced on the platform (...)".*

Another crucial aspect to consider in the digitalization process is ensuring the security of sensitive information. Digital applications handle confidential data that requires protection, a concern well acknowledged by HP. According to the interviews, *"(...) tests must be confidential (...)"* and *"(...) tests must be (...) destroyed after some time (...)".* Furthermore, *"(...) ensure data confidentiality (...)"* and *"(...) psychologists should not be capable of accessing old registers (...)".* As is known, the number of recent cyberattacks that have been witnessed in organizational sectors (Kamiya et al., 2018).

The literature study findings supplement the insights gathered from interviews with healthcare professionals, offering a thorough picture of the obstacles and opportunities in contemporary mental health screening procedures. Thus, the development of *Psyment* aims to close this gap by offering a user-friendly platform that simplifies assessment procedures and improves patient care. We aim to develop an easy interface with simplified procedures, allowing users to design, manage, and store assessment tools without needing substantial technical knowledge.

Drawing from strategies highlighted by (van Gils et al., 2024) and (Berry et al., 2020), a key approach in software development involves engaging potential stakeholders to assess their current needs within diverse contexts. In response to feedback gathered from these interviews, we initiated the development of an initial prototype called *Psyment* (short for Psychology + Assessment). *Psyment* is being developed as a web-based application using node.js (*Node.js—Run JavaScript Everywhere*, n.d.). We aim to develop a prototype that allows HP to create, modify, and utilize CAT. Moreover, to aid healthcare professionals during the CAT analysis, we aim to add functionalities to automate CAT result calculations based on predefined formulas established during CAT creation; also, it will feature a user-friendly graphical interface (GUI) for streamlined data analysis of patient results.

Another feature that we aim to implement is the sharing of data between other HPs, which is a functionality that was considered useful during the interviews. For example, P01 stated *"(...) There is an exchange of knowledge between psychologists (...)", "(...) this colleague sends it by e-mail or facilitates it in some way. That's usually how it works (...)"*. This platform will be designed to encompass a range of benefits, including enhanced accessibility, improved interoperability, and simplified maintenance, while prioritizing the security of all users, including healthcare professionals, patients, and their data. *Psyment* will be engineered to adapt to various healthcare contexts, ensuring compatibility not only with desktop systems but also with mobile devices during evaluation processes.

Through prioritizing usability and user experience design, this project hopes to increase the adoption and use of digital assessment tools among healthcare professionals, ultimately enhancing mental health treatment delivery. By integrating insights from both the literature review and interviews, our platform seeks to provide a solution that addresses the different demands of healthcare professionals while also improving the delivery of mental health services.

Our goal is to foster confidence among health professionals in the realm of these technologies. The ongoing challenge of transitioning is already impacted by deeply ingrained habits, and the existence of unreliable technologies could exacerbate difficulties or even jeopardize the overall shift to a fully digital approach. There must be trust between HP and technology. To achieve this, the engineering behind software systems must have high-quality standards, since the tools use the personal data of both health professionals and their patients.

Moreover, the effectiveness of these tools is compromised when mental health practitioners encounter usability issues or lack proficiency in their use. This underscores the importance of supporting healthcare professionals through training and assistance to maximize the benefits of digital tools. As stated previously (see Introduction) the inability of mental health practitioners to effectively use a digital tool or instrument hampers the realization of its maximum potential benefits. Thus, should *Psyment* be introduced to the market, some initial users may require assistance from the platform's team to become familiar with its usage. Holding regular workshops with stakeholders could serve as a solution to support HP in utilizing digital tools during medical practice, which can increase product retention (Konttila et al., 2019), but also enhance the user experience of the platform.

Conclusion and Ongoing Work

The initial findings of our comparison analysis between traditional and modern evaluation approaches in clinical assessment highlight an opportunity for digital transformation in mental health. As mental health disorders continue to rise in prevalence, updating and enhancing evaluation methods used by healthcare providers

becomes increasingly important. While paper-based procedures are common, they can be time-consuming, as revealed by insights from interviews with HP.

Technology holds promise in improving patient care and streamlining assessment processes for HP. However, obstacles such as the lack of user-friendly tools hinder widespread adoption in the healthcare sector. With the *Psyment* project, we aim to address these challenges by offering a comprehensive and user-friendly interface for creating, assessing, managing, and storing assessment tools. *Psyment* will be designed to adapt to the evolving needs of HPs, ultimately enhancing patient care and optimizing operational efficiency.

Furthermore, based on the initial findings of our project and scientific literature, we advocate for greater investigation and adoption of digital tools to advance mental health treatments into the digital age. We have recently completed the initial round of usability tests with HPs to assess the functionality and usage of *Psyment*, and we are currently analyzing the results.

Limitations

This study has certain limitations. Notably, the interviews were conducted with only 4 participants, potentially constraining the generalizability of our conclusions based on the responses obtained. Also, the inclusion of only four participants from a specific work setting may limit the generalizability of the findings to broader healthcare contexts. Therefore, future studies should aim to include a more diverse sample across various healthcare institutions to draw further conclusions from the results.

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References

Aceto, G., Persico, V., & Pescapé, A. (2018). The role of Information and Communication Technologies in healthcare: Taxonomies, perspectives, and challenges. *Journal of Network and Computer Applications*, *107*, 125–154. https://doi.org/10.1016/j.jnca.2018.02.008

Alloghani, M., Al-Jumeily, D., Hussain, A., Aljaaf, A. J., Mustafina, J., & Petrov, E. (2018). Healthcare Services Innovations Based on the State of the Art Technology Trend Industry 4.0. *11th International Conference on Developments in eSystems Engineering (DeSE)*, 64–70. https://doi.org/10.1109/DeSE.2018.00016

Bardhan, I. R., & Thouin, M. F. (2013). Health information technology and its impact on the quality and cost of healthcare delivery. *Decision Support Systems*, *55*(2), 438–449. https://doi.org/10.1016/j.dss.2012.10.003

Berry, N., Machin, M., Ainsworth, J., Berry, K., Edge, D., Haddock, G., … & Bucci, S. (2020). Developing a theory-informed smartphone app for early psychosis: learning points from a multidisciplinary collaboration. *Frontiers in psychiatry*, *11*, 602861.

BetterHelp—Get Started & Sign-Up Today. (n.d.). http://www.betterhelp.com

Guo, P., Watts, K., & Wharrad, H. (2016). An integrative review of the impact of mobile technologies used by healthcare professionals to support education and practice. *Nursing Open*, *3*(2), 66–78. https://doi.org/10.1002/nop2.37

Heathfield, H., Pitty, D., & Hanka, R. (1998). Evaluating information technology in health care: Barriers and challenges. *BMJ*, *316*(7149), 1959. https://doi.org/10.1136/bmj.316.7149.1959

Jarva, E., Oikarinen, A., Andersson, J., Tuomikoski, A., Kääriäinen, M., Meriläinen, M., & Mikkonen, K. (2022). Healthcare professionals' perceptions of digital health competence: A qualitative descriptive study. *Nursing Open*, *9*(2), 1379–1393. https://doi.org/10.1002/nop2.1184

Kamiya, S., Kang, J.-K., Kim, J., Milidonis, A., & Stulz, R. M. (2018). What is the Impact of Successful Cyberattacks on Target Firms? (Working Paper 24409). *National Bureau of Economic Research*. https://doi.org/10.3386/w24409

Konttila, J., Siira, H., Kyngäs, H., Lahtinen, M., Elo, S., Kääriäinen, M., Kaakinen, P., Oikarinen, A., Yamakawa, M., Fukui, S., Utsumi, M., Higami, Y., Higuchi, A., & Mikkonen, K. (2019). Healthcare professionals' competence in digitalisation: A systematic review. *Journal of Clinical Nursing*, *28*(5–6), 745–761. https://doi.org/10.1111/jocn.14710

N, T. (2018). IMPACT OF CYBERATTACKS ON FINANCIAL INSTITUTIONS. *Journal of Internet Banking and Commerce*, *23*(2), 1–11.

Node.js—Run JavaScript Everywhere. (n.d.). https://nodejs.org/en

Online psychometric testing software for behavioral health professionals—PsyPack. (n.d.). https://psypack.com

Paul, M., Maglaras, L., Ferrag, M. A., & Almomani, I. (2023). Digitization of healthcare sector: A study on privacy and security concerns. *ICT Express*, *9*(4), 571–588. https://doi.org/10.1016/j.icte.2023.02.007

Pinto-Meza, A., Moneta, M. V., Alonso, J., Angermeyer, M. C., Bruffaerts, R., Caldas de Almeida, J. M., de Girolamo, G., de Graaf, R., Florescu, S., Kovess Masfety, V., O'Neill, S., Vassilev, S., & Haro, J. M. (2013). Social inequalities in mental health: Results from the EU contribution to the World Mental Health Surveys Initiative. *Social Psychiatry and Psychiatric Epidemiology*, *48*(2), 173–181. https://doi.org/10.1007/s00127-012-0536-3

Practice Management Software for Therapists | Therasoft. (2021, November 25). https://www.therasoft.com/

PsicoReg. (n.d.). Plataforma de gestión de pacientes para Psicólogos. *PsicoReg — Plataforma para Psicólogos*. https://psicoreg.com

Sameera, V., Bindra, A., & Rath, G. P. (2021). Human errors and their prevention in healthcare. *Journal of Anaesthesiology, Clinical Pharmac*ology, *37*(3), 328–335. https://doi.org/10.4103/joacp.JOACP_364_19

Silva, M., Antunes, A., Azeredo-Lopes, S., Cardoso, G., Xavier, M., Saraceno, B., & Caldas-de-Almeida, J. M. (2022). Barriers to mental health services utilisation in Portugal — results from the National Mental Health Survey. *Journal of Mental Health*, *31*(4), 453–461. https://doi.org/10.1080/09638237.2020.1739249

Stoet, G. (2017). PsyToolkit: A Novel Web-Based Method for Running Online Questionnaires and Reaction-Time Experiments. *Teaching of Psychology*, *44*(1), 24–31. https://doi.org/10.1177/0098628316677643

Talkspace. (n.d.). Talkspace—#1 Rated Online Therapy, 1 Million+ Users. https://www.talkspace.com/

Thimbleby, H. (2013). Technology and the Future of Healthcare. *Journal of Public Health Research*, *2*(3), e28. https://doi.org/10.4081/jphr.2013.e28

van Gils, A. M., Rhodius-Meester, H. F., Handgraaf, D., Hendriksen, H. M., van Strien, A., Schoonenboom, N., ... & Visser, L. N. (2024). Use of a digital tool to support the diagnostic process in memory clinics–a usability study. *Alzheimer's Research & Therapy*, *16*(1), 75.

Whitler, K. A., & Farris, P. W. (2017). The Impact of Cyber Attacks On Brand Image: Why Proactive Marketing Expertise Is Needed for Managing Data Breaches. *Journal of Advertising Research*, *57*(1), 3–9. https://doi.org/10.2501/JAR-2017-005

Yao, W., Chu, C.-H., & Li, Z. (2012). The Adoption and Implementation of RFID Technologies in Healthcare: A Literature Review. *Journal of Medical Systems*, *36*(6), 3507–3525. https://doi.org/10.1007/s10916-011-9789-8

Ethical Statement

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