Taylor & Francis
Taylor & Francis Group

Disability and Rehabilitation: Assistive Technology

ISSN: 1748-3107 (Print) 1748-3115 (Online) Journal homepage: www.tandfonline.com/journals/iidt20

Identifying budget management apps for people with acquired brain injury: a comparison of search methods

Marine Thomasson, Michaël Cardinal, Simon Beaulieu-Bonneau, El Medhi Boubetana , Walter Wittich, Eva Kehayia, Mohamed-Amine Choukou & Frédérique Poncet

To cite this article: Marine Thomasson, Michaël Cardinal, Simon Beaulieu-Bonneau, El Medhi Boubetana , Walter Wittich, Eva Kehayia, Mohamed-Amine Choukou & Frédérique Poncet (02 Jun 2026): Identifying budget management apps for people with acquired brain injury: a comparison of search methods, Disability and Rehabilitation: Assistive Technology, DOI: 10.1080/17483107.2026.2678545

To link to this article: https://doi.org/10.1080/17483107.2026.2678545

Published online: 02 Jun 2026.

DISABILITY AND REHABILITATION: ASSISTIVE TECHNOLOGY
https://doi.org/10.1080/17483107.2026.2678545

Taylor & Francis
by informa

RESEARCH ARTICLE

OPEN ACCESS Check for updates

Identifying budget management apps for people with acquired brain injury: a comparison of search methods

Marine Thomasson[a,b,c,d], Michaël Cardinal[e], Simon Beaulieu-Bonneau[f,g], El Medhi Boubetana[e], Walter Wittich[c,h], Eva Kehayia[a,c], Mohamed-Amine Choukou[i*] and Frédérique Poncet[a,b,c,h*]

[a]School of Physical and Occupational Therapy, McGill University, Montréal, Québec, Canada; [b]Centre intégré universitaire de santé et de services sociaux (CIUSSS) du Centre Ouest-de-l'Ile-de Montréal, Lethbridge-Layton-Mackay Rehabilitation Centre, Montréal, Québec, Canada; [c]Center for Interdisciplinary Research in Rehabilitation of Greater Montreal, Montréal, Québec, Canada; [d]Cognitive Neurology Unit, Department of Neurology, University Hospitals of Geneva, Geneva, Switzerland; [e]TherAppX, Granby, Canada; [f]École de psychologie, Université Laval, Québec, Canada; [g]Centre interdisciplinaire de recherche en réadaptation et intégration sociale (CIRRIS), Centre intégré universitaire de santé et de services sociaux (CIUSSS) de la Capitale-Nationale, Québec, Québec, Canada; [h]School of Optometry, Université de Montréal, Montréal, Québec, Canada; [i]Department of Occupational Therapy, College of Rehabilitation Sciences, University of Manitoba, Winnipeg, Manitoba, Canada

ABSTRACT

Purpose: Cognitive impairments following acquired brain injury (ABI) often hinder individuals' ability to manage finances independently, a key component of autonomy and quality of life. While mobile applications (apps) offer promising support for budgeting, the identification of accessible and clinically validated tools remains limited by the unregulated and heterogeneous nature of commercial app markets. This study aimed to compare three methods for identifying mobile budgeting apps for use by individuals with ABI.

Methods: We applied three app identification methods: (1) a weighted keyword algorithm (AppGuide), (2) a Boolean keyword query on Apple and Google Play stores and (3) an AI-assisted query using ChatGPT. All methods used identical inclusion criteria, emphasising bilingual availability (English, French), cost accessible at an affordable cost, and platform compatibility. Apps passing automated filters were manually screened to evaluate performance and retrieval efficiency.

Results: Out of 84,827 apps identified *via Method 1*, 13,862 met automated criteria, and 62 were selected for manual review. *Method 2* yielded 121 apps, 62 of which were screened. *Method 3* generated five apps. After manual screening and testing, one app from *Method 1* (Spendee©) and three apps from *Method 3* (Spendee©, Wallet App©, Money Manager©) met all inclusion criteria. No apps from *Method 2* were retained.

Conclusion: This study presents a novel, clinically relevant methodological approach to guide the identification of mobile apps potentially suitable for prescription to users with cognitive impairments following ABI. It demonstrates how integrating complementary methods can enhance the precision and clinical relevance of app selection.

➢ IMPLICATIONS FOR REHABILITATION

- This study presents a novel, clinically relevant methodological approach to guide the identification of mobile apps potentially suitable for individuals with cognitive impairments following ABI
- Integrating complementary search methods can enhance the precision and clinical relevance of app selection
- Unstandardised metadata and opaque algorithms in commercial app stores limit the accuracy and reliability of app identification for clinical decision-making
- Generative AI shows clinical potential but raises challenges related to reproducibility and transparency
- Bilingual app selection highlights the need for inclusive and transferable identification strategies across linguistic contexts

ARTICLE HISTORY
Received 10 November 2025
Revised 17 April 2026
Accepted 18 May 2026

KEYWORDS
Acquired brain injury; financial management; cognitive rehabilitation; digital health mobile applications; App store; Google play; ChatGPT

CONTACT Frédérique Poncet frederique.poncet.ccomtl@ssss.gouv.qc.ca; frederiqueponcet@gmail.com Centre for Interdisciplinary Research in Rehabilitation of Greater Montreal (CRIR), Lethbridge-Layton-Mackay Rehabilitation Centre, 7000 Sherbrooke Street West, Montreal, QC H4B 1R3, Canada.
*These senior authors contributed equally to this work.

Introduction

Acquired brain Injury (ABI) is a leading cause of disability worldwide, affecting approximately 81 million individuals each year through new cases of traumatic brain injury (TBI) and stroke combined [1,2]. The consequences of ABI are often long-term and complex, impacting a wide range of functions including sensory, cognitive and socio-emotional abilities [3,4]. Among the many challenges encountered by individuals living with ABI, financial management is particularly critical, as it underpins autonomy, quality of life and social inclusion [5]. Effective budgeting and financial decision-making rely on executive functions such as inhibition, planning, organisation, but also on memory, cognitive abilities frequently impaired in individuals with ABI [6,7]. In the absence of adequate support, difficulties in managing finances may lead to debt, economic instability, dependency on caregivers and social marginalisation [8].

To address these issues, rehabilitation strategies often combine clinical interventions with ecological supports. For example, neuropsychologists and speech therapists work to restore impaired cognitive functions, while occupational therapists implement adapted strategies and tools to support the performance of activities of daily living such as grocery shopping and budgeting [9]. Additionally, family members and community organisations often provide essential external support, helping to mitigate risks such as financial exploitation and poor decision-making [10–13]. However, these human-centred interventions require ongoing involvement and are frequently constrained by therapist availability, cost, geographic accessibility and variability in patient adherence [14,15]. Recent clinical guidelines, such as the INCOG 2.0 recommendations for cognitive rehabilitation following traumatic brain injury, highlight the importance of structured and evidence-based approaches to support everyday functioning, including the use of compensatory strategies and external aids [16].

Recent technological advances offer promising new avenues to supplement traditional rehabilitation. The widespread adoption of smartphones and the proliferation of mobile applications have led to the development of digital tools aimed at enhancing daily functioning, including financial self-management [17]. Budgeting apps now provide a wide array of features such as expense tracking, savings goals and personalised financial advice. However, most of these applications are designed for the general population and often lack specific adaptations to the cognitive and emotional challenges faced by individuals with ABI. Their complex interfaces and limited accessibility features may reduce their suitability for this population [9,18].

A recent review by Prats et al. described two illustrative examples of digital tools applied to support budgeting after ABI. The first involved SAMI, a co-designed cognitive assistant aimed at supporting everyday financial tasks [19]. The second reported on the use of portable electronic devices by individuals with TBI to manage personal finances [20]. While both examples suggested possible benefits in terms of organisation and autonomy, they also highlighted common barriers to sustained use-such as cognitive complexity, technical constraints and lack of long-term support [20]. However, in both cases, the absence of long-term technical support and cognitive-accessible design features limited sustained adoption and impact.

In a recent qualitative study conducted by our team, individuals with ABI reported a wide range of cognitive, sensory and emotional barriers to financial management, including fatigue, memory difficulties, attentional deficits, anxiety and impulsivity [12]. While many valued the support of others, participants consistently expressed a desire to maintain independence in managing their finances, reinforcing the need for digital solutions that enhance autonomy while remaining accessible and easy to use.

Despite the growing number of commercially available budgeting apps, identifying those that meet the specific needs of individuals with cognitive impairments remains a significant challenge. The app marketplace evolves rapidly and is largely unstructured from both clinical and academic perspectives. As a result, systematic and timely identification of suitable digital tools is difficult to achieve using manual approaches alone. Automated and semi-automated multiplatform strategies may offer a promising solution to this challenge by enabling more efficient app monitoring, evaluation and selection. For researchers and health organisations seeking to identify suitable tools for specific populations, manually reviewing the entirety of the app corpus quickly becomes an overwhelming, unmanageable and time-consuming challenge. To date, no validated guidelines or best practice frameworks have been identified to systematically guide the identification of digital accessibility solutions. Semi-automated

strategies thus appear as a realistic and scalable approach to support ongoing app monitoring, evaluation and recommendation.

Given the absence of clinically validated budgeting apps specifically designed for individuals with ABI, and standardised methodologies to search apps in app stores and/or online, we explored novel strategies that help retrieve and appraise apps from online sources. Present approaches to app searches fail to deliver accurate and systematic results. Current methods mostly use basic keyword searches and simple filters, which often give poor or incomplete results because the app information is not consistent (e.g., lack of standard ways to tag app features, letting users help verify app information). These limitations highlight the need for more advanced and systematic search approaches. In this context, Artificial Intelligence (AI), particularly natural language processing and large language models, has shown potential to improve information retrieval and search accuracy in complex and unstructured datasets [21,22]. At the same time, emerging literature highlights important considerations regarding the risks, challenges and ethical implications associated with the use of AI in clinical and rehabilitation contexts, including issues related to transparency, reliability and bias [23]. In the field of digital health, structured approaches to app evaluation have also been emphasised, highlighting the need for more systematic and scalable identification methods [24], which AI-based approaches may help address. Building on this rationale, we therefore aimed to explore more accurate and structured approaches for identifying relevant applications. Further methodological innovation and comparison of different methods is needed. We reviewed the literature focused on budgeting apps designed for individuals with ABI and compared three methods to identify potentially suitable applications within the general marketplace. The first method used a *weighted keyword algorithm*, that assigns a relevance score for each app based on the presence and specificity of predefined search terms [25]. The second employed a traditional *Boolean keyword* approach, like those commonly used in literature reviews, applying strict logical operators to filter apps meeting all specified criteria. The third approach leveraged an *AI-assisted* method, using a *structured query* submitted to ChatGPT, a large language model, to generate a curated list of budgeting apps potentially suitable for individuals with ABI. By comparing these three methods (automated weighted algorithm, strict Boolean filtering, and AI-assisted querying) we aimed to assess their relative effectiveness, relevance and efficiency in identifying clinically appropriate digital budget management tools for users with cognitive impairments. This roadmap is essential to help clinicians, community services and research teams select digital solutions for adults with ABI.

Methods

Overview of search methods

To identify budgeting applications potentially suitable for individuals with ABI, we compared three distinct search methods. These methods were selected to represent complementary search paradigms, including a flexible scoring-based approach (weighted keyword algorithm), a strict rule-based filtering approach (Boolean keyword) and an emerging AI-assisted approach. This selection allowed us to compare traditional and innovative strategies commonly used in information retrieval and digital health app identification. The first two methods (*weighted keyword algorithm* & *Boolean keyword*) were implemented with the support of TherAppX, a Canadian company specialising in the curation and structured analysis of digital health applications through its platform AppGuide (https://appguide.ca), which indexes metadata from a vast number of apps available internationally, allowing filtering by countries. The third was independently performed using an AI-assisted approach *via* ChatGPT (GPT-4, founded in 2015, San Francisco, CA, USA).

Before running the search queries, a comprehensive set of keywords was developed in collaboration with clinical and digital health experts (MT, FP, MAC, MC). These keywords were designed to capture two main domains: (1) personal budgeting and financial management and (2) cognitive support and accessibility. The full list is available in Appendix A. The main goal of our searches was to identify apps available in both English and French (Canada's two official languages), compatible with Android and Apple devices and costing under $50 CAD annually, if not free.

Method 1 – Weighted keyword algorithm query (AppGuide)

This method applied a broad-spectrum, weighted keyword search to metadata from over 3.5 million apps indexed in the AppGuide database. Each keyword in the unified list was automatically assigned a weight based on:

- **Domain relevance**, categorised by project experts (neuropsychologist, occupational therapist) according to clinical importance and functional priorities related to user needs. Domain relevance was stratified into four levels, as shown in Table 1.
- **Semantic specificity** was computed as a proxy for how *discriminative* a given keyword is across the corpus of indexed apps. The underlying logic is comparable to inverse document frequency (IDF) in information retrieval, adapted to the app metadata context. To make specificity interpretable and usable in the scoring pipeline, we converted the raw scores into four specificity levels (1 to 4) based on quartiles across all keywords.

Finally, domain relevance level (Table 1) and Semantic Specificity level (Table 2) were combined multiplicatively to produce a final keyword weight used in the scoring of each app (1 to 16).

The dataset was then sorted by total score and normalised into percentiles to allow app ranking. Specifically, for each keyword *k*, we calculated:

$$\mathbf{Specificity\_raw(k) = log_{10}(1 + N / n_k)}$$

where: N = total number of apps in the corpus; n_k = number of apps in which keyword k appears at least once.

This transformation:

- Gives more weight to rare but distinctive terms;
- Smooths extreme values while preserving ordering (via the log scale);
- Avoids division-by-zero and instability on frequent terms (with the +1).

Example

- Keyword: "budget" → appears in 12,000 apps → Specificity_raw ≈ $\log_{10}(1 + 3{,}500{,}000/12{,}000) \approx 2.5$ → Level 2
- Keyword: "executive function" → appears in 120 apps → Specificity_raw ≈ $\log_{10}(1 + 3{,}500{,}000/120) \approx 4.5$ → Level 4

The full list of keywords with assigned weights is available in Appendix B.

Table 1. Levels of relevance used for keyword weighting.

Levels of relevance	Definition	Example categories of keywords
1 – Low	Valid but less important needs in the project context.	Etiology-specific terms (e.g., "traumatic brain injury", "stroke")
2 – Moderate	Useful but non-essential features.	Cognitive or sensory terms (e.g., "memory aid", "accessible interface")
3 – High	Frequently needed features supporting target use cases.	Functional budgeting terms (e.g., "budget assistant")
4 – Critical	Core features required to fulfil users' safety and autonomy goals.	Planning and tracking tools (e.g., "spending alerts", "budget management")

Table 2. Specificity levels used for keyword weighting.

Specificity level	Definition
1 – Generic	Appears in many apps
2 – Common	Moderately frequent
3 – Rare	Relatively infrequent
4 – Very Specific	Present in a few apps only

Method 2 – Boolean (and) keyword query (AppGuide)

This method employed strict Boolean logic, with the keyword list divided into two categories:

- **Group A**: Budget-related keywords (e.g., "budget", "expenses", "finance")
- **Group B**: Cognition and accessibility-related keywords (e.g., "memory support", "simple interface", "traumatic brain injury")

Only apps that included at least one keyword from each group were retained. This approach aimed to enhance specificity by focusing on apps that addressed both content domains simultaneously.

To ensure comparability between methods, we selected a matched number of top-ranked apps from Methods 1 and 2 for manual screening, based on their respective relevance scores or initial filtering outcomes.

Method 3 – AI-assisted search using ChatGPT

The use of ChatGPT was a complementary step to a traditional literature review. This approach aimed to gain an additional perspective on the most relevant apps. Also, to simulate a more naturalistic, user-facing search scenario, we submitted a plain-language query to ChatGPT (GPT-4), formulated as follows:

"Give me the five best budget-management apps that meet the following criteria:

1. Available in both English and French;
2. Available on both Android and Apple;
3. If not free, they must cost less than 50 Canadian dollars per year;
4. Simple to use, suitable for individuals with potential cognitive impairments".

The resulting recommendations were reviewed manually and subjected to the same exclusion criteria as the apps retrieved by the other two app searching methods. It should be noted that, due to the nature of the AI-assisted approach, information regarding non-selected or excluded applications was not accessible, limiting transparency and reproducibility compared to more structured search methods.

Given the vastly different initial yields and selection mechanisms of each method, we standardised the manual screening sample sizes for Methods 1 and 2 to ensure comparable assessment rigour, while the inherently focused output of Method 3 necessitated a smaller, yet comprehensive, set reflective of its AI-curated nature.

Exclusion criteria

All three search methods applied the following exclusion criteria:

- The app was not available on both iOS and Android;
- The app's annual cost exceeded 50 CAD;
- The app lacked sufficient French-language support.

Language availability was assessed *via* metadata: declared language settings in the Apple App Store and presence of French-language strings in Google Play metadata. Due to the limitations of automated detection, particularly in the Android ecosystem, manual validation was performed when required.

App screening and experimental testing

After automated filtering, two evaluators (MT and FP) independently performed a manual screening to exclude apps that did not satisfy the inclusion criteria, such as unavailability in both English and French, lack of relevance to financial management, or restriction to a single banking institution. Interrater reliability for inclusion decisions was moderate (Cohen's $\kappa = 0.53$), indicating a satisfactory level of agreement [21]. Discrepancies were resolved through consensus-based discussion among at least three members of the research team.

To illustrate practical aspects of app selection, a subset of shortlisted apps from each method was installed and briefly tested. This exploratory testing assessed core usability and accessibility features but

Table 3. Overview of tested applications: developers, identification methods, inclusion outcomes, and exclusion reasons.

Name of the apps	Developer	Found with Method 1, 2 or 3	Included/excluded	Reason for exclusion
ExpenGPT	Power House of Apps	1	Excluded	Not available in French
Money Tracker Expense Tracker	Gulooloo Tech Co., Ltd.	1	Excluded	Not available in English
My Wallet•Expense Tracker App	risibleapps	1	Excluded	Not available in French
Expense Budget Planner	Budgy Studio	1	Excluded	Not available in French
Bucks: Expense & Budget Tracker	Mind Stream Logics	1	Excluded	Not available in French
Expense Tracker	Advance Appsol Technologies	1	Excluded	Not available in French
Money Manager & Budget Tracker	Galaxy studio apps	1	Excluded	Not available in English
Money Wallet Spending Tracker	çまさゆき	1	Excluded	Not found on the Play Store
Budget Planner: Expense Tracker	Brown Berry	1	Excluded	Could not function without linking to an active bank account
Expense Tracker Budget Planner	Remotearth Solutions	1	Excluded	Not available in French
Pocket Money Manager	o16i Apps	1	Excluded	Not available in French
Budget planner—Expense tracker	Battery Stats Saver	1	Excluded	Not available in French
Spendee: Budget App & Tracker	SPENDEE a.s.	1 and 3	Included	
Budget & Suivi de Dépenses	Timo Stuebing	1	Excluded	No automatic reminders or notifications for payments or due dates
Moneyhub	Moneyhub Financial Technology	1	Excluded	No longer available for download: Announcement of the application's upcoming removal from mobile platforms
Pocket Budgeter	Vlow Productions	1	Excluded	Not available in French
Yalfin	Yalfin	2	Excluded	Not available in French
Rejoice Diary	Rejoice Learning LLP	2	Excluded	Not available in French
ControlGastos	Ing Jeff Jimenez (Apps & Soft KT)	2	Excluded	Not available in French and English
Bankin'	Bankin' SAS	3	Excluded	Manual transaction entry is not supported; expenses and income can only be added through bank integration.
Easybudget	Benoit Letondor	3	Excluded	Very poor design, visualisation only available through a calendar view.
Wallet – Budget Tracker	BudgetBakers s.r.o	3	Included	
Money Manager Expense & Budget	Realbyte Inc.	3	Included	

was not intended as a comprehensive clinical evaluation (see Table 3). For Method 1, 30% of the selected applications ($n = 16$), corresponding to the highest-ranked entries in the weighted classification, were installed and tested between 15 April and 8 May 2025. This proportion was chosen to ensure a manageable yet representative sample for in-depth evaluation. All applications identified through Methods 2 and 3 were installed and tested within the same timeframe.

Applications were excluded during this phase for one or more of the following reasons: (1) lack of true bilingual availability; (2) unavailability on Canadian app stores; (3) mandatory linkage to an active bank account; and (4) absence of key features such as reminders or notifications.

Results

App selection process

The identification and selection of budgeting applications followed a structured multi-step approach. A PRISMA diagram summarising the flow of app identification, automated filtering, screening and inclusion for *Methods 1* and *2* is presented in Figure 1.

Method 1 (weighted keyword algorithm query) was conducted on 14 April 2025, returning a total of 84,827 app entries (see Figure 1). *Method 2* (Boolean keyword query) was also executed on 14 April, yielding 121 applications. *Method 3* (ChatGPT-assisted search) was conducted on 6 May 2025 and generated a list of five applications in response to a structured, criteria-based prompt.

After automated filtering based on language support, cost and platform availability, 13,862 apps remained eligible for full review with *Method 1* and 62 apps with *Method 2*. To allow for meaningful comparison across methods, we selected the top 62 highest-ranked apps from *Method 1* based on their

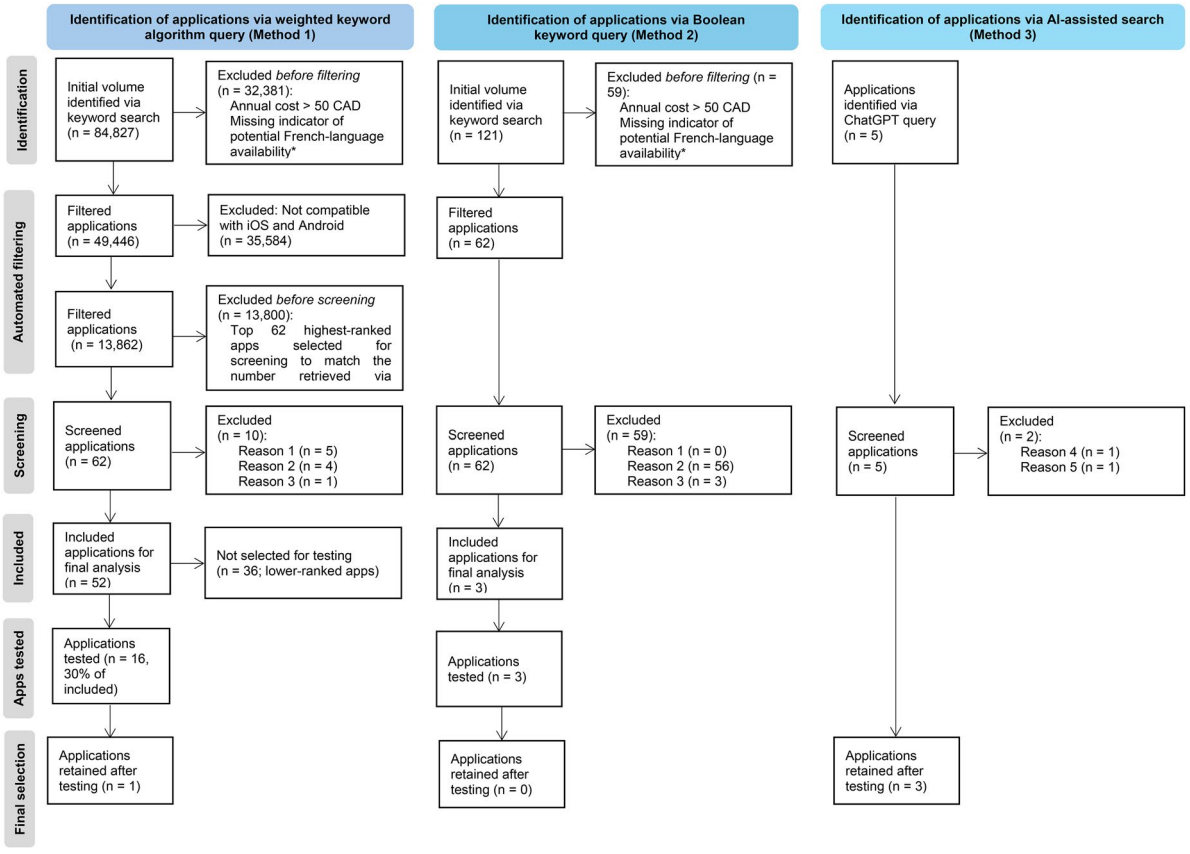

Figure 1. Flowchart showing the detailed identification, screening, and selection of budgeting apps for individuals with ABI across three search methods.

**Note:* The AppGuide software detects whether a developer declares their app as available in French on the App Store (iOS) and identifies the presence of a French-language page on the Play Store (Android). Based on our experience, this information should be confirmed through hands-on testing of the application.

For Method 3 (AI-assisted search), prior identification and exclusion steps could not be documented due to the generative nature of the approach.

Reason 1: Not available in English and French
Reason 2: Application unrelated to financial management
Reason 3: Bank-specific application
Reason 4: No manual transaction entry
Reason 5: Poor usability or cognitive accessibility

weighted relevance scores. This selection matched the number of results obtained *via* the Boolean search (*Method 2*).

Following manual screening, 60 apps were retained for detailed analysis (52 *via Method 1* and 3 *via Method 2*), along with 5 apps identified through *Method 3* (ChatGPT-assisted search).

Experimental testing of selected apps

To illustrate practical aspects of app selection, a subset of shortlisted apps from each method was installed and briefly tested (see Table 3). Out of the 16 tested applications identified with Method 1, one app, Spendee©, was retained for further evaluation. The remaining applications were excluded for one or more of the following reasons: (1) lack of true bilingual availability, as several apps were not fully accessible in both English and French despite metadata indicating otherwise; (2) unavailability on the Canadian App Store or Play Store, or pending removal from these platforms, which limits sustained usability; (3) mandatory linkage to an active bank account for core functionality, rendering these apps unsuitable for individuals who require or prefer manual transaction entry due to privacy concerns, cognitive impairments, or limited banking access and (4) absence of essential features such as automatic reminders or notifications for payments and due dates, which are critical to supporting budgeting adherence.

For Method 2 (Boolean keyword filtering), the three resulting applications were all installed and tested, but were subsequently excluded due to an absence of English/French language options, rendering them unsuitable for the target user group.

For Method 3 (AI-assisted querying *via* ChatGPT), all five recommended applications were installed and tested. Three applications (Spendee©, Wallet App© and Money Manager©) fulfilled the inclusion criteria and were retained for further analysis. The two excluded applications, from the five recommended by Method 3, were disqualified due to critical functional limitations: one lacked support for manual transaction entry, allowing expenses and income to be recorded only through bank integration; the other exhibited a very poor design characterised by an overly minimalistic interface that restricted visualisation solely to a calendar view, thereby reducing its cognitive accessibility and practical effectiveness for users with ABI.

According to the ranking generated by Method 1, these three applications were respectively positioned at the 16th, 239th and 1009th ranks within the initial corpus.

A summary of all tested applications, their origin (identified with Method 1, 2 or 3) and inclusion/exclusion status is provided in Table 3.

Discussion

Identifying appropriate digital tools to support independent financial management remains a critical challenge for individuals living with ABI. Our study aimed to compare three methods for identifying mobile budgeting applications suitable for individuals with ABI, a population known to experience persistent sensorimotor and cognitive challenges that can affect their ability to maintain independence in financial management [5,8,12]. Current app search methods are inaccurate and unorganised, leaving users frustrated when it comes to deciding what app to use. To address this, we need to explore innovative solutions. In this methodology paper, we proposed the comparison of three distinct app search methods to evaluate their effectiveness in retrieving relevant, accessible and bilingual applications. The weighted keyword approach retrieved the most potentially relevant apps but required substantial post-filtering. In contrast, the Boolean method, despite its stricter logical constraints, failed to yield any usable apps after applying the inclusion criteria, illustrating the limitations of overly rigid filtering in an unstructured app marketplace. The AI-assisted approach generated a concise list of five apps, three of which met all predefined criteria. While only one of these (Spendee©) appeared among the top 25 results of the algorithmic search, the inclusion of two additional apps ranked substantially lower (Wallet App© at 239th and Money Manager© at 1009th) suggests a degree of partial convergent validity between the AI-assisted query and the structured keyword-based method. However, the overall limited overlap between methods (restricted to a single shared application) indicates that each approach captures largely distinct subsets of apps. This divergence likely reflects differences in underlying search logic, including reliance on structured metadata, keyword constraints, or probabilistic language modelling. As such, no single method appears sufficient to comprehensively identify clinically relevant tools, supporting the value of combining complementary search strategies.

Conceptual relevance and clinical significance

To our knowledge, this is the first study to systematically compare three distinct search methods (an algorithmic weighted keyword method, a Boolean query and an AI-assisted approach) to identify mobile applications supporting budgeting in individuals with ABI. Although prior research has emphasised the need for rigorous curation of digital health tools [26,27], no published work has addressed the methodological challenges of retrieving functionally relevant apps for users with cognitive impairments from large, commercially driven marketplaces. In the absence of regulatory standards for cognitive accessibility, our comparative approach offers a pragmatic and replicable model for evidence-informed app selection in clinical settings.

Clinically relevant, the study highlights the importance of selecting appropriate digital tools to support individuals with cognitive impairments in complex everyday tasks such as budgeting, which carries significant real-life risks [28]. However, the primary contribution lies in demonstrating how distinct search methodologies vary in their ability to identify suitable applications within large, unstructured marketplaces. This methodological rigour aligns with current paradigms promoting person-centered technologies in neurorehabilitation [10,11] and provides a foundation for future systematic app identification efforts that can enhance evidence-based clinical practice.

Towards a systematic approach to mobile app selection

This study advances the methodological rigour of app identification in digital health by comparing three distinct search methods. The comparison between the algorithmic (*Method 1*) and Boolean (*Method 2*) approaches is particularly informative. Boolean queries, though common in systematic reviews [26], offer limited flexibility and fail to account for the relevance ranking mechanisms used in app stores. The algorithmic method allows for the integration of clinical priorities by weighting specific terms and metadata fields, enabling a more nuanced and scalable approach [29].

Although no prior studies have directly compared these two methods, our results suggest that the algorithmic method achieves a better balance between inclusiveness and clinical relevance. It yielded a wider set of apps meeting the inclusion criteria, while the Boolean method returned few or no relevant results. This contrast illustrates the need for evolving methodological frameworks that adapt to the dynamic and unregulated nature of app marketplaces.

Given the increasing presence of AI in both consumer and clinical search behaviours [30], our inclusion of ChatGPT (*Method 3*) reflects current trends. While fundamentally different in architecture and logic, this generative model showed an ability to retrieve clinically promising apps. However, its probabilistic outputs lack transparency and reproducibility [31,32]. Therefore, its use as a stand-alone tool should be approached with caution due to limitations in transparency and reproducibility. Nonetheless, its partial convergence with the algorithmic method supports its complementary value within combined search strategies.

Methodological considerations and constraints

Several methodological limitations must be acknowledged in interpreting the comparative findings of this study. First, the three search methods employed differ substantially in terms of their underlying logic, input structures and output formats. The algorithmic weighted keyword method (*Method 1*), applied *via* the AppGuide platform, uses a curated metadata structure and term-weighting logic informed by clinical and technical criteria. In contrast, the Boolean method (*Method 2*) operates within the open search interfaces of both Apple's App Store and Google Play, whose proprietary algorithms prioritise app visibility based on commercial factors such as download volume, ratings and advertising placement, parameters that are largely opaque and uncontrolled by the user. This combination of algorithmic opacity and the lack of standardised, structured metadata within commercial app stores likely contributed to the limited yield of usable results after filtering, despite the widespread use of Boolean queries in prior digital health app reviews [26,33]. In addition, only a subset of applications identified through Method 1 (30% of apps retained after screening) was selected for experimental testing. While this approach enabled a manageable and in-depth evaluation of the highest-ranked applications, it may have introduced a selection bias and limited the representativeness of the findings.

Second, the AI-assisted method (*Method 3*) relied on a generative language model (ChatGPT) to produce app suggestions based on learned semantic associations and web-derived knowledge. This method does not query live app databases but instead draws from its pre-trained corpus up to 2025, which may limit the recency and precision of its outputs. Furthermore, while it identified relevant and clinically promising applications, the epistemological basis of this strategy differs significantly from structured filtering methods, making direct performance comparisons less straightforward. It is also worth noting that slight variations in prompt phrasing or model state can yield different results across repeated queries, posing challenges for reproducibility. Additionally, future studies should assess the stability and reproducibility of AI-generated app lists by replicating queries across different dates, users and alternative AI tools (e.g., Gemini [34], Co-pilot [35], Le Chat [36]). This evaluation was beyond the scope of the current study but is essential to understand the robustness of generative approaches in clinical app identification.

Third, while app inclusion was based on standardised criteria, manual screening remained necessary. To mitigate subjectivity, we employed a structured coding framework and achieved moderate interrater agreement (Cohen's $\kappa = 0.53$), strengthening the reliability of our selection process.

Lastly, this study was geographically and linguistically restricted to apps available in Canada and usable in both French and English. While this reflects real-world clinical settings, it may limit broader applicability. In contrast, the AI-assisted method's app suggestions, generated *via* ChatGPT, were based

on broad criteria without explicit geographic or language constraints, which could affect the relevance of results in specific contexts. Future methodological research should consider integrating factors such as literacy, cultural fit and digital equity into search criteria to improve the inclusiveness and applicability of app identification processes.

Clinical integration and future applications

Our methodological approach offers a replicable strategy to identify functionally relevant apps and holds promise for broader application across other domains of cognitive rehabilitation. Extending these comparative search methods to varied clinical contexts through pilot studies involving diverse clinical teams and end-users (using both quantitative metrics (e.g., retrieval performance, user satisfaction) and qualitative feedback) would allow for a comprehensive assessment of their robustness, scalability and adaptability. This mixed-methods evaluation can guide iterative refinement and tailoring to specific rehabilitation scenarios.

Given the growing presence of poorly regulated digital products, integrating structured and transparent app selection processes into routine clinical workflows could support clinicians in making evidence-informed decisions, enhancing both the relevance and safety of selected tools. Encouraging systematic post-use evaluations, such as clinician ratings based on clinical utility and usability, is essential to ensure the sustainability and continuous improvement of these digital tools. Such feedback mechanisms can also facilitate app prioritisation in systematic reviews and research, strengthening the evidence base for app selection.

Nonetheless, it is essential to address the ethical challenges posed by digital health technologies, particularly given current gaps in AI governance that undermine accountability and oversight [37]. Without proper ethical evaluation and regulation, clinical use of these tools may unintentionally perpetuate bias or cause harm, emphasising the need to integrate ethical considerations with technical and clinical assessments.

Future research should focus on refining and validating app search methodologies across diverse clinical domains and user populations. This includes developing standardised criteria (particularly for cognitive accessibility) within search frameworks, an often overlooked but critical factor for equitable digital health tool identification. Additionally, optimising AI-assisted search techniques to better align with clinical and ethical standards represents a promising avenue for methodological advancement. Interdisciplinary collaboration among clinicians, developers and researchers will be key to enhancing the transparency, relevance and safety of digital health app curation.

Finally, given the evolving role of AI in health technology discovery, deeper investigation into the ethical and practical integration of generative tools is warranted to ensure these innovations augment efficiency without compromising clinical decision-making quality or patient safety.

Conclusion

This study presents an innovative and replicable methodological approach for identifying mobile budgeting applications adapted to the cognitive profiles of individuals with ABI. By systematically comparing a novel weighted keyword algorithm, a conventional Boolean query and an AI-assisted method, we demonstrate that methodological design significantly influences the scope and clinical relevance of app retrieval. The weighted algorithmic method offers a promising balance between breadth and clinical specificity, while the inclusion of AI-assisted methods reflects the growing role of generative technologies in digital health navigation.

In a digital health landscape marked by rapid innovation and limited regulatory oversight, this work lays the groundwork for more structured, evidence-informed app selection in cognitive rehabilitation. Beyond its methodological contribution, it advances the broader agenda of aligning digital health tools with real-world functional needs: an essential step towards enhancing autonomy, safety and quality of life for individuals with ABI. Future research should build on this methodological foundation to further refine and validate app identification strategies, supporting more consistent, transparent and structured approaches to digital health app selection in neurorehabilitation.

Acknowledgement

The authors thank the members and staff of the association Servio for their valuable support.

Author contributions

CRediT: **Marine Thomasson**: Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing; **Michaël Cardinal**: Investigation, Resources, Writing – review & editing; **Simon Beaulieu-Bonneau**: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Resources, Validation, Writing – review & editing; **El Medhi Boubetana**: Resources; **Walter Wittich**: Conceptualization, Funding acquisition, Methodology, Validation, Visualization, Writing – review & editing; **Eva Kehayia**: Conceptualization, Funding acquisition, Validation, Writing – review & editing; **Mohamed-Amine Choukou**: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing; **Frédérique Poncet**: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Supervision, Writing – review & editing.

Disclosure statement

This study was conducted in collaboration with TherAppX. El Medhi Boubetana is an employee of the company, and Michael Cardinal is a shareholder. This collaboration is disclosed in the interest of transparency. It did not unduly influence the study design, data analysis, or manuscript writing. No other conflicts of interest are declared.

Funding

The study was supported by Société Inclusive. Dr. Thomasson was funded by MITACS Accelerate in partnership with Servio (https://www.servio.ca/). Dr. Poncet was funded by the 1) Fonds de Recherche du Québec-Santé [Junior 1 career grant FRQS - Unité de soutien SSA Québec/"Jeunes leaders d'un système de santé apprenant", (#322317)] and 2) the Habilitas Foundation.

Notes on contributors

Marine Thomasson is a neuropsychologist at the Department of Neurology of the Geneva University Hospitals (HUG), Switzerland. Her work focuses on the assessment and understanding of cognitive and emotional functioning in individuals with neurological conditions. Her research interests include affective neuroscience, emotion processing, social cognition, and the role of cerebellar and basal ganglia networks in emotional functioning. Her previous research has explored emotional processing in neurological populations, including individuals with cerebellar stroke and Parkinson's disease. During her postdoctoral training, she investigated the use of digital technologies and innovative tools to support participation and improve quality of life among individuals living with traumatic brain injury. Through clinical and research collaborations, she seeks to contribute to a better understanding of the mechanisms underlying cognitive and emotional changes following neurological disorders and to support patient-centered care.

Michaël Cardinal (Pharm.D.) is a pharmacist and the Chief Operating Officer at TherAppX. As COO, he oversees the company's execution which includes its standardized evaluation processes. He is also a researcher on Digital Health Tools' implementation in clinical practice and a lecturer at the Public Health School of the University of Montreal on Digital Health accreditation frameworks. He is a Healthcare provider Advisor for the Label2Enable project looking to promote the adoption of a unique market access label (ISO 82304–2) for Digital Health apps.

Simon Beaulieu-Bonneau is associate professor in clinical neuropsychology at Université Laval in Québec, Canada. He is a regular researcher at the Interdisciplinary Research Center on Rehabilitation and Social Integration (Cirris) and the Center for Studies and Interventions in Mental Health (CEISM). His research program focuses on two main areas: (1) long-term outcomes and interventions related to cognition, sleep, and fatigue following acquired brain injury, primarily traumatic brain injury (TBI) and stroke; and (2) the use of technology in clinical neuropsychology, including mobile devices, telehealth, and virtual reality. A licensed psychologist/neuropsychologist in Québec, he is also involved in training and supervising doctoral students in clinical neuropsychology.

El Mehdi Boubetana is a software engineer and Cloud & DevOps expert based in Montreal, recognized for his technical expertise at TherAppX (now AppGuide). A certified Google Cloud specialist, he has solid experience in infrastructure automation and application development.

Walter Wittich, Professor at the School of Optometry at the Université de Montréal in Quebec, Canada, is dedicated to researching the rehabilitation of older adults facing both vision and hearing difficulties. He explores dual sensory impairment and acquired deafblindness, and how sensory difficulties interact with cognitive abilities. His most recent

work focuses on global equity disparities and how they relate to sensory difficulties, as he represents Deafblind International on the World Health Organization's Disability Health Equity Initiative. He is the inaugural chair of the Deafblind International Research Network, and the 2025 recipient of Perkins' Anne Sullivan Medal.

Eva Kehayia is Associate Professor and Director of Research at the School of Physical and Occupational Therapy at McGill University, Adjunct Professor at the School of Communication Sciences and Disorders at McGill University and Scientific Co-Director of Feil Oberfeld research site of the Centre for Interdisciplinary Research in Rehabilitation of greater Montréal (CRIR). Her research program spans two main streams of local, national and international activities and funding. The first stream, in the area of psycholinguistics/neurolinguistics, focuses on the study of the architecture of the Mental Lexicon in unilingual, bilingual and multilingual adults, healthy aging and individuals with language limitations due to acquired neurological conditions. The second stream of research addresses health and well-being, accessibility, inclusion and participation of persons living with physical disabilities. Using a Living Lab approach, in collaboration with European Living Labs and the European network of Living Labs, for the past 15 years, she has been conducting and fostering interdisciplinary and intersectoral projects in the community, in everyday lived spaces, leisure environments, including museums. Her recently published, co-edited book Musée pour tous-Aude Porcedda-Editions Hermann, provides a collection of views on accessibility and inclusion in museum environments in Europe and Canada.

Mohamed-Amine Choukou is an associate professor in the Department of Occupational Therapy at the University of Manitoba whose research focuses on digital health, rehabilitation technologies, aging in place, and community-connected health innovation. His work explores the use of telehealth, wearable technologies, artificial intelligence, and remote monitoring to improve healthcare accessibility and support person-centered care, particularly for rural, remote, and underserved populations. Through interdisciplinary collaborations with healthcare providers, community organizations, and Indigenous and community partners, his research aims to develop accessible and meaningful solutions that promote independence, well-being, and quality of life.

Frédérique Poncet, OT, PhD, is an Establishment Researcher at the Lethbridge-Layton-Mackay Rehabilitation Centre (CIUSSS du Centre-Ouest-de-l'Île-de-Montréal), Assistant Professor at the School of Physical and Occupational Therapy at McGill University, and a Regular Researcher at the Center for Interdisciplinary Research in Rehabilitation of Greater Montreal. A Scholar of the Fonds de recherche du Québec (FRQ), her work focuses on food literacy (including meal preparation and budget management), neurological rehabilitation, and integrated knowledge translation within a learning health system perspective. She is the founder of the Gusto Lab, dedicated to the development and evaluation of food literacy interventions to support the autonomy and social participation of individuals living with functional limitations (www.gusto-lab.com)

ORCID

Marine Thomasson http://orcid.org/0000-0002-5213-2924
Michaël Cardinal http://orcid.org/0009-0000-3855-6547
Simon Beaulieu-Bonneau http://orcid.org/0000-0002-9544-5023
Walter Wittich http://orcid.org/0000-0003-2184-6139
Eva Kehayia http://orcid.org/0000-0003-4463-1376
Mohamed-Amine Choukou http://orcid.org/0000-0001-9477-2412
Frédérique Poncet http://orcid.org/0000-0002-2017-4046

References

[1] Dewan MC, Rattani A, Gupta S, et al. Estimating the global incidence of traumatic brain injury. J Neurosurg. 2019;130(4):1080–1097. doi: 10.3171/2017.10.JNS17352.
[2] Feigin VL, Stark BA, Johnson CO, et al. Global, regional, and national burden of stroke and its risk factors, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet Neurol. 2021;20(10):795–820. doi: 10.1016/S1474-4422(21)00252-0.
[3] Ruet A, Bayen E, Jourdan C, et al. A detailed overview of long-term outcomes in severe traumatic brain injury eight years post-injury. Front Neurol. 2019;10:120. doi: 10.3389/fneur.2019.00120.
[4] Shuanglong Z, Jiangyuan Y, Meng N, et al. A meta-analysis of cognitive and functional outcomes in severe brain trauma cases. Front Behav Neurosci. 2024;18:1349672. doi: 10.3389/fnbeh.2024.1349672.
[5] Bottari C, Gosselin N, Guillemette M, et al. Independence in managing one's finances after traumatic brain injury. Brain Inj. 2011;25(13-14):1306–1317. doi: 10.3109/02699052.2011.624570.
[6] Azouvi P, Arnould A, Dromer E, et al. Neuropsychology of traumatic brain injury: an expert overview. Rev Neurol (Paris). 2017;173(7-8):461–472. doi: 10.1016/j.neurol.2017.07.006.
[7] Vakil E. The effect of moderate to severe traumatic brain injury (TBI) on different aspects of memory: a selective review. J Clin Exp Neuropsychol. 2005;27(8):977–1021. doi: 10.1080/13803390490919245.
[8] Engel L, Ewesesan R, Arowolo I, et al. Financial empowerment for adults living with brain injury: systems advocacy for inclusive and accessible financial contexts to improve financial well-being. Arch Phys Med Rehabil. 2024;105(4):e117–e118. doi: 10.1016/j.apmr.2024.02.331.

[9] Prats F, Choukou M-A, Wittich W, et al. Digital tools to support technology-enabled budget management in people with acquired brain injury: a rapid review. Disabil Rehabil Assist Technol. 2024;19(8):2797–2805. doi: 10.1080/17483107.2024.2323146.
[10] Cicerone KD, Goldin Y, Ganci K, et al. Evidence-based cognitive rehabilitation: systematic review of the literature from 2009 through 2014. Arch Phys Med Rehabil. 2019;100(8):1515–1533. doi: 10.1016/j.apmr.2019.02.011.
[11] Cicerone KD, Langenbahn DM, Braden C, et al. Evidence-based cognitive rehabilitation: updated review of the literature from 2003 through 2008. Arch Phys Med Rehabil. 2011;92(4):519–530. doi: 10.1016/j.apmr.2010.11.015.
[12] Thomasson M, Prats F, Beaulieu-Bonneau S, et al. Toward an inclusive digital budgeting solution for people with traumatic brain injury: a focus group study. Under Review.
[13] Topping M, Douglas JM, Winkler D. Factors that influence the quality of paid support for adults with acquired neurological disability: scoping review and thematic synthesis. Disabil Rehabil. 2022;44(11):2482–2499. doi: 10.1080/09638288.2020.1830190.
[14] Harrison AL, Hunter EG, Thomas H, et al. Living with traumatic brain injury in a rural setting: supports and barriers across the continuum of care. Disabil Rehabil. 2017;39(20):2071–2080. doi: 10.1080/09638288.2016.1217081.
[15] Seneviratne MG, Li RC, Schreier M, et al. User-centred design for machine learning in health care: a case study from care management. BMJ Health Care Inform. 2022;29(1):e100656. doi: 10.1136/bmjhci-2022-100656.
[16] Jeffay E, Ponsford J, Harnett A, et al. INCOG 2.0 guidelines for cognitive rehabilitation following traumatic brain injury, part III: executive functions. J Head Trauma Rehabil. 2023;38(1):52–64. doi: 10.1097/HTR.0000000000000834.
[17] Torous J, Wisniewski H, Bird B, et al. Creating a digital health smartphone app and digital phenotyping platform for mental health and diverse healthcare needs: an interdisciplinary and collaborative approach. J Technol Behav Sci. 2019;4(2):73–85. doi: 10.1007/s41347-019-00095-w.
[18] Poncet F, Swaine B, Migeot H, et al. Effectiveness of a multidisciplinary rehabilitation program for persons with acquired brain injury and executive dysfunction. Disabil Rehabil. 2018;40(13):1569–1583. doi: 10.1080/09638288.2017.1300945.
[19] Groussard PY, Pigot H, Giroux S. From conception to evaluation of mobile services for people with head injury: a participatory design perspective. Neuropsychol Rehabil. 2018;28(5):667–688. doi: 10.1080/09602011.2015.1117499.
[20] Hart T, Sherer M, Whyte J, et al. Awareness of behavioral, cognitive, and physical deficits in acute traumatic brain injury. Arch Phys Med Rehabil. 2004;85(9):1450–1456. doi: 10.1016/j.apmr.2004.01.030.
[21] Zhu Y, Yuan H, Wang S, et al. Large language models for information retrieval: a survey. ACM Trans Inf Syst. 2026;44(1):1–54. doi: 10.1145/3748304.
[22] Ai Q, Bai T, Cao Z, et al. Information retrieval meets large language models: a strategic report from chinese ir community. AI Open. 2023;4:80–90. doi: 10.1016/j.aiopen.2023.08.001.
[23] Smith EM, Graham D, Morgan C, et al. Artificial intelligence and assistive technology: risks, rewards, challenges, and opportunities. Assist Technol. 2023;35(5):375–377. doi: 10.1080/10400435.2023.2259247.
[24] Stoyanov SR, Hides L, Kavanagh DJ, et al. Mobile app rating scale: a new tool for assessing the quality of health mobile apps. JMIR Mhealth Uhealth. 2015;3(1):e3422. doi: 10.2196/mhealth.3422.
[25] de Chantal PL, Chagnon A, Cardinal M, et al. Evidence of user-expert gaps in health app ratings and implications for practice. Front Digit Health. 2022;4:765993. doi: 10.3389/fdgth.2022.765993.
[26] BinDhim NF, Hawkey A, Trevena L. A systematic review of quality assessment methods for smartphone health apps. Telemed J e-Health. 2015;21(2):97–104. doi: 10.1089/tmj.2014.0088.
[27] Lewis TL, Wyatt JC. mHealth and mobile medical apps: a framework to assess risk and promote safer use. J Med Internet Res. 2014;16(9):e3133. doi: 10.2196/jmir.3133.
[28] Marson DC, Sawrie SM, Snyder S, et al. Assessing financial capacity in patients with Alzheimer disease: a conceptual model and prototype instrument. Arch Neurol. 2000;57(6):877–884. doi: 10.1001/archneur.57.6.877.
[29] Lu K, Mao J, Li G. Enhancing subject metadata with automated weighting in the medical domain: a comparison of different measures. In: Digital Libraries: Providing Quality Information: 17th International Conference on Asia-Pacific Digital Libraries, ICADL 2015, Seoul, Korea, 2015 December 9-12. Proceedings 16. Cham: Springer. 2015. p. 158–68 doi: 10.1007/978-3-319-27974-9_16.
[30] Topol EJ. High-performance medicine: the convergence of human and artificial intelligence. Nat Med. 2019;25(1):44–56. doi: 10.1038/s41591-018-0300-7.
[31] Biswas A, Talukdar W. Robustness of structured data extraction from in-plane rotated documents using multi-modal large language models (LLM). J Artif Intell Res. 2024. 10.48550/arXiv.2406.10295
[32] Fukataki Y, Wakako H, Naoki N, et al. Ethical review of clinical research with generative AI: evaluating ChatGPT's accuracy and reproducibility. medRxiv. 2024;2024(11):19–24317555. doi: 10.1101/2024.11.19.24317555.
[33] Zhao J, Freeman B, Li M. Can mobile phone apps influence people's health behavior change? An evidence review. J Med Internet Res. 2016;18(11):e287. doi: 10.2196/jmir.5692.
[34] Team G, Anil R, Borgeaud S, et al. Gemini: a family of highly capable multimodal models. arXiv preprint arXiv:231211805. 2023. doi: 10.48550/arXiv.2312.11805.
[35] Stratton J. An introduction to microsoft copilot. In Copilot for Microsoft 365: harness the power of generative AI in the Microsoft Apps you use every day. Berkeley, CA: Apress; 2024. p. 19–35. doi: 10.1007/979-8-8688-0447-2_2.
[36] Mistral LC. Le chat mistral. Chatbot platform powered by artificial intelligence. 2024.https://chat.mistral.ai/chat
[37] Prud'homme B, Régis C, Farnadi G, et al. Angles morts de la gouvernance de l'IA. UNESCO et Mila. Unesco press; 2023. ISBN: 978-92-3-100579-4

Appendix A. Keyword list

The following list contains all keywords used in the app selection process for Methods 1 (Weighted Keyword Query) and 2 (Boolean Query). Keywords were drawn from two conceptual domains: **budgeting and financial management** (Group A), and **cognitive accessibility and support** (Group B).

- In *Method 1*, all keywords were combined into a unified query, with individual weights applied based on domain relevance and term specificity.
- In *Method 2*, the list was split into **two separate groups**. An app was retained only if it contained at least one keyword from each group.

Group A – Budgeting and financial management keywords
budget OR gestion de budget OR budgeting OR gestion financière OR financial management OR finance OR finance personnelle OR personal finance OR planification financière OR financial planning OR suivi des dépenses OR expense tracker OR assistant budgétaire OR budget assistant OR outil de budget OR budgeting tool OR application de budget OR budget app OR budget manager OR expense manager OR spending tracker OR income tracker OR financial control OR financial tracker OR gestion de l'argent OR money management OR autonomie financière OR financial autonomy OR gestion des dettes OR debt management OR littératie financière OR financial literacy OR rappels de paiement OR payment reminders OR paiements automatisés OR automated payments OR catégorisation des dépenses OR expense categorisation OR coaching financier OR financial coaching OR budgétisation prédictive OR predictive budgeting OR budget partagé OR shared budgeting OR co-gestion financière OR co-management finance OR tableau de bord interactif OR visualisation des finances OR jauge budgétaire OR affichage des dépenses OR classification automatique OR tri des dépenses OR alertes de paiement OR rappels automatiques OR notification dépassement budget OR graphiques financiers OR tendances budgétaires OR prévisions de dépenses OR budget personnalisé OR budget par projet OR suivi épargne OR objectif d'épargne OR épargne avec notification OR gestion de crédit OR suivi des cartes OR suivi de l'épargne OR connexion bancaire OR synchronisation bancaire OR importation automatique des transactions OR tutoriel budgétaire OR vidéo explicative OR aide à l'utilisation OR guide d'utilisation OR simulateur de budget OR simulation financière OR rappel budgétaire OR alerte échéance OR paiements récurrents OR paiement programmé OR notifications visuelles OR notification sonore OR alerte tactile OR personnalisation des notifications OR dashboard OR finance visualisation OR budget gauge OR spending display OR automatic classification OR spending categories OR automatic reminders OR budget overrun notification OR financial charts OR budget trends OR spending forecast OR custom budget OR project budgeting OR savings goal OR savings tracking OR savings notifications OR debt tracking OR credit management OR card tracking OR bank integration OR bank sync OR automatic transaction import OR budget tutorial OR explainer video OR usage guide OR in-app tutorial OR budget simulator OR financial simulator OR spending impact tool OR budget reminder OR due date alert OR recurring payments OR scheduled payment OR visual notification OR sound alert OR haptic feedback OR customisable notifications OR adaptive budgeting OR inclusive budgeting

Group B – Cognitive accessibility and support keywords
cognitive impairment OR memory support OR task assistance OR executive function OR neurodivergent support OR accessible interface OR TBI support OR brain injury OR cognitive disability OR trouble cognitif OR soutien à la mémoire OR aide aux tâches OR fonction exécutive OR soutien neurodivergent OR interface accessible OR lésion cérébrale OR handicap cognitif OR traumatisme craniocerebral OR patients cérébrolésés OR outils de rééducation AVC OR lésion cérébrale acquise OR trouble neurologique OR accident vasculaire cérébral OR commotion cérébrale OR neurodégénératif OR acquired brain injury OR cerebral contusion OR stroke OR traumatic brain injury OR TBI OR TCC OR concussion OR brain injury recovery OR neurorehabilitation OR cognitive rehabilitation OR brain injury patients OR cognitive impairments OR disability management OR neurological disorder OR rehabilitation tools OR neurofinance

Appendix B. List of keywords with assigned weights for method 1

Keyword	Priority	Specificity	Score	Count_in_apps	Specificity
Dashboard	2	1	2	29882	2.077359027
Budget	4	1	4	20006	2.250405611
Finance	3	1	3	18119	2.293201451
Stroke	1	1	1	5385	2.818593316
Financial management	4	1	4	4744	2.873555837
Budgeting	4	1	4	3287	3.032722316
Personal finance	4	1	4	2153	3.216339012
Financial planning	3	1	3	2061	3.235293773
Money management	4	1	4	1627	3.33793101
Recurring payments	3	1	3	1172	3.480335168
Expense tracker	4	1	4	1076	3.517438738
Financial literacy	2	1	2	1007	3.546213078
Financial control	3	1	3	925	3.583090762
Payment reminders	4	1	4	918	3.586388955
Customisable notifications	2	1	2	830	3.630142753
Haptic feedback	2	1	2	804	3.643961609
Automatic reminders	4	1	4	795	3.648849425
Expense manager	3	1	3	479	3.86884229
Usage guide	2	1	2	478	3.869749784
Accessible interface	3	1	3	374	3.976293325
Debt management	4	1	4	292	4.083772019
Spending tracker	2	1	2	241	4.167131573
Savings goal	1	1	1	227	4.193121042
Brain injury	1	1	1	222	4.202793311
Budget app	4	1	4	218	4.210689302
Credit management	3	1	3	195	4.259108363
AVC	1	1	1	195	4.259108363
TCC	1	1	1	158	4.35048135
Spending categories	4	1	4	147	4.381819753
Sound alert	4	2	8	131	4.43186383
Cognitive impairment	2	2	4	125	4.452224376
Concussion	1	2	2	120	4.46995253
Income tracker	2	2	4	111	4.503809694
Budget manager	2	2	4	104	4.532098474
Gestion financière	4	2	8	93	4.580647516
Budgeting tool	4	2	8	92	4.585342515
Traumatic brain injury	1	2	2	91	4.590088827
Interface accessible	3	2	6	87	4.609610476
Scheduled payment	3	2	6	85	4.619710558
TBI	1	2	2	84	4.624850075
Automated payments	2	2	4	84	4.624850075
Suivi des dépenses	4	2	8	81	4.640643974
In-app tutorial	2	2	4	73	4.685805152
Expense categorisation	4	2	8	69	4.71027843
Debt tracking	4	2	8	61	4.763796705
Automatic classification	2	2	4	52	4.833122093
Financial tracker	3	2	6	51	4.841555137
Custom budget	4	2	8	49	4.858928988
Project budget	3	2	6	43	4.915655877
Cognitive impairments	2	2	4	43	4.915655877
Rappels automatiques	4	2	8	42	4.925874919
Financial autonomy	3	2	6	38	4.969340122
Financial charts	2	2	4	38	4.969340122
Bank integration	1	2	2	37	4.980921872
Visual notification	4	2	8	35	5.005055307
Explainer video	2	2	4	34	5.017644311
Cognitive rehabilitation	2	2	4	34	5.017644311
Financial coaching	2	2	4	33	5.030609166
Vidéo explicative	2	3	6	30	5.072001483
Accident vasculaire cérébral	1	3	3	26	5.134148899
Card tracking	2	3	6	26	5.134148899
Planification financière	3	3	9	24	5.16891076
Neurorehabilitation	2	3	6	22	5.206699076
Neurological disorder	1	3	3	21	5.226902339
Rappels de paiement	4	3	12	21	5.226902339
Gestion de budget	4	3	12	21	5.226902339
Savings tracking	1	3	3	20	5.248091516
Guide d'utilisation	2	3	6	16	5.345001038
Paiements récurrents	3	3	9	16	5.345001038
Task assistance	3	3	9	14	5.40299274
Bank sync	1	3	3	14	5.40299274

(*Continued*)

Continued.

Keyword	Priority	Specificity	Score	Count_in_apps	Specificity
Acquired brain injury	1	3	3	14	5.40299274
Memory support	2	3	6	13	5.435177301
Connexion bancaire	1	3	3	9	5.594877653
Rehabilitation tools	2	3	6	8	5.646030053
Notification sonore	4	3	12	8	5.646030053
Budget reminder	3	3	9	7	5.704021877
Cognitive disability	2	3	6	6	5.770968544
Financial simulator	2	3	6	6	5.770968544
Autonomie financière	3	3	9	6	5.770968544
Application de budget	4	3	12	6	5.770968544
Disability management	2	3	6	5	5.850149667
Shared budgeting	3	3	9	5	5.850149667
Brain injury recovery	1	3	3	5	5.850149667
Catégorisation des dépenses	4	3	12	5	5.850149667
Notifications visuelles	4	3	12	5	5.850149667
Littératie financière	2	4	8	4	5.947059558
Aide à l'utilisation	2	4	8	4	5.947059558
Fonction exécutive	2	4	8	4	5.947059558
Gestion des dettes	4	4	16	4	5.947059558
Commotion cérébrale	1	4	4	4	5.947059558
Finance personnelle	4	4	16	4	5.947059558
Classification automatique	2	4	8	3	6.071998172
Budget simulator	2	4	8	3	6.071998172
Spending forecast	3	4	12	3	6.071998172
Brain injury patients	1	4	4	3	6.071998172
Gestion de l'argent	4	4	16	3	6.071998172
Lésion cérébrale	1	4	4	3	6.071998172
Synchronisation bancaire	1	4	4	3	6.071998172
TBI support	1	4	4	2	6.248089308
Savings notifications	1	4	4	2	6.248089308
Handicap cognitif	2	4	8	2	6.248089308
Aide aux tâches	3	4	12	2	6.248089308
Tableau de bord interactif	2	4	8	2	6.248089308
Prévisions de dépenses	3	4	12	2	6.248089308
Outil de budget	4	4	16	2	6.248089308
Importation automatique des transactions	1	4	4	1	6.549119181
Budget assistant	3	4	12	1	6.549119181
Paiements automatisés	2	4	8	1	6.549119181
Due date alert	3	4	12	1	6.549119181
Trouble cognitif	2	4	8	1	6.549119181
Automatic transaction import	1	4	4	1	6.549119181
Suivi épargne	2	4	8	1	6.549119181
Suivi des cartes	2	4	8	1	6.549119181
Graphiques financiers	2	4	8	1	6.549119181
Objectif d'épargne	1	4	4	1	6.549119181
Lésion cérébrale acquise	1	4	4	1	6.549119181
Budget personnalisé	4	4	16	1	6.549119181
Affichage des dépenses	4	4	0	0	
Budget périodique	4	4	0	0	
Gestion de crédit	4	4	0	0	
Jauge budgétaire	4	4	0	0	
Tri des dépenses	4	4	0	0	
Inclusive budgeting	4	4	0	0	
Visualisation des finances	4	4	0	0	
Spending display	4	4	0	0	
Épargne avec notification	1	4	0	0	
Co-gestion financière	3	4	0	0	
Patients cérébrolésés	1	4	0	0	
Soutien neurodivergent	1	4	0	0	
Predictive budgeting	3	4	0	0	
Alerte échéance	3	4	0	0	
Budgétisation prédictive	3	4	0	0	
Budget par projet	3	4	0	0	
Personnalisation des notifications	3	4	0	0	
Co-management finance	3	4	0	0	
Rappel budgétaire	3	4	0	0	
Assistant budgétaire	3	4	0	0	
Neurofinance	2	4	0	0	
Alerte tactile	3	4	0	0	
Budget trends	3	4	0	0	
Budget tutorial	2	4	0	0	

(*Continued*)

Continued.

Keyword	Priority	Specificity	Score	Count_in_apps	Specificity
Paiement programmé	3	4	0	0	
Tendances budgétaires	3	4	0	0	
Outils de rééducation	2	4	0	0	
Budget partagé	3	4	0	0	
Coaching financier	2	4	0	0	
Simulation financière	2	4	0	0	
Neurodegeneratif	1	4	0	0	
Simulateur de budget	2	4	0	0	
Spending impact tool	2	4	0	0	
Soutien à la mémoire	2	4	0	0	
Tutoriel budgétaire	2	4	0	0	
Cerebral contusion	1	4	0	0	
Notification dépassement budget	4	4	0	0	
Finance visualisation	4	4	0	0	
Periodic budgeting	4	4	0	0	
Budget gauge	4	4	0	0	
Alertes de paiement	4	4	0	0	
Adaptive budgeting	4	4	0	0	
Budget overrun notification	4	4	0	0	
Suivi de l'épargne	1	4	0	0	
Neurodivergent support	1	4	0	0	
Traumatisme craniocérébral	1	4	0	0	
Trouble neurologique	1	4	0	0	