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INFORMATION SYSTEMS PROMOTING HABIT FORMATION FOR USERS: FROM THEORIES TO DESIGN PRINCIPLES

Research in Progress

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Abstract

Sustaining behaviour change is fundamental for the effective uptake of policies and practices aimed at improving individual and collective well-being; yet, it can be very difficult for individuals to adhere to new desired behaviours. A number of information systems (IS) are being proposed to help individual users instil target behaviours as habits so that they can be performed even when intentions shift. However, these systems tend to be designed in an ad hoc manner and, as a result, their effectiveness can vary substantially. To better guide the design of systems for sustained behaviour change, we integrate concepts from habit theory and IS continuance theory to present a design-relevant explanatory/predictive theory (DREPT) for IS promoting habit formation. Design principles are then rigorously derived from the DREPT. This research contributes to the prescriptive knowledge base on how to design for sustained behaviour change.

Keywords: Design Principles, Persuasive Systems, Behaviour Change, Habit Formation

1 Introduction

Behaviour change interventions are fundamental for effective implementation of policies and practices that target growing challenges like self-management of chronic diseases, upkeep of personal hygiene, and promotion of sustainable transportation modes. Despite a significant amount of research undertaken on the important topic of fostering behaviour change for individuals, researchers and practitioners continue to find it challenging to successfully facilitate sustained behaviour change (Bouton, 2014). To address this problem, it has been suggested that behaviour change interventions shift away from simply invoking the behaviour to focusing on instilling it as a habit for it to be sustained (e.g., Kwasnicka et al., 2016, Marteau et al., 2012, Rothman et al., 2009). Once instilled as a habit, behaviours are performed automatically given specific cues and they relieve the cognitive stress of having to make a volitional decision towards performing the behaviour (Bargh, 1994). In such instance, the habitual behaviour becomes more resistant to relapses because it persists even when motivation and intention shifts (Webb and Sheeran, 2006) – thus, leading to sustained behaviour change (Marteau et al., 2012).

A growing body of research has shown that individual behaviour change can be facilitated by technologies (Fogg, 2002). Information systems (IS) that are designed to help people form, alter, or reinforce their attitudes, behaviours, or acts of compliance are known as behaviour change support systems (BCSS, Oinas-Kukkonen and Harjumaa, 2009). Such systems often come in the form of mobile/wearable devices along with their respective applications. While BCSS are promising, there is limited evidence to support their widespread effectiveness (Milne-Ives et al., 2020, Free et al., 2013), in particular in terms of their ability to support *sustained* behaviour change (McKay et al., 2019). Part of the challenge can be attributed to the ad-hoc design and development of such systems, where recognised

psychological theories on how to support behaviour change are not considered (Orji and Moffatt, 2016). Even when solutions leverage behaviour change theories to support their design decisions, the theories selected often focus on instilling a new behaviour rather than sustaining it (e.g., theory of planned behaviour, health belief model; McKay et al., 2019, Kwasnicka et al., 2016). This situation creates a practical problem for systems designers and developers who have limited guidance for designing systems that can support sustained behaviour change. Without such knowledge, we will continue to see variations in effectiveness and we may not harness the full potential of BCSS.

Design approaches addressing the issue of sustaining behaviour change through the development of habits have emerged (e.g., Karppinen et al., 2018, Pinder et al., 2018, Stawarz et al., 2015). However, these approaches either do not provide prescriptive guidance for how such systems should be designed, or they are not transparent in how the prescriptive guidance is derived from behavioural theories. As a result, it can be difficult to justify design decisions based on the use of these approaches. Additionally, instantiation validity can be improved when design decisions can be traced back to design principles and supporting kernel theory concepts (Lukyanenko et al., 2015).

To provide more transparent and rigorous guidance for designing IS to promote habit formation for sustained behaviour change, we propose (1) *a design-relevant explanatory/predictive theory* (DREPT) and (2) *design principles* for this class of systems. The DREPT integrates relevant kernel theories and explains how and why the intended effects of the designed system occur (Kuechler and Vaishnavi, 2012). While the design principles are "statements that prescribe what and how to build an artefact in order to achieve a predefined design goal" (Chandra et al., 2015 p. 4040). Our design principles are intended to extend the knowledge on how to design BCSS, in order to increase the likelihood that the target behaviour will be sustained. Thus, they should be used in conjunction with existing design principles for the BCSS class of systems (e.g., Oinas-Kukkonen and Harjumaa, 2009).

Accordingly, we adopt the design science research approach and literature on theorising design artefacts to derive prescriptive knowledge (i.e., design principles) from kernel theories (Kuechler and Vaishnavi, 2012). Kernel theories are explanatory/predictive theories borrowed from the natural or social sciences to help govern the design requirements of a system (Walls et al., 1992). Hence, we propose for habit theory (Lally and Gardner, 2013) and IS continuance theory (Bhattacherjee and Lin, 2015) to be used as kernel theories and present justification for our decision at the start of Section 2. In line with Kuechler and Vaishnavi (2012), we integrate kernel theory concepts into a DREPT before deriving design principles, thus bridging the conceptual gap between kernel theory concepts and design principles. We refer to habit formation as the process of breaking an established habit in favour of a new desired habit. For example, to form a habit of running before work, we must, for instance, break the habit of spending too much time on social media applications when we wake up. We note that the habitual behaviour we are trying to form (e.g., habitual running every morning) is different from the widespread discussions in the IS field on habit, which refers to habitual use (e.g., habitual use of running app; see De Guinea and Markus, 2009, Limayem et al., 2007).

The theoretical contribution of this research-in-progress paper lies in the integration of kernel theory concepts to present an explanatory/predictive theory for IS-supported habit formation. From a practical perspective, this paper presents a suite of theory-anchored design principles that are intended to guide the design and development of systems to achieve IS-supported habit formation.

In the following sections, we first present the theoretical foundations for this research, followed by the research methodology. We then propose the DREPT explaining the IS-supported habit formation process. The DREPT is then used to inform the derivation of design principles in the subsequent section before concluding with limitations and future work.

2 Theoretical Foundations

We propose to anchor the design of IS promoting habit formation in two kernel theories: (1) habit theory and (2) IS continuance theory. Habit theory was chosen because it explains how to reinforce behaviour change such that the target behaviour persists even when intentions and motivations shift (Lally and Gardner, 2013). Once instilled as a habit, the target behaviour becomes automatic and can be triggered

by specific cues. Thus, it relieves the cognitive stress of having to make a conscious decision about performing the behaviour (Bargh, 1994). This automatic characteristic of a habit explains why habitual behaviours can be more robust – allowing them to be sustained over the long-term (Marteau et al., 2012, Rothman et al., 2009). However, when the formation of a new habit is supported by an IS, users of such a system must not abandon its use before the habit is formed, and should continue to use the system to prevent relapses (Canhoto and Arp, 2017). Our theoretical model thus integrates IS continuance theory, which explains the cognitive beliefs and affects influencing the user's intention to continue using systems (Bhattacherjee, 2001). The knowledge from IS continuance theory complements habit theory by explaining the motives that would help keep users engaged in an IS supported habit formation intervention. Habit formation is inevitably a long process (Lally et al., 2010) and when IS are used to support habit formation, abandonment of the system partway through can disrupt the process. An IS anchored in both of these theories will be more likely to support sustained behaviour change by way of making the behaviour automatic and ensuring that users continue to use the system until automaticity is achieved.

2.1 Habit Theory

Habit theory refers to the growing knowledge base that explains how existing habits can be broken and how new habits can be formed (Gardner and Rebar, 2019, Lally and Gardner, 2013). Such habitual behaviours are defined as "memory-based propensities to respond automatically to specific cues, which are acquired by the repetition of cue-specific behaviours in stable contexts" (Verplanken, 2018 p. 4). Thus, there are two distinct characteristics of a habit: repetition and the cue-behaviour association.

To help better understand how habits are formed and the concepts that can influence habit formation, Lally and Gardner (2013) present a framework suggesting that the process leading to habit formation goes through three stages of outcomes: (1) intention formation (2) action initiation, and (3) habit formation. In the first stage, individuals decide on whether the target behaviour will be performed and the psychological activities focus on the deliberations over whether behaviours should be changed based on their benefits and consequences. For the second stage, individuals mobilise the resources necessary to translate intention to action and can consciously perform the behaviour. In the third stage, individuals repeat the target behaviour in a manner that is conducive to the development of automaticity, which culminates in habit formation. As an example, someone can start with building the intention to floss every night (stage 1), followed by consciously flossing every night (stage 2), and finally automatically flossing after brushing their teeth because it has become a habit (stage 3).

Several techniques have been developed in the field of psychology to alter established habits in favour of forming new habits. The techniques discussed in habit theory focus on the outcomes of stages 2 and 3 from Lally and Gardner's (2013) framework. To facilitate the discussion, we present the techniques based on five predominant types that have emerged in the literature: (1) techniques targeting planning; (2) those centred around self-monitoring; (3) those aiming to use rewards; (4) those helping to decompose/stack behaviours; and (5) those focused on restructuring the context of the behaviour. These techniques are complementary and can be used together to deliver a habit formation intervention.

In terms of the *planning* type, action planning and coping planning are two prominent techniques discussed as part of habit theory to promote habit formation. Action planning requires individuals to specify what goal-directed behaviours will be performed and connect them to situations in which they should be performed (Sniehotta et al., 2006). Coping planning is a self-regulation strategy that accounts for barriers to action plans and requires individuals to form "if-then" statements for how and when to act (Gollwitzer and Sheeran, 2006). Both action and coping planning can help individuals anticipate how they will behave in different situations and environments; hence, these activities are conducive to help repetition of the target behaviour and lead to habit formation (Fleig et al., 2013).

The second type is *self-monitoring* of the target behaviour. The feedback from self-monitoring activities like tracking or recording draws attention to when individuals revert to an undesired behaviour and consequently prompts them to perform the desired behaviour (Quinn et al., 2010). Moreover, the results

can highlight the progress made towards the overall goal and bring about a sense of accomplishment – encouraging individuals to perform the behaviour again (Burke et al., 2009).

As a third technique type, *rewarding* can drive repetition of the target behaviour and promote habit formation (Hull, 1943, Skinner, 1938). When rewards are integrated, habits start with a cue, that triggers a behaviour, to achieve a reward. When the reward is perceived as worthwhile, the brain is more likely to notice the cues going forward and repeat the behaviour in anticipation of the reward. During the early stages, behaviours that lead to satisfying rewards can bolster repetition while behaviours that prompt negative affect are abandoned (Lally and Gardner, 2013, Louro et al., 2007). A distinction should be made between extrinsic (e.g., financial) and intrinsic (e.g., pleasure) rewards. Extrinsic rewards can initially spur the action (Dickinson, 1985), but they can lose their effects over time as an expectation for the reward is formed (Deci et al., 1999). Thus, it is useful to identify intrinsic rewards that align with people's identity – allowing them to internalise the desired behaviour and repeat the behaviour (Ryan and Deci, 2000).

The first three technique types are supported by literature that suggests they are effective in promoting repetition of the target behaviour. The fourth and fifth types focus on how one can establish that cue-behaviour association that is unique to habits. The fourth type considers *decomposing* the target behaviour into simple actions and *stacking* such actions against already established behaviours. The evidence suggests that complex behaviours are less likely to become automatic (Verplanken, 2006). Thus, decomposition transforms the complex behaviour into a sequence of simple actions where each action can become a habit on its own. Furthermore, by stacking simple actions against an established behaviour, the completion of the established behaviour acts as a trigger for the desired habitual action. We are more likely to perform an action when it is stacked because our brain is cognitively free after the completion of the preceding behaviour and can be triggered by another cue (Wood and Neal, 2007).

The fifth technique type focuses on disrupting the context for undesired behaviours and stabilising it for desired behaviours, which we refer to as *context restructuring*. The disruption prompts the conscious decision-making process for the undesired habit and may be enough for people to consciously shift towards performing the desired behaviour (Verplanken and Wood, 2006). While contextual stability at the time of performing the desired behaviour allows for the brain to establish the cue-behaviour association needed to form a habit (Lally et al., 2010). For example, a phone placed out of reach can disrupt the habitual behaviour of scrolling through social media after waking up and having the same routine before running every morning can stabilise the context to promote running as a habit.

2.2 Information Systems Continuance Theory

For IS to effectively support habit formation for users, the use of the system should be continued until automaticity is formed and even beyond to prevent relapses. However, habit theory was developed from the perspective of clinical psychology and does not provide insights in the IS regard. The IS continuance theory, which provides requisite knowledge on the dimensions influencing continued IS use, was thus chosen as a second kernel theory for this research. IS continuance theory explains the psychological motives that emerge after the initial acceptance of IS. IS continuance theory examines users' post-adoption behaviour and implies that the long-term viability of IS rests more on its continued use than on initial adoption (Bhattacherjee, 2001).

The latest conceptualisation of IS continuance theory, the unified IS continuance model, integrates three perspectives that have appeared in the literature over the years: (1) reasoned action, (2) experiential response, and (3) habitual response of IS (Bhattacherjee and Lin, 2015). The unified model posits that continuance intention positively influences continuance behaviour. Within the model, three constructs have direct and positive effects on continuance intention: subjective norm, perceived usefulness, and satisfaction. The *subjective norm* is the degree to which users believe those important to them approve of their continued use of the system. *Perceived usefulness* is defined as users' perception of expected benefits from the use of the system. *Satisfaction* captures users' overall experience of IS usage and stems from the experiential response to using the system. The unified model also incorporates the concept of *IS use habit* which captures habitual use of the system (e.g., habitual use of calory tracking app).

3 Research Methodology

The overarching objective of this research-in-progress paper is to derive theory-driven design principles for IS promoting habit formation for users. Thus, we focus on the rigour cycle of design science research (Hevner et al., 2004) and draw from habit theory and IS continuance theory to derive design principles for systems design. To achieve this objective, we adopt the Design Science Research Process Model (Vaishnavi et al., 2019, Takeda et al., 1990) and its five steps for artefact development (see Figure 1). Considering our objective, the artefacts of interest are a DREPT and design principles for IS promoting habit formation. Figure 1 shows how we address each step of the process model within the different sections of the paper.

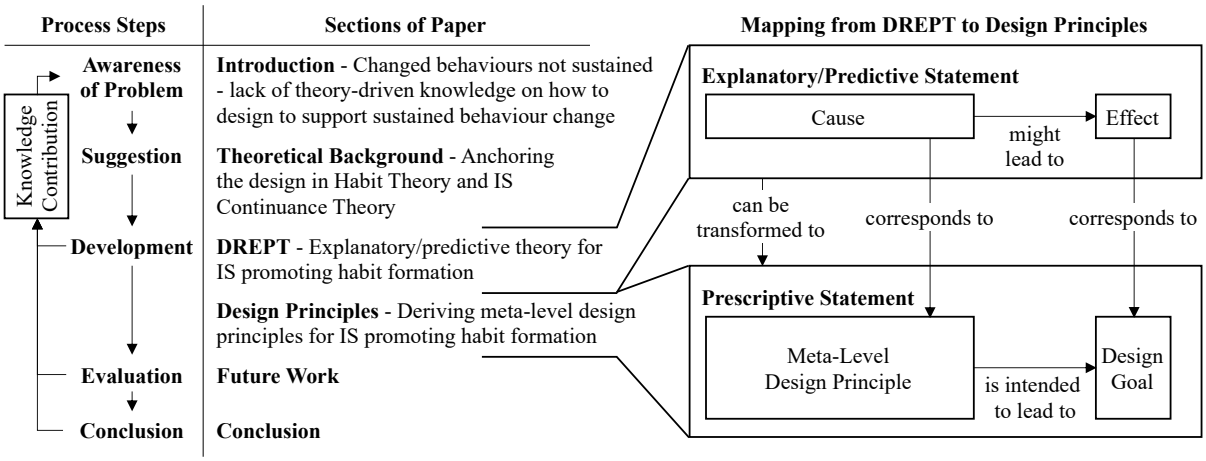


Figure 1. Research methodology and description of how explanatory/predictive statements from the DREPT are mapped to prescriptive statements that are the design principles.

Specific to the development step, we address Kuechler and Vaishanavi's (2012) call for a DREPT that narrows the creative leap from behavioural kernel theories to design principles. Hence, we use abductive reasoning and supporting literature to integrate the concepts derived from the kernel theories into a DREPT for how IS can promote habit formation for sustained behaviour change. Following the development of the DREPT, we derive design principles from the explanatory/predictive statements of the DREPT (Kuechler and Vaishnavi, 2012). Explanatory/predictive statements provide a cause-and-effect relationship that can be mapped to prescriptive design knowledge as shown in Figure 1 (Kuechler and Vaishnavi, 2012).

The scope of this research-in-progress paper is limited to the rigour cycle of design science, which we address through a transparent mapping process. Empirical evaluation is left for future work, however, we briefly explain how the DREPT and design principles will be evaluated using an iterative process in the future work and conclusion section.

4 Design-Relevant Explanatory/Predictive Theory

In this section, we integrate the concepts from the two kernel theories presented in Section 2 to propose a DREPT of IS promoting habit formation for sustained behaviour change. Thus, the DREPT serves as a concept that helps translate relevant kernel theories into the IS design realm (Kuechler and Vaishnavi, 2012, Baskerville and Pries-Heje, 2010). In doing so, the DREPT articulates how and why an instantiated system derived from it can achieve its desirable effects. Our DREPT is composed of two components: a theoretical model (shown in Figure 2) and propositions that hypothesise the relationships between the concepts of the DREPT.

Situated across the top of the theoretical model are three concepts that are derived from Lally and Gardner's (2013) framework for habit formation. The first concept, *intention to perform behaviour,* captures the outcome of the first stage for habit formation. As individuals decide on whether the target behaviour will be performed, they build their intention. Following intention formation is *behaviour*

performance and this concept is derived from the second stage of habit formation. Through behaviour performance (i.e., repetition), the target behaviour becomes automatic and a habit forms (Lally et al., 2010). Thus, the third concept is *habit formation* and represents an individual's ability to perform the behaviour automatically. Once instilled as a habit, it is suggested that the target behaviour can be sustained over the long-term (Marteau et al., 2012) – leading to the concept of *sustained behaviour*.

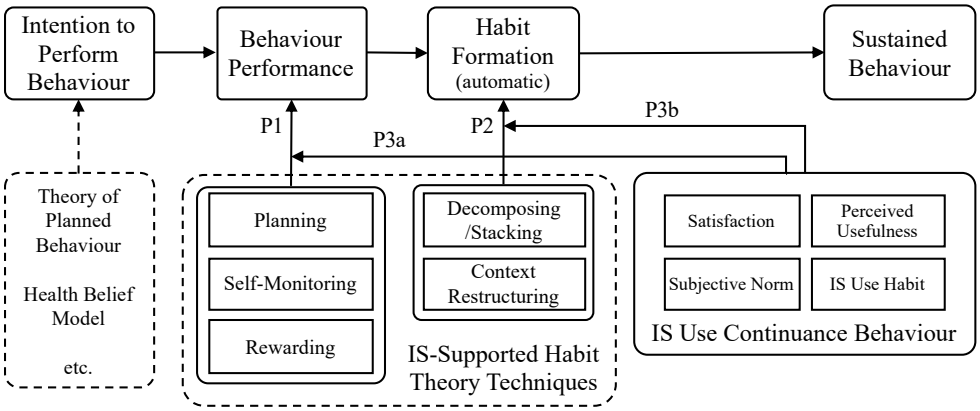


Figure 2. Theoretical model for the design-relevant explanatory/predictive theory for how IS can promote habit formation for sustained behaviour change.

Many behaviour change theories have emerged to explain how intention can be formed and they include the Theory of Planned Behaviour (Ajzen, 1985) and the Health Belief Model (Rosenstock, 1974), as shown in the dotted box of Figure 2. We did not derive propositions for how these theories support the intention to perform a behaviour because it is not within the scope of this research. The knowledge base for how to design IS to build intention is more mature (e.g., Oinas-Kukkonen and Harjumaa, 2009) and our focus is on the post-intention stages that can help instil the behaviour as a habit to help sustain it.

As mentioned, the definition of a habit has two distinct characteristics: one entails repetition of the behaviour and the other emphasises the cue-behaviour associations (Verplanken, 2018). In this regard, the techniques discussed in habit theory can either influence the repetition aspect or influence the cue-behaviour association. For the design-relevant realm, these techniques present an opportunity for technologies to enter and support the habit formation process for users. Correspondingly, we refer to these techniques as *IS-Supported Habit Theory Techniques* in Figure 2.

The techniques that influence repetition do so by promoting the *behaviour performance* concept and through behaviour performance, a habit can be formed (see Figure 2). These techniques can be recognised from other behaviour change theories as they are well accepted for promoting controlled behaviour performance (Michie et al., 2013) and they are (1) *planning*, (2) *self-monitoring*, and (3) *rewarding*. This leads us to our first proposition stating that:

P1. IS-supported *planning*, *self-monitoring*, and *rewarding* can influence *behaviour performance* for users.

The remaining two techniques discussed in habit theory, (1) *decomposing/stacking* and (2) *context restructuring*, are unique to habit formation. The literature shows that they can be used to influence the cue-behaviour association by making the cues more salient, simplifying behaviours, disrupting the association, or stabilising it depending on whether the behaviour is desired or not. Hence, our second proposition states that:

P2. IS-supported *decomposing/stacking* and *context restructuring* can influence *habit formation (automatic)* for users.

Bhattacherjee and Lin (2015) noted that successful implementation of technologies is based on the continued use of it and not necessarily its initial use or acceptance. Applying this view to IS promoting habit formation stresses the importance of continued use of the IS until automaticity can be achieved. As the formation of a habit inevitably takes time and repetition, a decrease in use or full abandonment of the system will thwart the process. Considering the techniques as technology entry points into the

habit formation process, a decrease in the use of the IS will moderate the effects that the techniques have on the process. Thus we present the following propositions to incorporate *IS use continuance behaviour*.

P3a. *IS use continuance behaviour* positively moderates the effects that IS-supported *planning*, *self-monitoring*, and *rewarding* have on promoting *behaviour performance*.

P3b. *IS use continuance behaviour* positively moderates the effects that IS-supported *decomposing/stacking* and *context restructuring* have on promoting *habit formation*.

5 Design Principles

Having presented the DREPT, we move to derive design principles from the propositions of the DREPT. Such design principles are intended to guide the development of system-specific features and functionalities by establishing core design goals for the class of systems (Chandra et al., 2015, Walls et al., 1992). Design principles, per se, do not embody specific target behaviours, but rather focus on the features that a system should provide to promote habit formation through a context-specific application. Specifically, our design principles are intended to provide prescriptive knowledge at the meta-level for the BCSS class of systems. We follow Chandra et al.'s (2015) approach for conceptualising design principles based on action, materiality, and boundary conditions. This format prescribes what a system should enable users to do (action), how it should be built to achieve the action (materiality), and under what boundary conditions will the prescribed statement hold. This approach is relevant for metal-level design principles because it allows for specifying the role of varied features in line with a DREPT without constraining the choice of technology for implementing these features.

To derive such principles, we examined each proposition's cause and effect relationship and asked what prescribed actions from an IS perspective are intended to lead to the goal of the designed system. To demonstrate the mapping process, we take the first proposition and specifically the cause-and-effect relationship of how planning activities (cause) can be used to promote behaviour performance (effect). We map this cause-and-effect relationship to a prescriptive statement and goal for the system. We propose that the system shall provide features in the form of an interface to ask users to specify what, when, and where behaviours will be performed – and possible alternatives (prescribed materiality) in order to guide users through the planning process (prescribed action). This design principle is intended to lead to repetition (design goal) of the target behaviour. As a boundary condition for all of our design principles, users should have voluntarily adopted the system and intend to form a new habit as a means to sustain the behaviour. To help with the applicability of each design principle, we provide an example of its instantiation using the case of an app designed to promote running as a habit.

This approach led to the articulation of six design principles that are shown in Table 1. We did not propose design principles for the *IS use habit* construct of IS continuance theory due to the ethical concerns surrounding designing for automatic and non-volitional technology use (Tarafdar et al., 2013). By excluding the *IS use habit* construct we are designing for intentional and continued use of the system where users are aware that the system is supporting them in achieving their goals.

Mapped from	Materiality	Action	Design Goal	Example
	The system shall provide features…	**in order to…**	**This design principle is intended to…**	**Mobile app promoting running as a habit**
P1	In the form of an interface to ask users to specify what, when, and where behaviours will be performed – and possible alternatives	Guide users through the planning process.	Lead to repetition	A graphical user interface walks the user through a series of questions asking them to specify that they want to run 3km, in the mornings, around the neighbourhood.
P1	In the form of context-aware technologies to collect data about the target behaviour and algorithms to adapt the visualisation to the context	Display and help users become aware of their progress.	Lead to repetition	GPS sensors to track speed, distance and location (context) of the run. Displays results on a dashboard that is adapted for running metrics for the user.

P1	In the form of an interface and algorithms that can find various extrinsic rewards relevant to the target behaviour and are capable of helping users define their online identity	Provide effective extrinsic rewards for users while also helping them incorporate the target behaviour into their identity.	Lead to repetition	After a successful run, the system provides a coupon code for the user's favourite athletic clothing store. The system provides the functionality for the users to share images of them exercising in the new clothes with their online community.
P2	In the form of algorithms to decompose the behaviour into a series of actions and recommend a time and place to perform the actions based on user-generated data (e.g., schedule and location)	Make recommendations for users on when to most effectively perform target actions.	Form cue-behaviour associations	AI algorithm identifies that running involves getting dressed, warming up, and running. The system recommends, based on user schedule, that walking kids to the bus stop should be done between getting dressed and warming up to prompt the running sequence.
P2	In the form of context-aware technologies to determine how the surrounding context can be restructured and algorithms to connect to and change the context	Disrupt or stabilise the context for users.	Form/alter cue-behaviour associations	Sensors recognise that the user currently runs at various times in the mornings. The system connects to the user's smart home and stabilises the context by turning on the lights, coffee maker, and opening the garage door at set times to nudge users out the door.
P3a/b	In the form of an interface for users to express their degree of satisfaction, perceived usefulness, and subjective norm and an algorithm to adjust other features accordingly	Modify the delivery of techniques as needed to maintain system use.	Maintain effectiveness of techniques	A graphical user interface allows the user to express their degree of satisfaction, perceived usefulness, and subjective norm of the techniques used. The system recognises the user is not satisfied with the route and recommends a new one.

Table 1 Design principles for IS promoting habit formation for sustained behaviour change.

6 Future Work and Conclusion

We adopted Kuechler and Vaishnavi's (2012) framework for theory development in IS to propose a DREPT and design principles for IS promoting habit formation for sustained behaviour change. However, as a research-in-progress, the DREPT and design principles are limited in terms of conceptualisation, validation, and instantiation. Conceptually, the granularity of the DREPT and design principles can be increased, and future research may choose to examine constructs individually and in more detail to derive more nuanced knowledge for design.

As for the limitations associated with validation and instantiation, we plan to address them in the next steps of this research. Work is underway to validate the DREPT using expert focus groups (i.e., psychology and IS academics, and behaviour change practitioners). After validation of the DREPT, the design principles will be revised and validated with systems designers using the criteria for design principle reusability (accessibility, importance, novelty and insightfulness, actability and guidance, and effectiveness; Iivari et al., 2020). After which an instantiation in the form of a mobile application will be developed and implemented using a pretest-posttest design for exercise as a form of self-management for chronic conditions. Such implementation will help validate the effectiveness of the design principles (Hevner et al., 2004). As with any form of theory development, iterations back to refine the DREPT and design principles after each stage will strengthen the contributions.

The contributions of this research-in-progress paper are both theoretical and practical. From a theoretical perspective, our DREPT explains the underlying reasoning for how IS can support habit formation, while the design principles move the knowledge base closer towards an accepted design theory. At a practical level, this research-in-progress presents a suite of design principles for systems designers and developers interested in designing and evaluating systems promoting habit formation for users.

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