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Designing a Persuasive Model for Early Intervention of Digital Islamic Spiritual

Mereka Bentuk Model Persuasif untuk Intervensi Awal Spiritual Islam Digital

Mohd Amin Mohd Noh[1,2,], Siti Fadzilah Mat Noor[1], Hairulliza Mohamad Judi[1], Nor Azan Mat Zin[1], Noraidah Sahari@Ashaari[1]*

[1]Faculty of Information Science and Technology, Universiti Kebangsaan Malaysia, Malaysia
[2]Faculty of Education, Universiti Islam Selangor, Malaysia

**Corresponding author: mamn@uis.edu.my*

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ABSTRACT

The landscape of persuasive technologies within digital health interventions has witnessed diverse implementations, employing various strategies to tackle a broad spectrum of health and wellness issues. However, the infusion of persuasive technology with a spiritual approach intertwined with cultural and religious elements remains largely unexplored. While the Islamic spiritual approach has demonstrated effectiveness in inducing changes in attitudes and behaviors, especially concerning sexual behavior problems, such approaches are predominantly confined to face-to-face interactions within adolescents' rehabilitation and guidance centers. This study, therefore, endeavors to discern the features of self-management interventions tailored for adolescents, incorporating Islamic spiritual components along with relevant persuasive design principles. The study employs TUDER for creating digital spiritual interventions that integrate behavioral change strategies with persuasive design principles. The synthesis of these components aims to formulate a comprehensive model framework for the development of digital Islamic spirituality for early interventions. Through the identification of seven self-management characteristics, seven Islamic spiritual components, and 13 persuasive design principles, the proposed model framework underwent rigorous content validity evaluation by nine experts spanning the fields of human-computer interaction, persuasive technology, system development, and the Islamic spiritual domain and communication. This model framework holds promising potential as a foundational blueprint for the development of web-based intervention platforms.

Keywords**:** Persuasive Technology; Persuasive System Design; Islamic Psychospiritual Intervention; Human-Computer Interaction; Intervention Technology

ABSTRAK

Perkembangan teknologi persuasif dalam intervensi kesihatan digital telah mengalami kepelbagaian implementasi, dengan menggunakan pelbagai strategi untuk menangani isu kesihatan dan kesejahteraan. Namun, gabungan teknologi persuasif dengan pendekatan spiritual yang berteraskan elemen budaya dan keagamaan masih belum diterokai secara

meluas. Pendekatan spiritual Islam terbukti berkesan dalam mempengaruhi perubahan sikap dan tingkah laku, khususnya berkaitan masalah tingkah laku seksual. Walau bagaimanapun, pendekatan ini hanya terhad kepada pendekatan intervensi bersemuka di pusat pemulihan dan bimbingan remaja. Oleh itu, kajian ini bertujuan mengenal pasti ciri-ciri intervensi pengurusan kendiri yang disesuaikan untuk remaja dengan mengintegrasikan komponen spiritual Islam serta prinsip reka bentuk persuasif yang relevan. Kajian ini menggunakan rangka kerja TUDER dalam pembangunan intervensi digital berteraskan spiritual, yang menggabungkan strategi perubahan tingkah laku dengan prinsip reka bentuk persuasif. Integrasi komponen ini bertujuan merangka model rangka kerja komprehensif bagi pembangunan intervensi awal spiritual Islam digital. Melalui pengenalpastian tujuh ciri pengurusan kendiri, tujuh komponen spiritual Islam, dan 13 prinsip reka bentuk persuasif, model rangka kerja yang dicadangkan dinilai kesahan kandungannya oleh sembilan penilai pakar dalam bidang interaksi manusia-komputer, teknologi persuasif, pembangunan sistem, serta domain komunikasi dan spiritual Islam. Model ini berpotensi besar sebagai asas pembangunan platform intervensi berasaskan web.

Kata kunci**:** Teknologi Persuasif; Reka Bentuk Sistem Persuasif; Intervensi Psikospiritual Islam; Interaksi Manusia-Komputer; Teknologi Intervensi

INTRODUCTION

Persuasive technology (PT) is a significant innovation that differs from conventional persuasive methods through its interactive, continuous, and confidential nature (Almaliki & Ali, 2016; Pickrell et al., 2016). It operates across multiple modalities, including graphics, audio, text, interactivity, and haptic feedback, and can be used autonomously without face-to-face supervision (Ma & Atkin, 2017). When applied in interactive applications, PT has been shown to improve efficacy, self-efficacy, motivation, acceptability, retention, and compliance, while supporting a wide range of targeted behaviors (Ndulue & Orji, 2018; Nor Aziah et al., 2017). In Malaysia, however, its application in intervention technology remains limited, particularly in designs that integrate an Islamic spiritual approach to address sexual and behavioral issues. Evidence suggests that incorporating religious and spiritual elements in interventions can positively influence emotions, beliefs, attitudes, and behaviors (Wan Yusoff & Mohd Amin, 2020).

Spiritual intervention includes practices such as prayer, religious meditation, mantra repetition, yoga, mindfulness, and a mind–brain approach (de Diego-Cordero et al., 2020). These practices are transcendent or religious in nature. The definition used by non-Muslim researchers often differs from the Islamic perspective, which holds that spirituality and religion are inseparable (Hamjah, 2018).

In this study, sexual behavior problems (SBPs) refer to actions driven by erotic desires for sexual pleasure, including accessing pornography, masturbation, and sexual promiscuity (Noh et al., 2019; Norman & Othman, 2020). These behaviors contribute to adolescents' involvement in sexual crimes. In Malaysia, over half of adolescents involved in sexual crimes have SBPs (Intan Farhana & Siti Nabilah, 2018). Common offenses include indecent acts, rape, incest, and premarital pregnancies (Bahori & Ismail, 2018). Although SBPs are often associated with family, educational, peer, or environmental factors (Baharuddin et al., 2020), self-related factors are the main drivers of behaviors that go against commendable moral standards (Atiah Absha & Mohd. Isa, 2019; Farhan, 2019). Strengthening self-management skills is therefore a central strategy in sustaining positive behavioral change (Asbjørnsen et al., 2020).

While various strategies and technologies influence behavior (Aldenaini, Orji, & Sampalli 2020), the consensus combination of persuasive design principles remains unclear (Torning, 2014). Furthermore, no studies have explored the integration of persuasive design principles with Islamic spiritual interventions for the purpose of addressing SBPs. Islamic spiritual interventions help individuals regulate behavior more effectively than those focusing solely on physical and material aspects (Abdul Aziz et al., 2021). However, the interventions are primarily conducted face-to-face in shelters and rehabilitation centers for adolescents with severe SBP (Mohd Jodi & Mansor 2019; Nursyahidah, Nurul Husna, & Yusmini 2020). In contrast, self-management interventions empower individuals by fostering autonomy in health-related decision-making (Daud et al. 2020). Digital platforms further enhance adolescent receptiveness, self-awareness, and proactive behavior change (Hooi & Cho 2013; Enjey Lin & Wood 2013). Given its success in face-to-face settings, Islamic spiritual interventions hold significant potential for integration into digital health intervention. This study aims to identify features of self-management interventions that integrate Islamic spiritual components and persuasive design principles specifically for early-stage adolescent digital health interventions.

The paper is structured systematically to present the development of a persuasive digital spiritual intervention model. It begins with the Introduction, which outlines the background, significance, and research gap in integrating persuasive technology with Islamic spiritual intervention. The Related Work section provides a comprehensive review of existing persuasive technology models, digital health interventions, self-management strategies, and Islamic spiritual interventions. The Methodology section describes the research framework, TUDER, and explains the process of designing and validating the proposed model. The Results section presents the identified intervention components, their mapping with persuasive design principles, and expert validation findings. This is followed by the Discussion, which elaborates on the implications of the findings, the model's potential, and its alignment with existing theories. Finally, the Conclusion summarizes key contributions, suggests future research directions, and highlights the importance of prototype validation to ensure real-world applicability.

RELATED WORK

PERSUASIVE TECHNOLOGY ON DIGITAL HEALTH INTERVENTIONS

Investigations were conducted on integrating PT with spiritual and religious elements in web-based intervention approaches. Nevertheless, the extensive examination of PT implementation also covers web design development (Daud, Sahari@Ashaari, & Muda 2013) and digital health interventions (Noh, Zin, & Ashaari 2019) more broadly. A PT strategy was introduced, incorporating 16 principles centered on the three primary functions of computers: tools, media, and social actors (Fogg, 2003). Following this, six basic persuasion principles with a significant impact on individuals' willingness to act or comply with a request were delineated (Cialdini, 2001). Two hygiene factors that can be seen as motivators in a web environment and four potential factors influencing persuasion were incorporated into website design to reduce cognitive load and elicit positive effects during visitors' initial access to the website (Nor Aziah et al., 2017).

The persuasive system design comprises a conceptual model delineating 28 principles categorized into four support groups: primary task support, dialogue support, system credibility support, and social support (Oinas-Kukkonen & Harjumaa 2008). This model serves as a framework for designing, developing, and evaluating persuasive systems. A set of guidelines

for persuasive interfaces, measuring persuasive dimensions within usability contexts, is introduced (Némery & Brangier 2014). These guidelines are categorized into two categories: static and dynamic, consisting of eight principles encompassing 23 sub-criteria. Subsequently, Geovanna and Maria (2020) expound on the framework of the persuasive design concept, aiding designers in developing persuasive systems tailored to the needs and challenges of contemporary technology development, incorporating 28 principles grouped into four categories.

The use of persuasive design concepts in digital health interventions that incorporate spiritual, religious, and mindfulness elements remains inconsistent in addressing concerns, behavioral objectives, and target users. While primary task support and dialogue support are frequently applied, their potential is not fully explored (Merz & Ackermann, 2021). Social support and system credibility support appear less frequently in internet-based mindfulness interventions, and elements such as real-world feel and verifiability are inconsistently integrated. The 13 principles discussed in Table 1 were selected based on their frequency of use in digital health interventions, positive user feedback, and their measurable impact on user motivation (Flett et al., 2019). Certain concepts were excluded due to limited application, lack of demonstrated effectiveness, or overlapping functions with the chosen principles (Yunlong et al., 2019). For instance, personalization was considered redundant to tailoring, and reminders were omitted due to the role of remembrance in Islamic culture, where practices such as the adhan serve as natural triggers for prayer or fasting (Bawazir et al., 2019).

TABLE 1. List of persuasive design principles

Principle	Study
Reduction, Tunneling, Tailoring, Self-monitoring, Simulation, Rehearsal.	(Hutchings, 2017); (Kelders et al., 2012a);(Oinas-Kukkonen & Harjumaa 2009); (Ndulue & Orji 2019)
Privacy.	(Geovanna & Maria 2020); (Némery & Brangier 2014); (Mustaquim & Nyström 2014)
Praise, Rewards, Suggestion, Similarity, Liking, Social Role.	(Kelders et al., 2012a);(Oinas-Kukkonen & Harjumaa 2009); (Winterling et al., 2016)

SELF-MANAGEMENT INTERVENTION

Self-management interventions involve individuals actively empowering themselves with knowledge, skills, and confidence to engage in personal health activities, encompassing the adoption of healthy lifestyles and modifying one's behavior (Daud et al. 2020). Essential for ongoing behavior change implementation, self-management skills enable individuals to actively participate in shaping their health (Asbjørnsen et al., 2020; Marzuki et al., 2023). These interventions go beyond knowledge transfer, necessitating users' active involvement to drive behavioral change and take responsibility for managing the proposed intervention plan (Jonkman et al., 2016). Implementation involves educating users to self-monitor, enhancing problem-solving skills, and optimizing the function of online interventions (Ciocarlan, Masthoff, & Oren 2018).

Therefore, incorporating self-management strategies into the design of digital health interventions provides a viable approach to addressing SBPs among adolescents. The study examines the necessity for online self-management interventions for adolescent users and identifies seven features that may enhance users' motivation (Jamaludin et al., 2021) to use

web-based interventions, especially those related to personal matters or requiring secrecy. Table 2 discusses seven features crucial in designing and developing digital Islamic spiritual intervention (DISI) for adolescent users. Privacy features are particularly vital for adolescents grappling with SBPs (Panting & Sui Mien 2020). Creating a relaxed state is among the expected emotional responses that can positively influence users' attitudes or behavioral change (Fishbein & Ajzen 2011). Interventions tailored to adolescents should embrace a light-hearted style for effective communication, ensure user comfort, and steer clear of confrontational atmospheres. Adolescents favor personalized activities that are straightforward, non-serious, or not overly challenging (Sporrel et al., 2021).

Employing catchy messages for disseminating safer sex information on social media platforms targeting adolescents is advisable, as it effectively captures consumers' attention (Cornelius et al., 2019). When delivering internet content to adolescents, incorporating engaging humor and avoiding excessive length are crucial considerations (Rasmussen-Pennington et al., 2013). Integrating motivational quotes into interventions can enhance self-assurance among those grappling with diverse personal issues (Alqahtani, Meier, & Orji 2021). Faith should foster confidence through a change in attitude and behavior (Wan Nooraishya & Nazlena 2018). Active participation in interventions by adolescents eliminates the need for regular communication with third parties, such as online face-to-face interventions. This intervention feature is particularly apt for adolescents susceptible to SBPs, ensuring confidentiality and privacy during implementation (Siti Fadzilah et al., 2024).

TABLE 2. Features of self-management intervention

No.	Characteristics
1.	Privacy
2.	Relaxed
3.	Non-serious
4.	Catchy
5.	Humorous
6.	Confidence-boosting
7.	Infographics

ISLAMIC SPIRITUAL INTERVENTION

Islamic spiritual intervention offers an alternative approach to address spiritual degradation, a factor linked to moral deviation, emotional instability, and psychological insecurity. This method adopts a non-coercive and friendly style (Nor Ezdianie & Mohd Tajudin, 2019), motivating individuals to exercise greater self-control when facing challenges and proving more effective than interventions that focus only on physical or material aspects (Abdul Aziz et al., 2021). Al-Ghazali, a prominent Islamic scholar, describes purification as the removal of immoral tendencies, enriching the human spirit with virtuous values (*tazkiyah al-nafs*). His concept has been translated into seven components: soul training (*riyadah al-nafs*), self-actualization (*ma'rifah al-nafs*), root cause analysis, resisting lust (*mujahadah al-nafs*) through main and specific methods, improving worship and developing praiseworthy qualities (*mahmudah*), and self-reflection (*muhasabah al-nafs*) for happiness in both worlds (*al-Sa'adah*) (Mohamad Yusoff, 2019). This adapted approach is widely used by Muslim counselors in face-to-face settings (Saper et al., 2016). The principles of persuasive technology, self-management interventions for adolescents, and the Islamic spiritual intervention process can be combined as a reference framework for future DISI development.

METHODOLOGY

The research employs the TUDER framework-Targeting, Understanding, Designing, Evaluating and Refining as the process for crafting a DISI persuasive model framework. TUDER serves as a comprehensive guide for developing digital health interventions that integrate behavioral change techniques with persuasive design principles (Yunlong et al., 2019). TUDER integrates behavior change theories, techniques, and persuasive design principles, enabling iterative testing and refinement. Its structure aligns with the translation of Al-Ghazali's *tazkiyah al-nafs* concept and self-management features into measurable intervention components and user interface elements, consistent with recent calls to combine theory, taxonomies, and usability evaluation in digital health intervention development.

This study utilizes the targeting, understanding, and designing stages to accomplish its primary objective. The targeting stage to identify the target user, which is adolescents, the target issue related to SBPs, and the target behavior to diminish adolescents from engaging in more severe SBPs with an Islamic spiritual intervention approach. The understanding stage encompasses PT models and intervention components, including a discussion of PT, digital health interventions, self-management strategies, and Islamic spiritual practices. The article has already discussed these two stages.

The primary objective is to design a persuasive model for digital Islamic spiritual intervention and obtain expert agreement to validate the produced model. The design requires integrating Islamic spiritual interventions and self-management features with PT principles. The process involves developing elements for both self-management and Islamic spiritual interventions, then mapping it with persuasive design principles. The process then produces a set of checklists with examples to improve comprehension. Figure 1 depicts the integrating process of all the components.

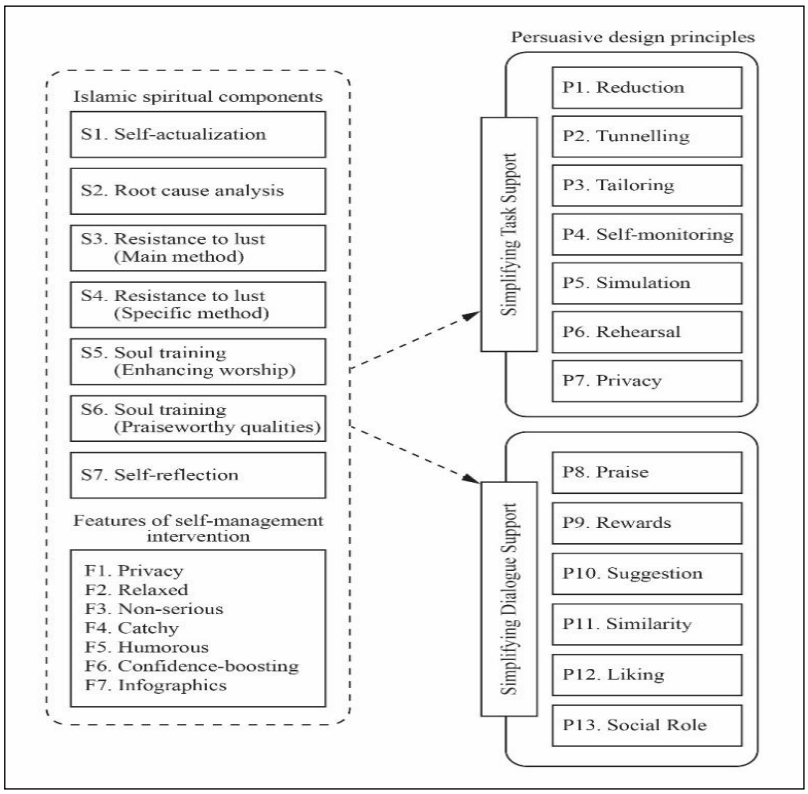

FIGURE 1. Designing digital Islamic spiritual intervention (DISI)

The design process systematically maps each component, element, and concept to the model framework. The mapping concept aligns with the Causal Modelling approach (Hardeman et al., 2005), enhancing aspects of behavioral change techniques (Michie et al., 2008). In this design process (Figure 2), the determinant of behavior pertains to the principles of persuasive design, and the behavior change technique relates to the features of self-management interventions and the components of the Islamic spiritual intervention (Al-Ghazali). The connection between these two aspects is established through the design elements.

The mapping procedure culminates in the creation of a comprehensive set of checklists that functions as the blueprint for the proposed model. This set of checklists requires thorough validation from experts across diverse domains, including PT, human-computer interaction, web and multimedia, Islamic psychospiritual and intervention studies, as well as language and communication. The designing stage unfolds iteratively with the evaluation and refining stages, as these processes are intricately interconnected (Yunlong et al., 2019).

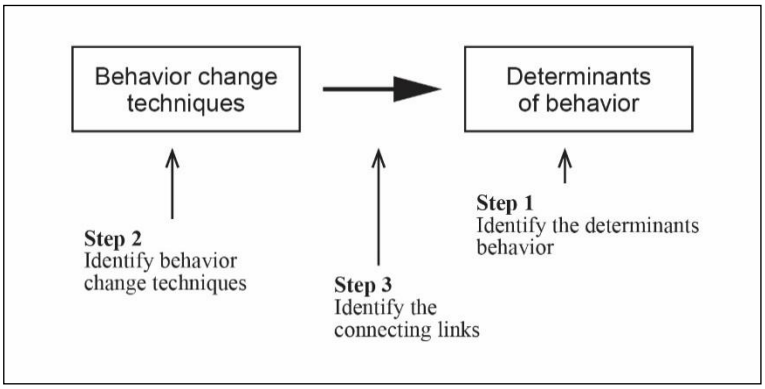

FIGURE 2. Mapping process

Fifteen experts were initially invited to validate the final checklist set, and nine agreed to participate. The panel comprised four experts in persuasive technology, two in Islamic counseling, two in Islamic psychospiritual approaches, and one in communication, each with over 10 years of professional experience and relevant theoretical knowledge (Almanasreh et al., 2019). Validation was conducted through in-person and online sessions, beginning with a briefing. Each expert received an evaluation form, model frameworks, and mapping lists to guide their assessment. They examined whether the mapping process reflected the predefined conceptual links, confirming consistency between determinants of behavior, behavioral change techniques, and the design elements linking these components. Content validity was measured using the content validity index (CVI), which quantifies expert agreement and provides evidence that items represent the intended construct (Yusoff, 2019). Items were rated on a four-point scale (1 = not relevant, 4 = highly relevant). The CVI for each item was the proportion rated 3 or 4, with 0.78 or higher considered acceptable for nine experts (Polit et al., 2007).

RESULTS

The results explain the designing stage, which included developing elements for seven features of self-management intervention tailored to adolescent users, elements for seven components of Islamic spiritual intervention, and a mapping process comprising 13 persuasive design principles. Table 3 showcases 14 design elements crafted to bolster the seven features of self-

management intervention. Each element represents a fitting application for web development, incorporating interactive and multimedia elements, and is deemed feasible for the target user.

TABLE 3. Elements for self-management intervention

Feature	Element
F1. Privacy	User identification
	Use of symbols
F2. Relaxed	No coercion
	Relaxing approach
F3. Non-serious	Visual appreciation
	Gift
F4. Catchy	Prompt
	Award
F5. Humorous	Audio appreciation
	Rank
F6. Confidence-boosting	Positive feedback
	Avatar
F7. Infographics	Image
	Video

The design of Islamic spiritual intervention elements in accordance with the seven intervention components is inspired by Al-Ghazali's idea of purification. The design includes 25 parts, as shown in Table 4, which are strategically correlated to each Islamic intervention component's function. This exact alignment seeks to best motivate users throughout the intervention stages, assuring relevance and efficacy in an online context.

TABLE 4. Elements for Islamic spiritual intervention

Components	Elements
S1: Self-actualization	Brief information of the intervention
	Simple explanation
	On-screen display
S2: Root cause analysis	Priority process
	Intervention guide
	Sequence by process
S3: Resistance to lust (Main method)	Personalize information
	Specific information
	Self-assessment
S4: Resistance to lust (Specific method)	Achievement categorization
	Repetition
	Activity approach
	Brief explanation
S5: Soul training (Enhancing worship)	Activity description
	Overview of activity
	Backup support
	Information per activity
	Activity phases
S6: Soul training (Praiseworthy qualities)	Autonomy
	Activity initiative
	Set of activity
	Option activity
S7: Self-reflection	Compatibility
	Expertise
	User information

The following phase applies a mapping strategy to guide the creation of an intervention platform or approach (Hardeman et al., 2005). This strategy addresses the challenges of applying multiple theoretical frameworks by linking theoretical concepts with effective behavior change techniques. It involves selecting appropriate techniques to influence behavioral determinants and setting clear criteria for matching each technique with its corresponding determinant. Using this method helps optimize the design and effectiveness of theory-based interventions (Michie et al., 2008).

Table 5 presents 39 design elements that connect self-management intervention with Islamic spiritual intervention, aligned with 13 persuasive design principles. Based on the persuasive system design model (Kelders et al., 2012; Oinas-Kukkonen & Harjumaa, 2009), these principles fall into two categories: simplifying task support and simplifying dialogue support. Simplifying task support includes reduction, tunneling, tailoring, self-monitoring, simulation, rehearsal, and privacy. Simplifying dialogue support covers praise, rewards, suggestions, similarity, liking, and social roles.

TABLE 5. Islamic spiritual intervention design system

C1: Simplifying Task Support		
Principle	Element	Source
Reduction	Priority process	S2
	Brief information of the intervention	S1
	Simple explanation	S1
Tunneling	Intervention guide	S2
	Sequence by process	S2
	On-screen display	S1
Tailoring	Personalize information	S3
	Specific information	S3
	Autonomy	S6
Self-monitoring	Self-assessment	S3
	Achievement categorization	S4
	Repetition	S4
Simulation	Activity description	S5
	Overview of activity	S5
	Backup support	S5
Rehearsal	Information per activity	S5
	Activity phases	S5
	Activity initiative	S6
Privacy	User identification	F1
	Use of symbols	F1
	No coercion	F2
C2: Simplifying Dialogue Support		
Principle	Element	Source
Praise	Prompt	F4
	Audio appreciation	F5
	Visual appreciation	F3
Rewards	Award	F4
	Gift	F3
	Rank	F5
Suggestion	Set of activity	S6
	Option activity	S6
	Activity approach	S4
Similarity	Brief explanation	S4
	Relaxing approach	F2
	Compatibility	S7
Liking	Image	F7

	Video	F7
	Positive feedback	F6
Social Role	Expertise	S7
	User information	S7
	Avatar	F6

A series of checklists are developed to support the Islamic spiritual intervention design system, clarifying the function of each element, and assisting designers in converting it into real features for web intervention development. Table 6 describes and illustrates each component and element. The content is divided into two principal categories: simplifying task support and simplifying dialogue support. These categories encompass a definition, 13 persuasive design principles with their corresponding definitions, along with 39 elements accompanied by detailed descriptions and examples.

TABLE 6. Descriptions of components and elements

C1: Simplifying Task Support - Aims to help communicate key information needed for users to perform targeted actions.
P1: Reduction - Summarize complex and difficult behaviors into simpler actions can encourage users to implement the intervention process continuously.
Elements of Reduction: E1.1 Priority process: Data is gathered based on the significance of the focal point of the matter for user comprehension. Example: Introduction to the topic of sexual behavior issues. E1.2 Brief information of the intervention: Information is made simpler so that users may effectively receive and implement it on their own. Example: Self-actualization of the true purpose of life. E1.3 Simple explanation: The intervention method is provided in a sequence that aligns with the user's capabilities. Example: A guide to identify personal strengths and limitations.
P2: Tunneling - Provide a step-by-step walkthrough of the steps involved and effectively convince the user to initiate and maintain usage of the system throughout the defined procedure.
Elements of Tunneling: E2.1 Intervention guide: Provide users with clear instructions on how to carry out actions for certain purposes. Example: Determining the objectives of the intervention to be attained. E2.2 Sequence by process: Displays a guide to user responses to the information presented. Example: List of phased interventions throughout the process. E2.3 On-screen display: Displays the state of each screen according to the user's response to the provided information. Example: Status completed for each piece of information received.
P3: Tailoring - Intervention information is tailored to the need to convince users of the importance of achieving the true goals of interventions based on potential, capabilities, and the context of system usage.
Elements of Tailoring: E3.1 Personalize information: The method's compatibility with the target user is determined by how well it correlates with the user's awareness and motivation. Example: Elucidation on the significance of fortifying one's faith. E3.2 Specific information: Information on the focus of issues that can attract attention and drive the attitude of the user to implement the target action. Example: Risk of couple culture or pornographic material. E3.3 Autonomy: Users have the freedom to carry out specific tasks at their own convenience. Example: Ideal time for meditation (*muraqabah*).
P4: Self-monitoring - Facilitate monitoring the performance or implementation status of intervention activities as an impetus for the user to achieve the target goals.
Elements of Self-monitoring: E4.1 Self-assessment: Provide self-reflection on the experience of targeted actions implemented by the user. Example: Gratitude journal.

E4.2 Achievement categorization: Presents the specific action categories that the user must accomplish based on individual capabilities. Example: *Zikr* activities are categorized into three levels: basic, intermediate, and advanced.
E4.3 Repetition: Enables the user to repeat the desired activities at a frequency and intensity of their choosing. Example: The act of reciting prayers is reiterated with the purpose of enhancing personal abilities.

P5: Simulation - Provide a visual representation of real-time process actions as a reliable tool to inspire user confidence in executing desired actions.

Elements of Simulation:
E5.1 Activity description: Provide a detailed explanation of each task that the user must carry out, considering their level and capabilities, and present it in a step-by-step manner. Example: Types and significance of *zikr*, along with the advantages it brings to an individual.
E5.2 Overview of activity: Visuals are used as a tool to clearly observe and comprehend behavior, which can then be translated into specific actions by the user. Example: The appropriate order and arrangement of prayer are practiced.
E5.3 Backup support: Provide explanatory support as a clearer guide to understand in the form of recommendations to users. Example: Description of the right time to pray.

P6: Rehearsal - Providing training for each target action aims to drive changes in user behavior or attitudes.

Elements of Rehearsal:
E6.1 Information per activity: Lists and explains each activity and the benefits received by the user as a result of the intended action. Example: *Zikr* before bedtime can help to calm the heart.
E6.2 Activity phases: Isolate activities based on their complexity and frequency to ensure that the user is willing to perform them. Example: *Zikr* may be read seven, 13, or more times.
E6.3 Activity initiative: Provide activities that are in accordance with the user's capabilities and preferences for accomplishing targeted actions. Example: Make a charitable donation or distribute specific information.

P7: Privacy - Creating a sense of security and not encouraging individuals to provide or divulge personal information without consent.

Elements of Privacy:
E7.1 User identification: There is no pressure to provide personal information or user identity to complete intended actions. Example: Do not request full names or user addresses.
E7.2 Use of symbols: Users apply easily available symbols to instill confidence when carrying out actions. Example: Avatar or icon that meets the user's preferences.
E7.3 No coercion: Activities are carried out once the user feels confident and safe enough to carry out the intended action. Example: No repeat or frequent reminder notifications.

C2: Simplifying Dialogue Support - Aims to provide many levels of system feedback to motivate users to carry out intended actions on a regular basis.

P8: Praise - The approach enhances the user's confidence in completing the intended action by providing various types of appreciation.

Elements of Praise:
E8.1 Prompt: Speech or words of encouragement urging the user to complete the intended action at the right time. Example: The user is a chosen one for Allah test.
E8.2 Audio appreciation: When the user effectively achieves an intended activity with faultless precision, their satisfaction increases. Example: 'Congratulations!' or '*Alhamdulillah*, may healthy living (*Istiqamah*)'.
E8.3 Visual appreciation: A persuasive image that makes the user want to engage in the intended actions more frequently. Example: An image view acknowledges the user's performance.

P9: Rewards - Provides rewards for intended actions taken to increase user motivation through rational approaches.

Elements of Rewards:
E9.1 Award: Provide benefits to the user for successfully carrying out the intended action. Example: A virtual prize after successfully completing an action.
E9.2 Gift: Provide valuable returns to motivate the user to repeat the intended action. Example: Reward points are earned after performing the prayer.
E9.3 Rank: Displays the number of users who undertake target actions on a regular, active, or repetitive basis. Example: Obtaining a badge dependent on the level of the current user.

P10: Suggestion - Provide systematic and relevant recommendations for each activity that help make the intervention process easier and motivate users to complete intended actions.
Elements of Suggestion: E10.1 Set of activity: Prepare a structured set of intervention activities based on the procedures that the user needs to implement. Example: A set of prayers, or *zikr*, at *Zuhr* time. E10.2 Option activity: The selection of intervention activities for a specific session is based on the user's preferences and ability to complete the intended action. Example: Congregational prayer is easier than midnight prayers (*tahajjud*). E10.3 Activity approach: user takes an alternative approach to appropriate activities based on a specific time. Example: Avoid using filthy language with friends.
P11: Similarity - A compatible and distinctive approach with user interests or inclinations is utilized to persuade the implementation of intended actions.
Elements of Similarity: E11.1 Brief explanation: Information using simple sentences to facilitate the understanding of the user performing the intended action. Example: Sentences are used in accordance with the preferences of adolescents. E11.2 Relaxed approach: The arrangement of information closer to the generation of users is aimed to persuade and encourage the implementation of intended actions. Example: Adolescent slang. E11.3 Compatibility: Intervention activities are easy to implement because they are built on the user's prior learning experience and knowledge. Example: Meditate in remorse for past crimes.
P12: Liking - The use of attractive visual designs and layouts can increase the persuasion and confidence of the user to implement the intended action.
Elements of Liking: E12.1 Image: Visually appealing arrangements that encourage the user to complete intended actions. Example: A display design that draws the attention of adolescent users. E12.2 Video: Use motion pictures to explain each cause and consequence, as well as the intended actions that the user must take. Example: Infographic animation with a short duration. E12.3 Positive feedback: The increased experience motivates the user to continue completing the intended actions on an ongoing basis. Example: Simple system interactivity and navigation.
P13: Social Role - Communication support is more effective at persuading and guiding users as they carry out intended actions.
Elements of Social Role: E13.1 Expertise: Provide ideas on how to reach out to designated professionals for ongoing help. Example: Brief facts about the expert to convince the user. E13.2 User information: Users are willing to reveal personal information to receive suitable advice from relevant professionals. Example: Assist users in contacting an expert. E13.3 Avatar: Each intervention activity is accompanied by instructions that direct users to perform intended actions. Example: Symbols or animations can serve as a brief guide.

The score evaluation results from nine experts based on CVI reveal that most experts considered each listed item as relevant, except for "*Personalize information*," which received a less relevant rating from expert #8, and "*Use of symbols*," which received a less relevant rating from expert #4. The I-CVI scores for most items are 1.00, with the exceptions receiving a score of 0.89. The S-CVI/Ave score of 1.00 indicates perfect agreement, and the S-CVI/UA score of 0.98 signifies a high level of agreement. Overall, the evaluation suggests a high degree of relevance, concluding that the I-CVI, S-CVI/Ave, and S-CVI/UA scores demonstrate a strong level of expert agreement, and the checklist items exhibit thresholds for satisfactory content validity.

DISCUSSION

The aim of this study is to develop a web-based early intervention that combines PT with Islamic spiritual concepts. A validated framework, tested in a shelter for adolescents facing

social challenges such as unwed pregnancies, is applied to address the issue proactively and reduce the risk of further complications. Integrating PT principles increases the potential for attitudes and behaviors to change in relation to the risks associated with SBPs. The persuasive design mapping was found to align with all elements of both the Islamic spiritual and self-management interventions. Experts approved the integration of selected elements for the development of a DISI model. Two components from each self-management feature are designed to make the technology more accessible to adolescents within the SBP context. Future interventions may adjust the number of design elements depending on the target issue.

The Islamic spiritual intervention component is given varying levels of importance, with each element differing in scope. It relates to how strongly it can shape behaviors, attitudes, and decisions among adolescent users (Intan Farhana & Siti Nabilah, 2018). This process is systematic, aiming to bring about meaningful change, improvement, and adjustment, and to encourage continued engagement with the intervention technology (Mohamad Yusoff, 2019). The mapping process aligns persuasive design principles with elements of self-management and Islamic spiritual interventions, focusing on validated principles that have proven effective in earlier technologies. Integrating these three components into the DISI model shows their suitability and mutual compatibility. The Islamic spiritual aspects offer an indirect, non-coercive approach that supports persuasive technology strategies (Wan Yusoff & Mohd Amin, 2020).

There are traits that closely resemble components of this model. Privacy, an important aspect in addressing SBPs, is incorporated into the persuasive design principle. Conscientious users may prefer a relaxation approach (Alqahtani et al., 2021), while non-serious features can balance the often serious and strict tone of cultural and religious approaches. Adolescents respond more positively to catchy captions, phrases, or audio tones (Cornelius et al., 2019). Humor, in addition to being catchy, can foster camaraderie, reduce stress, and improve engagement (Horvath et al., 2016). Confidence-boosting supports self-efficacy and strengthens the ability to initiate and sustain changes in attitudes and actions (Wilkes et al., 2017). For self-management web-based interventions, infographics in the form of posters, videos, or animations can be more effective for adolescent comprehension (Liu & Li, 2019).

In theory, the design of this model can effectively transfer the traditional method of spiritual intervention to a digital platform, allowing for increased user accessibility based on the specific issues it aims to address (Ahmad & Ali 2018). In practice, it could be implemented in mobile health applications, web platforms, or blended counselling services to deliver customized self-management and spiritual guidance. Interactive features such as progress tracking, adaptive reminders, multimedia lessons, and secure communication with counselors can support ongoing engagement. For adolescents, gamified challenges and culturally relevant design elements can boost motivation and adoption while aligning with religious and cultural values. Prior to assessing the impact of attitude and behavior change, it is crucial to obtain user acceptability feedback on the integration of persuasive technology.

CONCLUSION

The study yields 54 components, categorized into two sections for DISI, which are simplifying task support and simplifying dialogue support. Following this, an illustrated implementation of PT principles is identified and analyzed, eliminating redundancy and ineffective PT applications in DISI designs. To validate the framework's effectiveness, the subsequent phase involves developing DISI prototypes incorporating the specified components and elements.

This prototype will undergo an evaluation and refining phase conducted by both experts and target users, which will enhance the framework's validity, especially in early intervention for addressing SBPs. In the future, the framework holds potential for addressing various health and well-being issues within the Islamic spiritual approach.

Beyond addressing SBPs among adolescents, this study contributes to the broader discourse on persuasive digital interventions by integrating Islamic spiritual elements with persuasive technology. The suggested model framework provides a structured approach for developing digital interventions that are sensitive to different religions and cultures. This implies that the application of persuasive technology extends beyond health and wellness. Future research should explore the long-term efficacy of this model in real-world settings, particularly its impact on sustained behavioral change. Adding adaptive and personalized features based on user feedback and artificial intelligence could also make the intervention more effective, making sure that adolescents are more involved and that beneficial things happen for them.

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