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Empathetic and Emotive Design: A Scoping Review

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Abstract. With the advent of the digital health era, there has emerged a new emphasis on collecting health information from patients and their families using technology platforms that are both empathetic and emotive in their design to meet the needs and situations of individuals, who are experiencing a health event or crisis. Digital empathy has emerged as an aspect of interactions between individuals and healthcare organizations especially in times of crises as more empathetic and emotive digital health platforms hold greater capacity to engage the user while collecting valuable health information that could be used to respond to the individuals' needs. In this paper we report on the results of a scoping review used to derive an initial set of evidence-based empathetic or emotive design heuristics.

Keywords. Empathy, emotive, design, heuristics, user interface, human-computer interaction, evidence-based

1. Introduction

Empathetic and emotive interaction is an important element in the design of digital health tools. Empathetic and emotive interaction is focused on how users feel and react to technologies. Feeling and reactions affect user engagement with digital tools (e.g., mobile apps, websites, surveys) and can have significant impacts on the use of these tools. Such interactions attend to how emotion affect the user experience from first acquiring or using a software or a product through to its use and abandonment (or user disengagement). Empathetic or emotive interaction is present throughout a user's journey with a software or product. It also deals with how users can become emotionally attached to a software or product [1,2]. Yet, we have few tools available in healthcare to collect information about individuals in a way that addresses their individual sensitivities and health needs while providing health information. This is an area of research that holds great promise for affording us the opportunity to collect information to support effective decision making by healthcare service managers while at the same collecting information from patients. In this paper we describe our work in conducting a

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scoping review of empathetic or emotive design to identify themes and approaches to creation of empathetic user interfaces.

2. Background

Emotive and empathetic design promotes positive emotions [3] or pleasure in users [4] by means of the design properties of products and software. Researchers have laid some of the groundwork for this new area of research, yet more investigation is needed. Through the study of empathetic or emotive user interface designs, knowledge can be gained about what concepts, designs, and frameworks could be used to inform the collection of data and the satisfaction of population health needs in the areas of compliance with health orders, trust in health and government action, and health related stress reduction initiated by health events. Although the construct of empathy is multidimensional in nature and difficult to measure, there are effective strategies for teaching empathy that focus on design, communication and training. The study of digital empathy in the context of features and functions of emotive interface designs remains to be explored and we began our work in this area by conducting a scoping review [5,6].

3. Procedure

A scoping review was undertaken that focused on empathetic and emotive interface design. The scoping review determined the current state of the literature for assessing the empathy of user interfaces. The scoping review focused on user interface design, empathy, emotion, communication and engagement. Arksey and O'Malley's five-step framework [7] as advanced by Levac et al. [8] was used to guide the scoping review. Five electronic databases were searched: (1) Medline®, (2) the Cumulative Index to Nursing and Allied Health Literature (CINAHL)®, (3) Psychinfo®, (4) Web of Science® and (5) IEEExplore®.

Articles selected for further review had to be related or relevant to the topic of empathetic and emotive user interfaces. Keywords used in the search included: "digital empathy", "empathetic design", "content design", "cultural design". "inclusive design", and "persuasive design" (see author for a full list of keywords used). Published peer-reviewed papers that focused on digital empathy, emotive design, and communication and engagement were identified and uploaded to Covidence® for further screening and review. Following the completion of the search, two researchers reviewed each publications' titles and abstracts using the inclusion and exclusion criteria in Table 1.

Table 1. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
• a digital tool	• opinion pieces
• empathy	• editorials
• emotion	• paper-based tool
• user interface design	• not in the English language
• communication	
• engagement	
• empathetic or emotive interface designs	
• Peer reviewed	
• English language	

After the two researchers completed their title and abstract reviews, a meeting was held, where the two researchers along with a third researcher discussed conflicts in the selection of articles that emerged after the initial screening. A final decision was made by the three researchers as to whether to include or exclude the article for further full-text review by a majority vote. This screening took place in Covidence®. The review software supports screening and review of peer-reviewed research by the researchers. Irrelevant, unrelated, or duplicate studies were removed prior to screening by the two researchers. A PRISMA flow diagram was created as part of this process. The PRISMA diagram was populated with information regarding paper eligibility arising from the title, abstract and full paper screening. Articles that met the eligibility criteria were read, and data were extracted from these articles that included: the researcher's name, publication date, research questions, subjects/participants, setting, methods, design findings/implications and conclusions [7,8].

4. Results

4.1 PRISMA Diagram

Below are the results from the PRISMA diagram and the review of the data extractions from the articles from Phase 1 (see Figure 1). 559 records were identified. 146 duplicate records were removed before title and abstract screening. 413 records were screened using the inclusion and exclusion criteria. As a result, 357 records were excluded and 62 were sought for full text retrieval. Of the 62 records, three were excluded as they did not deal with digital tools, leaving in the end 59 records available for full text review (see Figure 1: PRISMA Diagram).

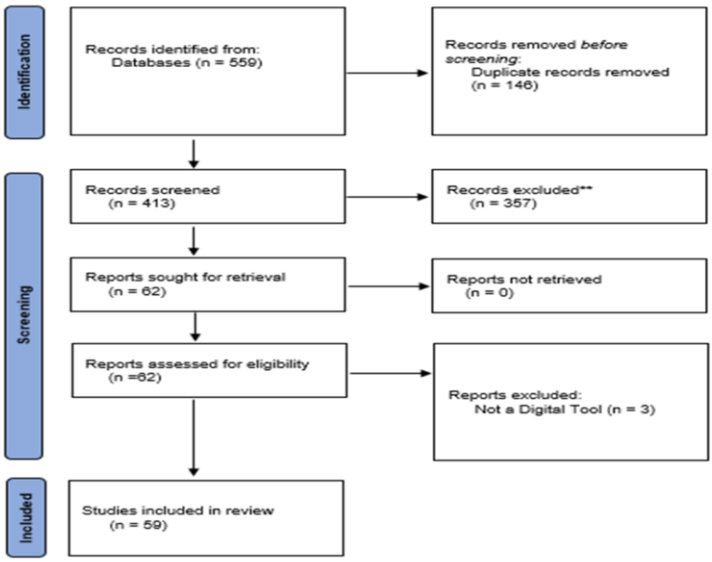

Figure 1. PRISMA Diagram.

4.2 Thematic Analysis of the Data Extractions from the Articles

Several themes emerged from a qualitative analysis of the results found in the data extraction table. Extracted data were analyzed qualitatively for themes [5]. Tools that are designed and developed with digital empathy or emotion perform better than tools that do not. According to the literature, user engagement is an important aspect of digital tool development related to creating empathetic user interfaces [1]. Researchers found that digital tools that have an underlying strategy or plan for enhancing user engagement are more empathetic. Layout and navigation as well as content and support have been found to improve user engagement and empathy [2,3]. Choosing the right design, attending to wording and developing language in a user oriented, participatory design approach improves user engagement and user perceptions of digital tool empathy. Communication improved empathy. Wording and language enhances communication. Timing of messages was identified in the research literature. Some researchers noted the timing of messages provided by digital tools influences use of materials and the information presented by tools [2].

Design influenced empathy [1-4]. Several aspects of design are important such as aesthetics, participant participation, and design conventions for digital empathy to be present. Imagery influences user engagement [2,3]. Graphic designs are a critical aspect of digital tools [2,3]. Comello and colleagues [9] identified graphic design impacts users. Several studies noted that personalization improves empathy and engagement, user satisfaction, and dialog quality. Whiteside and colleagues [10] recommended user endorsed personalization be considered in digital tool development [1,10]. Personalization of digital tools also took the form of customizing the features and information content provided by users. Lastly, digital tool content is important [1,2].

Gamification may improve user engagement and retention. Researchers have found game dynamics may influence user engagement and satisfaction with digital tools and their ability to meet users' needs. Researchers suggested that digital tools should be part of gamified care. Digital tool design is also important from a usability perspective. Usability is an essential aspect of user interface design. Usability is associated with engagement. Here, researchers have suggested that there is a need for designers to create clear consistent and visually appealing designs to ensure tool usability. To enhance usability, interfaces can be designed using strategies that include user input in the design of the interface, which could involve iterative design with cycles of user feedback and re-design. Other digital tool related factors that affect user engagement and empathy include: enjoyment, attention, user satisfaction, privacy, information security and technical difficulties, bugs and errors.

Privacy and information security are essential to engender trust which is fundamental to achieving empathetic interactions and engagement [1,2]. User questions about privacy should be clearly answered and explained. Privacy and data access issues are important to users, and if the user does not feel these issues are adequately addressed this may decrease engagement. Researchers found that user perceptions regarding their being a lack of privacy or information security could be a barrier to engagement with digital tools. Lastly, technical difficulties, bugs or errors could act as a barrier to engagement and may be perceived as un-empathetic and may lead to dis-engagement (e.g., error messages may be perceived as frustrating if designed in an unfriendly sounding text).

5. Discussion and Conclusions

The scoping review reported in this paper explored empathetic and emotive design. From the review a number of themes emerged. These included identification of concepts related to and associated with emotive design as well as specific design approaches and features that were found to support emotive design. This included a focus on careful design of communication and messaging that is simple and geared to the literacy level of the user of systems or user interfaces. Supporting user engagement was found to be highly related to emotive user interfaces. Other aspects related to emotive design include use of personalization and customization, gamification, the use of attractive and visually appealing graphics as well as a focus on both usability and security to engender trust in users. The results of the review reported in this paper are being used as a basis for the development of a new set of evidence-based heuristics that may be used to assess the degree to which different user interface designs support user experience and positive emotional interaction [11,12].

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Note: The full data extraction can be obtained from the corresponding author.

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