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SURVEY FATIGUE IN DIGITAL HEALTH APPLICATIONS: CAUSES, CONSEQUENCES, AND PREVENTION STRATEGIES

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ABSTRACT
Thanks to an increase in digital health applications, information is now collected instantly, patients take part in decision-making and treatments are customized for each person. At the same time, having many surveys inside mobile apps is causing some people to grow tired of answering them. In this article, the reasons behind survey fatigue in digital health are investigated, for example, people become tired of surveys due to confusing instructions, little value and insufficient design. The paper discusses the issues caused by people losing interest in the platform such as poorer data, fewer users and shrinking insights for health services. This article provides solutions supported by research and real-world studies, including using adaptive algorithms, applying nudges, personalizing surveys and designing them with the user in mind. Authors have recommended that data collection and user experience are equally important which helps developers, clinicians and researchers discover how to improve user involvement without burdening them.

Keyword:
Survey Fatigue, Digital Health, User Engagement, Mobile Health (mHealth), Patient-Reported Outcomes, Data Quality

1. INTRODUCTION

With digital technology in healthcare, the whole process of providing, supervising and appraising health services has been greatly improved. Nowadays, digital health applications such as mHealth apps, wearables and telemedicine systems are commonly used to engage patients, offer care from a distance and collect information on the spot (Keesara, Jonas, & Schulman, 2020). Healthcare professionals are given ongoing information on patients' health, while individuals are given a chance to look after their health.

Digital health applications are beneficial because they can collect information from users by including surveys and other feedback methods. In most cases, treatment is assessed using patients' reports, tracking symptoms and conducting satisfaction surveys (Nelson et al., 2015). Still, when users receive lots of repeated surveys, they may become survey tired and feel less interested (Rolstad, Adler, & Rydén, 2011).

Surveys can become an overwhelming issue in the world of digital health. Low response rates, lower quality of research data and a less pleasant experience for users may make health projects less effective. It is common to acknowledge this problem in conventional research, though it is not being looked at as much in digital health. Here, we explore reasons for survey fatigue in digital health and introduce methods that help reduce its consequences. Taking action against this problem allows stakeholders to attract more users and ensure the information they provide is accurate.

Brief Overview of Digital Health Application Usage

Digital health technologies have quickly changed the way health care is delivered. Nowadays, mHealth apps, wearable devices and telemedicine platforms are common in most healthcare settings. Remote monitoring, patient instructions, disease management at home and online consultation with specialists help provide and improve healthcare services (Bashshur et al., 2020).

Key highlights of digital health application usage include:

Widespread Adoption

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The global spread of smartphones and wearable technologies has led to the mass adoption of digital health applications across various healthcare settings (Aitken et al., 2020). They allow users to monitor their health, oversee medical conditions and keep in touch with doctors.

Real-Time Data Collection

Digital health tools continuously capture physiological and behavioral data, allowing for early diagnosis, adaptive interventions, and informed clinical decision-making (Nelson et al., 2015).

Patient Empowerment

These applications enhance user engagement by promoting health literacy and offering personalized insights, empowering individuals to take active roles in managing their health conditions.

Data-Driven Decision-Making

The integration of digital tools with clinical workflows enables providers to analyze trends in patient-reported outcomes (PROs) and deliver personalized care plans based on real-time information.

Enhanced Accessibility and Equity

Digital health solutions remove geographic and economic barriers, enabling underserved populations to access high-quality care and aligning with global health equity goals (World Health Organization, 2021).

Integration into Health Systems

Many platforms now synchronize with electronic health records (EHRs), improving communication among care teams and supporting coordinated, longitudinal care.

Emerging Challenges

Despite their advantages, digital health applications face issues such as privacy concerns, technology literacy gaps, and survey fatigue—a growing problem where excessive survey prompts reduce user engagement and data accuracy. They reveal the power of digital health apps and the need to focus on making them user-friendly to preserve people's interest and the quality of the data they provide.

2. DEFINITION AND TYPES OF SURVEY FATIGUE

Survey fatigue refers to the physical and psychological exhaustion experienced by users who are repeatedly exposed to survey requests, especially in digital environments. It typically manifests as reduced attention, declining motivation, and lower quality or incomplete responses (Porter et al., 2004). In the context of digital health applications, survey fatigue arises from the overuse of in-app feedback forms, symptom check-ins, and patient-reported outcome measures (PROMs), which can overwhelm users and negatively affect engagement and data integrity.

Many patients in digital health feel tired of having to complete various questionnaire and check-in forms as standard parts of diagnosis or research. It happens when people answer queries less and less because they keep answering the same surveys over and over and no personal attention or value is given back to them (Porter et al., 2004). To make sure engagement improves, data is accurate and trust is upheld, learning about survey fatigue is essential.

When people are repeatedly given surveys and asked to take them online, they may grow tired both mentally and physically. Usually, it is seen as a lack of attention, less motivation and lower quality or incomplete work (Porter et al., 2004). Because of too many feedback requests, users reporting their symptoms and having to fill in PROMS all the time, users often face survey fatigue which makes them less likely to share accurate information in the app.

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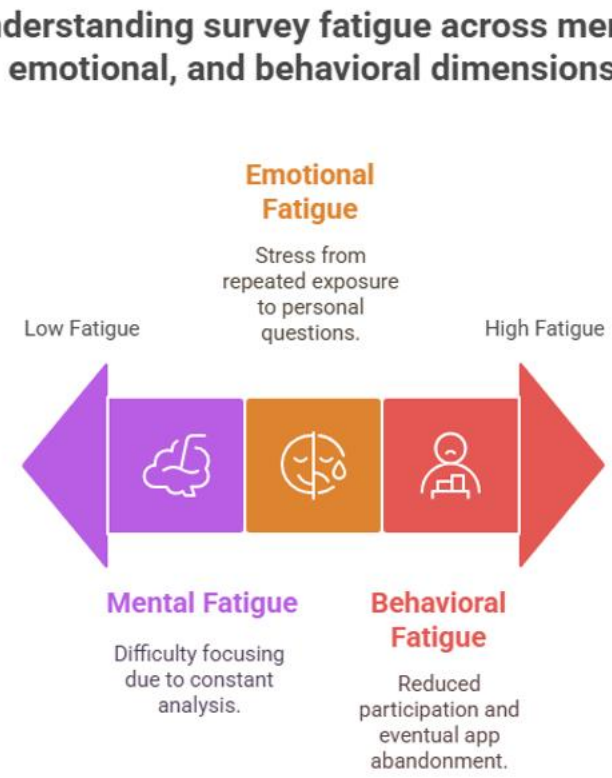
Figure: This diagram shows the understanding survey fatigue across mental, emotional, and Behavioral dimensions



Survey fatigue is a multidimensional phenomenon, commonly categorized into three interrelated types:

i. Mental Fatigue

Being mentally exhausted from a survey is due to constantly analyzing each item on the form. Some users may have problems focusing, react slower or show no desire to continue answering questions. If a health app bothers you with many pop-ups, asks the same queries several times or does not have a user-friendly layout, this may boost your mental strain (Galesic & Bosnjak, 2009). If someone is mentally exhausted, they will typically opt for an easy solution over the right one.

ii. Emotional Fatigue

Feeling emotionally exhausted occurs when survey questions are repeatedly stressful, especially when the subjects discuss personal health information. Sometimes, users may feel stressed, unsure or tired due to the exposure of their information or feelings with mental health apps (van Ballegooijen et al., 2016). Such feelings might make users not want to interact with the app any longer.

iii. Behavioral Fatigue

When users take part less and respond less over a period, it is called behavioral fatigue. It usually happens when combined mental and emotional exhaustion decreases the amount of survey answered, omits questions or causes someone to stop using the app (Rolstad et al., 2011). If users get tired of the process, it can lower the quality of health monitoring data.

How Survey Fatigue Manifests in Digital Health Contexts

Taking part in multiple surveys online can wear a patient out, causing them to avoid surveys and affect the reliability of collected data. Users of mobile health solutions are habitually asked to fill out surveys monitoring their health,

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noting their level of treatment adherence or measuring satisfaction with the service. Improper or inappropriate use of the tools aimed at modern healthcare can bring about employee fatigue and compromise the quality of the health data recorded (Rolstad et al., 2011; Nelson et al., 2015).

Here are some signs of survey fatigue in the context of digital health:

i. **Lower Responses From Customers**
If users get tired of taking so many surveys, they may just pick appropriate but mediocre choices. Because of this, the results from patient-reported data are reduced and its use in clinical or research areas is limited (Galesic & Bosnjak, 2009).

ii. **Less people are now completing surveys.**
Some platforms use the rate at which patients finish their planned activities to measure their level of engagement. On the other hand, users might stop filling out a survey if the questions are too complex, the same or pointless (Porter et al., 2004). It is common for people to stop using these apps as time goes on.

iii. **A Leader Survey can cause more items to be skipped and bias the results.**
Since answering open-ended questions takes more effort, people who are tired are more likely to pass by them. Consequently, the survey may not reflect the opinions of the whole group which could influence the accuracy of health studies (Revilla & Höhne, 2020).

iv. **When use of the app drops.**
Global Foundation for MI asks users to provide feedback too often, causing many to disable notifications and stop using the app. In fact, mental health or chronic disease apps need people to use them often to maintain their effectiveness (van Ballegooijen et al., 2016).

v. **Not Caring and Putting Up a Fight**
Besides how someone acts, people may feel frustrated, indifferent or resistant if they feel asked too many questions. If the app disconnects users emotionally, they may start to distrust it and are less likely to participate in even important medical surveys (Meade & Craig, 2012).

They show that designers should focus on keeping the needs of users in mind with their data. To put users first, developers and health professionals must relieve stress, tailor the survey process and clearly explain the importance of each person's answers.

Table1: Survey Fatigue in Digital Health Applications

Section	Key Concepts	Examples / Manifestations	Cited Sources
Understanding Survey Fatigue	Survey fatigue refers to the reduced quality and quantity of user responses due to frequent or poorly designed surveys in digital health apps.	- Mental overload - Decreased motivation - Diminished data accuracy	Porter et al., 2004; Galesic & Bosnjak, 2009
Types of Survey Fatigue	Categorized into: 1. Mental fatigue 2. Emotional fatigue 3. Behavioral fatigue	- Cognitive strain - Frustration, burnout - Skipping questions, app abandonment	van Ballegooijen et al., 2016; Rolstad et al., 2011
How it Manifests in Digital Health Contexts	Practical expression of fatigue in user behavior and data outcomes	- Satisficing (lazy answers) - Low completion rates - Nonresponse bias - App disengagement	Revilla & Höhne, 2020; Nelson et al., 2015; Meade & Craig, 2012

3. Causes of Survey Fatigue

(i) Over-surveying and frequency overload

When companies send out surveys too often, it gives users a feeling that their time is constantly being overwhelmed by these surveys. Those designing digital health apps for long-term diseases or mental health often include daily or weekly surveys that users have to complete. If people are asked about the same topic often, they have less mental

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capacity for each survey, grow less motivated to respond and this leads to tiredness quickly (Porter et al., 2004; Revilla & Höhne, 2020).

(ii) Poorly Designed or Lengthy Questionnaires and Lack of Personalization and Relevance

Survey fatigue in digital health applications is often driven by two intertwined factors: the poor design of questionnaires and the failure to tailor survey content to individual user contexts. These issues can significantly degrade both user experience and data quality.

Poorly designed or overly lengthy questionnaires place a substantial cognitive and emotional burden on users. When surveys contain too many questions, use complex language, or fail to maintain user engagement, individuals are likely to experience mental fatigue and disengagement. Repetitive or redundant items, unclear phrasing, and an excessive time requirement can frustrate users, leading to reduced attention, incomplete responses, or total abandonment of the survey. Research has shown that longer surveys correlate with decreased participation rates and a decline in the accuracy and completeness of responses (Galesic & Bosnjak, 2009; Rolstad et al., 2011).

The situation is exacerbated when these surveys lack personalization and relevance. In many digital health systems, users receive generic surveys that are not adapted to their specific health condition, treatment stage, or previous responses. This mismatch between user expectations and survey content results in emotional detachment and apathy. Users often perceive these interactions as irrelevant or meaningless, especially if they do not see how their input is being used. The absence of adaptive, responsive feedback loops can make the survey process feel transactional and hollow rather than supportive or clinically meaningful (Nelson et al., 2015; Meade & Craig, 2012).

Together, poor design and low relevance amplify each other's negative effects. A lengthy survey might be tolerable if it feels personally significant or clinically impactful. Conversely, even a short survey can be fatiguing if its questions are irrelevant or impersonal. When digital health applications fail on both fronts—by delivering long, generic questionnaires—they risk not only losing valuable user data but also diminishing the credibility of the application itself.

(iii) Insufficient Feedback Loops: Impact on Survey Fatigue

Often, a reason for fatigue in surveys for digital health apps is that users do not understand how their answers help their care or improve the application. If users give time to fill out surveys but there is no proof that their replies matter, they stop caring and lose enthusiasm (van Ballegooijen et al., 2016).

If feedback to users does not relate to adjustments in the app, updates that consider their responses or research, they may notice their efforts are not recognized. As a result, people start providing less helpful comments or even quit taking part in the question-and-answer session. If the gap is closed using personalized updates, user motivation improves and users stay more engaged (Revilla & Höhne, 2020).

The absence of enough feedback in digital health poorly supports the idea of patient-centered care, as it hinders people from working together. Ensuring patients get useful feedback about their input motivates them to care for their health in the long run.

Table 2: Causes of Survey Fatigue in Digital Health Applications

Cause Category	Description	Manifestations	Cited Sources
High Survey Frequency	Excessive number of survey prompts over short intervals	User annoyance, ignored notifications, rushed answers	Porter et al., 2004; Revilla & Höhne, 2020
Length and Complexity of Surveys	Long or cognitively demanding surveys increase mental load	Survey dropouts, satisficing behavior, skipped open-ended questions	Galesic & Bosnjak, 2009; Rolstad et al., 2011
Poor Interface Design	Unintuitive UI/UX, difficult navigation, or overwhelming layouts	User frustration, app disengagement	Nelson et al., 2015
Lack of Personalization	Generic survey content not aligned with user context or relevance	Emotional detachment, reduced response effort	Meade & Craig, 2012

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Inadequate Feedback Loop	No visible use of user-provided data or lack of communicated outcomes	Loss of trust, user apathy, belief that responses "don't matter"	van Ballegooijen et al., 2016

4. Consequences of Survey Fatigue in Digital Health Applications

After feeling survey fatigue, people are less likely to use the platform for its intended purposes. Users, healthcare professionals and the whole system may suffer from these consequences.

a) Base data is of poor quality.

People who feel tired often answer without thinking or even skip some questions. Because of this, medical data may be unreliable, leading to errors in healthcare plans and computer-based solutions. As people hurry through surveys or choose easy replies without paying attention, the credibility of the collected health data decreases (Galesic & Bosnjak, 2009).

b) A larger number of people leaving school

When users get tired of taking surveys, they tend to leave the app. Users who find themselves bombarded with annoying and unnecessary surveys might decide to quit using the app. This reduces the ability to provide continuous monitoring and management in both chronic health conditions and mental health issues (van Ballegooijen et al., 2016).

c) When users become bored with an app, it often results in them choosing to abandon it.

A tired user can mute alerts from the app, stop seeing survey messages or simply uninstall it. It leads to a breach in collecting data and breaks the continuity of therapeutic steps based on using the app. It is hard for the platform to win back users' loyalty if they have lost respect for its reactions or benefits.

d) A Decline in Someone's Emotions and Behaviors

Doing the same types of surveys may cause exhaustion, mainly for users who frequently struggle with chronic or mental health issues. The stress of filling out many surveys may dampen individuals' interest in joining more digital health initiatives (Meade & Craig, 2012).

e) Lowering personalization affected how well the AI performed.

Machines use survey results to customize the ways patients are cared for. When an operator feels tired or records does not contain enough information, the algorithm may generate irrelevant or incorrect insights and responses. As a result, the app cannot offer customized, high-quality care like it did earlier (Nelson et al., 2015).

f) Mistakes in Reading and Error in Diagnosis

If doctors and other healthcare workers depend on fatigued data from digital health, they could make mistakes. As a result, patients might receive too many treatments, too few treatments or essential signs of an illness could be missed.

Drop in user participation and engagement and Decline in data quality and response accuracy

1) People are less willing to participate and engage.

- When users get too many similar or meaningless surveys, they choose to stop interacting with the app.
- Annoying surveys are overlooked and some apps may be put under mute or removed completely.
- As patients skip appointments, their health care and monitoring are interrupted.
- People get less motivated when they do not feel that their input is useful.

2) There is a drop in data accuracy and the responses people give.

- When users are tired, they quickly respond to surveys without much care or thought.
- If you fail to answer certain questions, the dataset will lack important information
- Because of biases, results and clinical opinions can no longer be trusted.
- Machine learning models lose accuracy when the algorithm is trained using low-quality data.

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Table 2: Consequences of Survey Fatigue in Digital Health Applications

Consequence	Description	Impact on Health Systems / Research	Cited Sources
Decline in Response Rates	Fewer users complete surveys as fatigue sets in	Poor longitudinal tracking, reduced statistical power	Revilla & Höhne, 2020
Lower Data Quality	Users give less thoughtful or inaccurate responses	Biased health metrics, misleading conclusions	Galesic & Bosnjak, 2009
High Survey Abandonment	Surveys are left incomplete or ignored	Disrupted data flows, app feedback loops fail	Rolstad et al., 2011
Reduced App Engagement	Users stop interacting with app features due to constant survey prompts	Drop in adherence to care plans, decreased retention	Nelson et al., 2015
Psychological Impact	Users feel overwhelmed or burdened by constant questioning	Negative user experience, potential stress and reduced compliance	Meade & Craig, 2012; van Ballegooijen et al., 2016

5. PREVENTION AND MITIGATION STRATEGIES

a) Smart Scheduling and Timing of Surveys

When surveys are delivered smartly, researchers consider their schedule, target audience and the situation to ensure that participants answer fewer questions and their responses are more meaningful. If users are bombarded with surveys, there is a high chance they will lose interest right away. Yet, whensurveys are organized for the right reason and appropriate timing, they cause users less inconvenience and improve the measurement of results.

- **Context-Aware Timing**

Surveys are to be carried out according to how each person uses their app, their clinical progress or how they monitor certain symptoms. For example, you could ask how things are going at the close of therapy or after your patient takes their medication.

- **Adaptive Frequency**

Do not set a rigid pattern for conducting surveys. Therefore, you should trigger surveys based on things such as missed refills, patients' behavior or clinical alerts. When too much care is taken, asking excellent questions, students can become tired and end up leaving the course.

- **User-Controlled Scheduling**

Allowing users to decide when they would like feedback makes them feel respected. It is beneficial to allow users to delay answering surveys without facing any problems, as this promotes a healthier relationship.

- **Try not to make too many arrangements one after the other.**

Don't send out too many surveys to someone in quick succession. Should more than one test be given, either place them in different time slots or merge them as a unified piece of work.

- **Carry Out Event-Based Surveys Only if It's Necessary**

Carry out a survey just if there is something meaningful like a flare-up, a change in medicine or if someone uses a survey feature.

b) Reducing Survey Fatigue Through Value-Driven Engagement

If surveys in digital health apps are used excessively, patients might drop out, the collected information may be unreliable and the app's usefulness may suffer. The best approach to stop this is to ensure users feel valued, trusted and work alongside them. One can achieve this by introducing suitable incentives and making all communication clear. The type of key incentives include:

i. Tangible Rewards

- Some examples are gift cards, reduced-price memberships and health care vouchers.
- They are successful in making sure that participants stay in long-term health studies.

ii. Gamification Techniques

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- Ways included: gaining access to new options, collecting badges, following progress charts
- This makes the process pleasurable for users, especially when using wellness or fitness apps.

iii. Feedback from Health

- Examples: you can unlock tips tailored to your needs, check your progress and learn more about your symptoms.
- Once users notice that getting involved raises their importance in coaching, they are likely to continue being involved.

The Important Elements for Promoting Transparency:

- Purpose Disclosure: Always let the user know the purpose of the survey (e.g., "to set your personal sleep suggestions" or "to check how the app works while tracking your medicine").
- Feedback Visibility: Remind the users that their input plays a role in making the system better or supporting clinical success (by offering weekly dashboards, summary notes and email reports).
- Privacy Assurance: Provide information about how personal data will be protected, how it will be turned into anonymous data and how it can be used. This gives individuals more reason to answer answers honestly and without fear.
- Two-Way Dialogue: Seek input from your customers about the way the surveys are designed. Being mindful of users' opinions makes them feel valued and helps promote their loyalty.

The reason it works is…

Being open with information turns the user into someone who collaborates actively. If a user sees that their participation has an impact, they usually continue to care about the system.

c) Integrating Passive Data Collection Where Appropriate

Having to deal with many surveys is one of the top reasons users stop using digital health applications and sharing valuable information. Gathering information automatically through passive data collection is a good way to address this concern. By using this method, we clear the way for users and help consistently and reliably monitor their health and behavior.

Health data can be collected in a passive way through the benefits of modern mobile devices, wearables and the use of applications. For example, wearable devices such as fitness trackers and smartwatches continuously track your heart rate, hours of sleep, physical activity and stress (Piwek et al., 2016). Mobile phone sensors are capable of studying movement patterns, location, nearby sounds or the sound of a person's voice, information that can reveal signs of a user's well-being (Cornet & Holden, 2018). Changes in the way someone uses their phone or speaks could be a digital biomarker of depression or anxiety.

Passive data is useful since it sends information in real time without interrupting users over and over again. It is crucial for these users, as the task of often updating data on their own may further discourage them. Frequent and lengthy user replies that users take the initiative to give are a cause of many surveys being too long and passive data collection remedies this issue.

Also, if this data is combined with targeted surveys from time to time, it can make the person's health care more flexible and catered to their needs. In other words, an application could keep an eye on someone's sleep and exercise habits and only suggest completing a brief questionnaire if there are major changes. As a result of this approach, the data collected is still valuable and is gathered in a way that is appropriate for different users and suitable for each context.

6. CONCLUSION

Survey fatigue poses a significant threat to the effectiveness and sustainability of digital health applications. As these platforms become increasingly integral to health monitoring, behavioral interventions, and chronic disease management, the quality and consistency of user-reported data are paramount. However, excessive survey frequency, poorly designed questionnaires, lack of feedback, and a failure to personalize interactions often lead to user disengagement, lower data accuracy, and ultimately, diminished clinical value.

Understanding survey fatigue in digital health contexts requires a multidimensional perspective—recognizing not only its psychological manifestations (mental, emotional, and behavioral) but also the systemic causes embedded in digital

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design and health informatics strategies. The consequences, ranging from drops in user participation to compromised data integrity, highlight the urgent need for preventive interventions.

Effective mitigation hinges on a shift toward user-centered design. Strategies such as smart survey scheduling, meaningful incentivization, transparent communication, and the ethical integration of passive data collection help restore balance between data needs and user experience. These approaches empower users as collaborators rather than passive data sources, enhancing trust and long-term engagement.

Ultimately, the future of digital health depends on designing platforms that respect users' time, protect their privacy, and deliver meaningful value. By addressing the root causes of survey fatigue with empathy, innovation, and responsibility, developers and healthcare providers can ensure that digital tools fulfill their promise of accessible, scalable, and user-friendly healthcare solutions.

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