Chapter

Design Thinking Applications in Physical Activity and Exercise Literacy

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Abstract

Various theoretical models of Health Literacy (HL) discuss its importance for behaviour change, supporting long-term health and disease prevention. During the 21st century Physical Activity (PA), Exercise and Sedentariness (SD) have received an increased priority over other health indices for quality of life purposes due to their central importance over metabolic conditions and their comorbidities. This review aims to conceptualise the main issues and challenges of Physical Inactivity (PI) and SD through the new proposals of Design Thinking (DT) which is considered one of the most promising pathways in health promotion. DT is prioritising empathy for service users, brings together collaborative multidisciplinary teams and provides the opportunity to assess various solutions via iterative practices. This chapter: A. provides a review over the efficacy of health promotion strategies during the current era and the urgency of behaviour change in PA and SD for various population segments. B. Explains how HL links self-care practices to PA and SD habits. And C. Presents DT as a new layout for supporting the exploration and feasibility of more active lifestyles for overall health and quality of life.

Keywords: Health Literacy, Design Thinking, Exercise, Physical Inactivity, Sedentariness

1. Introduction

Newer definitions of human health adopt notions of a balanced, holistic and dynamic decision-making process via an ever-needing adjustment to environmental demands [1]. Such adjustment needs to be dynamic, supportive of own abilities and autonomy driven to stimulate personal goals and long-term adherence [2]. When it comes to personal impactful choices of health actions, dimensions of personal empowerment like recognition of the meaningfulness of health promoting behaviours, own competence, belief in personal impact and self-determination have been suggested to enhance health status reverting any negative effects involved -also- in chronic diseases [3].

Such Chronic Inflammatory Diseases (CID) are currently recognized as the leading cause of death world widely with more than 50% of deaths being attributable to inflammation-related diseases [4]. Such diseases are cancer, stroke, ischemic heart diseases, diabetes mellitus, autoimmune and neurodegenerative conditions, chronic kidney disease and non-alcoholic fatty liver disease (NAFLD). Evidence is mounting that those inflammation related conditions start in early years of life,

persisting throughout life and resulting in increased morbidity and mortality with health promotion behaviours being able to counteract those conditions [5].

2. Recent theories of physical activity and exercise

Within the top priority of behaviours able to counteract CID are regularly practiced physical activity and exercise. Even though exercise promotion has been at the focus of various organisations for more than thirty years [6], physical inactivity (PI) and sedentary behaviours (SB) are abundant in modern societies. It is estimated that they are the fourth contributing factor to global mortality [7, 8], causing -among other conditions- major modifiable cardiovascular diseases [9], diabetes [10], cancer [11], mental disorders [12], and specific illnesses such as Ischemic Heart Disease [13].

Further, PI and SB are currently considered among the most important modifiable factors for the prevention of cardiovascular conditions and other non-communicative conditions that contribute significantly to all-cause mortality in the global population [14]. It is estimated that 50 to 60% of selected cardiovascular conditions are currently attributed to PI [13], with the World Health Organisation (WHO) making the prevention of PI one of its key goals for reducing Noncommunicative diseases [15].

The current definition of PA is supportive of more than just the mere bodily movement that is produced by the contraction of skeletal muscles and the increases of energy expenditures resulting in significant health benefits. It is defined also by the psychological, social, political and situational phenomena related to the execution of physical movements and supporting a holistic definition of PA: "Physical activity involves people moving, acting and performing within culturally specific spaces and contexts, and influenced by a unique array of interests, emotions, ideas, instructions and relationships." (p. 5) [16]. It is important to note that when an individual is deciding to move, is far more than a travelling set of muscles, joints and energy expenditure repositioning in space, but rather a unique collection of emotions, interests, ideas, instructions, and relationships. Given the importance of regular engagement with PA for sustaining a good quality of life and maintenance of physical and mental health [17] such definition highlights novel suggestions and approaches for PA promotion and enhancement (see below).

Any PA that is planned, structured, repetitive and purposeful to increase physical fitness or its components is related to exercise behaviours [18]. Incorporating daily exercise programs in one's lifestyle is associated to reduced risks of morbidity and mortality across the lifespan [19]. Also, when exercise is part of therapeutic treatment of chronic conditions, contributes to better quality of life and prolonged duration of life [20].

Existing theoretical models are supporting a systematic approach towards the promotion of PA and exercise behaviours. In an attempt to create a better sense of those theories, their proposals and their applications, Rhodes [21] created the Multi-Process Action Control (M-PAC) Model with each theory placed at either, the reflective process (or else the intention formation phase), the regulation process (the adoption phase), or the reflexive process (the maintenance phase of exercise behaviour). Each of those phases is proposed to include separate stages of the exercise adoption, as social-cognitive theoretical applications are proposed to create an intention to become more physically active by enhancing the long-term utility of exercising, the expectation of positive emotional states during physical activity, the perception of physical and mental abilities to perform the requested exercise behaviours, and the environmental opportunity (i.e. time allocation) to perform physically active behaviours [21]. In the adoption phase, more behavioural methods are expected to create a change via techniques related to goal setting, positive

feedback, relevant environmental cues, and self-talk. Finally, in the reflexive phase, associations, repetition and maintenance of environmental cues are expected to create long-lived habits contributing to a more active identity type [21, 22].

Two main validation pathways can link to the M-PAC Model. The first one, is its ability to confirm already proposed components of the Behavioural Change Techniques (BCT) taxonomy [23], which is considered a comprehensive, hierarchical, reliable and generalizable catalogue of methods [24]. Michie et al. [23] created a catalogue of 16 separate clusters precising behaviour change interventions helping to sort out for the first time their active intervention ingredients based on inter-rater agreement. This catalogue provided a clearly defined set of active intervention types, which is considered complete until recently [25].

A second validation of the Rhodes [21] model was offered by the authors of the Health Action Process Approach (HAPA) [26]. Based on the HAPA model three levels of self-efficacy (SE) are needed to support behavioural change of PA and exercise behaviour: Action SE, linked to the creation of intention and preparation to engage to more active behaviours through the anticipation of positive outcomes, Maintenance SE, associated to behavioural techniques enhancing behavioural persistence and motivation over the needed behaviour change, and Recovery SE, reflected by the ability to resume behaviour after relapse and interruption. Both M-PAC and HAPA models support same stages and constructs denoting similar processes and corresponding to needed actions for optimal behavioural change.

Another important set of theories holding an ability to promote increased levels of PA and exercise behaviours are the dual-process frameworks [22]. They are models consisting on the one hand reflective processes including social-cognitive approach variables (such as intentions, expectations and values), and on the other hand non-conscious processes including other not so well tested PA determinants such as habits, automatic thinking processes and personal effectiveness evaluations [27]. The most recent addition to this type of theories is including also the emotional valence and its importance for future intentions to participate in PA and exercise behaviours (Affective-Reflective Theory, ART) [28]. This occurs through reflective and non-conscious processes based on emotions individuals acquire during their PA and exercise participation. It is a theory that uses previously psychophysiology findings and related theories such as the Dual-Mode Theory (DMT) [29] to suggest a varying core affect as a product of different sets of intensities during PA and exercise participation based on innate psychophysiology mechanisms (see [28], for details). ART enhances the motivational importance of affect in relation to exercise behaviour, and most importantly how exercise and the affective experiences they produce are encoded in associative memory (i.e. physical pain vs. pleasure when exercising) and the way such associations are gradually integrated into cognitive processes that could support regular exercise participation [28]. According to Rhodes et al. [22], the case of conflict between non-conscious (affective) and reflective (cognitive) influences, lead individuals to experience affectively charged motivational states "such as craving, desire or dread" (p.104). Even though there are points of skepticism around measurement of non-conscious processes and how those can alter via educational processes, the dual-process models like the ART theory hold important potential for the future as they are the first to challenge the significance of attitudes and self-efficacy for the change of PA behaviours [22].

3. Shifting the educational approach

Promoting participation in PA and exercise entails acquired perceptions of the body and already created associations between the body and the mind in relation

to personal attitudes, beliefs and appreciations from previous attempts to become physically active [30]. During this process, various implicit and explicit mechanisms are underway creating a unique response for the individual.

Using modern psychoanalytic views of unconscious processes representing wishful, fearful, and associated notions, Bendor [31] examined the main reasons behind exercise avoidance resulting in physical inactivity in modern society. Based on the views of practicing psychoanalysts, his results supported that exercise avoidance comes as a product of fear of identity change, learned disregard of own body, and repressed traumatic associations to exercise. Bendor's findings highlight the importance of unconscious processes over exercise adoption [29] in various populations in need and clearly call for the adaption of new exercise promotion and education methods [22, 28].

When it comes to exercise adoption, negative sentiments, fear and/or unconscious processes have been uncovered in coronary heart patients populations [32, 33], and community-dwelling osteoporotic older adults [34]. On the contrary, enjoyment and positive feelings are reported by young adult populations who actively participate in exercise behaviours [35] with positive feelings of valence and calmness supporting exercise participation in real life samples of healthy adults [36].

At the same time, very often messages calling for changing health behaviours (i.e. eating patterns, physical activity, smoking cessation) are based on appeals to personal responsibility, stigmatisation, controlling and inequality, that are ubiquitous around us [37]. This type of messages imply that illness or disable states are based on lack of responsibility, leading to blames of accusation to the sufferer (i.e. weak character) rather than social (lack of financial ability), environmental (i.e. relevant pollutants) or structural (i.e. disadvantaged working conditions) causes, contributing to the creation of stigma, fear and guilt [38]. The same type of messages are still making the most out of the exercise promotion campaigns aiming to change intentions and attitudes towards more active lifestyles based on cure and well-being rather than pleasures experienced during exercise [39].

Yet, it is not clear that those messages are capable of creating real change contributing to more active lifestyles [21]. Prioritising health over other behaviours by creating guilt and pointing out an inconsistency between personal standards and own behaviour having the goal of remorse and pointing out personal responsibility [40], seems to be successful in shifting health attitudes [41]. However, those changes are only related to initial stages of behavioural change, influencing attitudes and intentions to act towards more health-related behaviours, with their long-term effects still unexplored [40].

Criticism has been expressed in the past around the ways physical activity and exercise related concepts and resources have been conveyed to the general public in a non-understandable manner contributing to confusion as health related resources are not matching the recommended readability standards of the general public [42]. Same results were obtained from Thomas and Cardinal [43], showing that most of written PA educational resources are presented in a complicated and non-understandable format for the great majority of the American population. When it comes to PA and exercise literacy there seems to be an existing gap between what experts consider important to provide and the type of information required for the general public to change, becoming more physically active.

4. The importance of health literacy

Lack of knowledge of critical features that generate a health condition and low skills in obtaining, processing, understanding, and communicating health-related

information are critical components for supporting health [44]. Hence, opportunities for health-related educational sessions are important for improving health status in various population segments.

Health Literacy (HL) is related to the capacities of people to appreciate, realise, and meet the complex demands of health in modern society and its requirements. In their seminal article, Sørensen, Van den Broucke, Fullam et al. [45] defined HL as "entailing people's knowledge, motivation and competences to access, understand, appraise, and apply health information in order to make judgments and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality of life during the life course" (p. 3). Health literate individuals are in position to contextualise and appreciate personal needs supporting their health, their close ones and their community, understanding the most influential factors for retaining wellbeing and taking steps towards meeting those. It is about taking control and responsibility of one's own health as well as the health of their loved ones and their community [46].

It can be easily confused with academic literacy and the notion of well-educated approach and familiarity with literature. However, during the second half of the 20th century the combination of literacy to health has been expanding denoting not just the potential of personal growth and individual transformation as a result of such procedure but also the contextual and social transformation with its capacity to influence economic growth, and social, political and cultural changes [47].

Four distinct abilities are being assigned to HL. These are, a. the ability to seeking, accessing and obtaining health information, b. the ability to comprehend health information that is accessed, c. the ability to interpret filter and evaluate health information and d. the ability to make a decision to maintain and improve health through conscious decision making [45]. These four types of ability highlight the importance of availability of needed resources, and the opportunity to appreciate connections among behavioural choices and health outcomes [48].

The need for HL supports recent models of health care reinforcing the importance of education and best practices starting from a micro level (self-care or else person-centred) which are based on 7 pillars of health promotion: 1. knowledge and health literacy, 2. mental well-being, self-awareness and agency, 3. physical activity, 4.healthy eating, 5. risk avoidance, 6. good hygiene, and 7. rational use of products and services [49]. One of these pillars having extended effects on quality of life, physical and mental health, reduction of premature mortality and avoidance of morbidity is regular participation in physical activity (PA) behaviours [50].

A perspective of the Rogerian proposal of HL is based on the view that a successful health education procedure needs to be mutli-dimensional, person-centred and based on a partnership between the eager professional to train and educate and the individual willing to act based on available resources while placing health as a priority [51]. An explanation of this standpoint defines that, "health education is a continuous, dynamic, complex and planned teaching-learning process throughout the lifespan and in different settings that is implemented through an equitable and negotiated client and health professional 'partnership' to facilitate and empower the person to promote/initiate lifestyle-related behavioural changes that promote positive health status outcomes" [51], (p. 133). This view suggests that boundaries and choices in each health promotion relationship are well-placed within each individual deciding the point the affiliation with the educator begins and ends, with related partnerships based on mutual responsibility, collaboration, freedom of choice, equity and autonomy [52]. When health education is lacking the above elements, is likely to fail to recognise and integrate the recipients' preferences and requests risking being ineffective in the short or long term [53].

5. Design thinking in physical activity and exercise

Bringing the previous notions together, it seems that physical literacy contributing to more active lifestyles is requiring a new approach able to solve more complicated problems in human decision making and actioning. New perspectives in education have the potential to provide novel methods of exercise promotion and literacy helping inactive populations to change perspectives and start their participation in exercise programs. Such a framework recently presented as a method of exploring, defining, and solving complicated problems claiming to utilise user-centred or human centred design processes [54]. Started with Brown's definitions [55, 56] Design Thinking (DT) comprises of iterative processes of three to five phases: 1. The phase of inspiration (or empathising) with an effort to explore and redefine the problem based on the clients, their perspectives and needs, 2. The phase of ideation (or definition and ideation) where the formulation of the problem and its solution is defined, and 3. The implementation (or prototyping and testing) phase where potential solutions are created and assessed [56].

DT has been proposed as one of the best approaches in health promotion as it is prioritising empathy for service users, brings together collaborative multidisciplinary teams and provides the opportunity to assess various solutions via iterative practices [57]. The potential of DT in multiple health care settings has been assessed in the past via diverse models of applications and demonstrated promising results in relation to traditional interventions [58]. Results on its potential for multiple health care domains and across diverse patient population and conditions were confirmed with authors urging for the use of DT in interventions of overlooked approaches and populations.

The application of DT in disciplines like PA and exercise literacy can be a product of related steps and procedures pertinent to the population in focus and caring for particular -amid unmet- needs. Relevant knowledge of applying DT is listed in multitude of resources highlighting the importance of the method and the application of its protocol [59]. Connecting with the requests of the real user and the population in need is the first step in the DT methodology. Claiming expertise and knowledge of the scrutinised behaviour/phenomenon when the user is not available, can possibly lead to unproperly clarified problems and quick fixes based on preconceived notions (see "empowerment model for health", [60]). Disciplines that have been scrutinising potential solutions effectively (i.e. medical treatments) supported by increased public attention and funding could generate a platform for creating diverse opinions on needs analysis [58]. The process of prototyping in a way that each potential solution is explored for its feasibility based on the elicitation of effective final results [56], is another step on the application of DT. The process of limiting solutions based on expressed ideas and their feasibility is another crucial area of DT [55]. Exchange of ideas is essential in DT and does not occur without trust, freedom of expression and undistracted collaboration among the team members [61]. Finally, having a basic appreciation of the protocol of DT and its needed steps can create a better engagement with team members ready to explore user needs, envision the ideal solution, realise its potential and endorse the answer that fits best to the initially proposed needs [55].

Testing DT protocol with the needs of the end user (i.e. unfit or obese individuals) in mind might hold the potential of more successful PA and exercise literacy helping to move way from proposals that have been shown limited success in the previous years with profound health and economic results [62]. Suggested tips that can enhance the implementation of DT for enhancing PA and exercise literacy are included in 12 tips presented by Wolcott, McLaughlin, Hubbard et al. [63]. These are separated based on the steps of DT protocol and relate to the preparation of DT (i.e. gathering resources and committing to its thinking patterns), engaging to the

discovery of users' needs (i.e. connecting to the real user and being observant of the real issues), exploring expressed ideas with a variety of means (i.e. visualisation of ideal solutions, utilising a number of mediums to scrutinise the feasibility of ideas), and encourage optimism while testing chosen solutions (i.e. flexibility when it comes to the chosen time and setting to reach a conclusion, allow space for failure and iteration of solutions).

A model of DT dealing with PA and exercise literacy can take the following form based on the suggestions of Brown [55], and colleagues [56]:

Inspiration phase; realising the needs of the individual user when it comes to human movement requires their inclusion in the process. Observation of the user or the direct involvement of users targeting the improvement of the context and needed set of skills is foundational in DT [64]. There is a need to reframe the problem and exploring it while moving away from pre-existing assumptions that lead to unsuitably specified problems and unfeasible answers [65]. The example of wearable technology as means to support increased physical activity patterns is an assumption made and failing to incorporate more active lifestyles [66]. Contrary, the idea of Augmented Reality to support PA literacy/education and more active lifestyles remains viable and untested to a large extend [67].

Equally important is the realisation of the experience of PA and exercise through the eyes of the stakeholders. Experts in academia very often assume knowledge based on prior theoretical conceptions and what has shown potential in the past [22] whereas, unique ways of thinking, personal strivings, psychological responses and thinking patterns of stakeholders cannot be predicted let alone assumed in terms of realising change [68].

During the phase of ideation, solutions to the problem start to emerge. Such process is important to continue involving both positive and negative experiences of the user while clarifying the direction of solution [55]. Testing prototype ideas through iteration and experimentation is an essential part of this process with triggered rounds of problem definition and experimental solution creation with the goal to synthesise information into illustrative models [69]. Iteration refers to testing possible solutions through trial-error procedures, mock-ups, timelines and prototype appraisals with the support of end-users and representative stakeholders [70]. Scrutinising and visualising a solution (i.e. self-caring message before putting on walking shoes) [71], and utilising previous knowledge and experience of people representing different organisations [72], is a central notion of design thinking.

The implementation phase puts into final test the qualified prototype ideas through final series of iteration and experimentation aiming for synthesis [73]. Preparing a gestalt view on the proposed solution to the problem creates the opportunity for the users to be represented as a community testing assumptions and evaluating prototypes [74]. Through this process end-users have the opportunity to realise what each of the finalist proposals provides as a response to their recognised needs, offering feedback on the implementation of ideas [60]. This end result (i.e. new educational resources, holistic movement drills re-connecting mind–body) [75], provides the opportunity to move forward with new implementation of solutions and ideas around PA literacy that emanate from the users in need while implementing important theoretical positions produced via decades of systematic research and academic development [21, 22].

6. Conclusions

To overcome currently overwhelming degrees of worldwide physical inactivity [76], requires looking to new definitions of the problem emanating from the

actual users and their needs [55], helping us to redefine physical inactivity and our solutions to reverse this global trend. Wide examination of "prototypes" of solutions towards literacy and increased engagement with PA and exercise practices remains unexplored and profoundly based on socio-cognitive approaches (for an example see, [76]). At the same time, feasibility exploration of recently proposed PA and exercise literacy programs remains largely unknown [77]. Ideas like the application of virtual and augmented reality in the promotion of exercise [67], the role of mind–body interventions in prolonged exercise participation [78, 79], and the potential of embodied creativity activities [80] are examples of such exploration requests. There is a clear need to explore user-friendly PA and exercise literacy solutions with an unknown capability for creating active lifestyle responses for populations in need. DT methodology provides new exploration affordances towards this remit [60].

In summary, HL is believed to be one of the most promising pathways to deal with CID in modern society [45]. Even though the existing theoretical models are supporting a systematic approach towards the promotion of PA and exercise behaviours, their educational applications are limited and still underdeveloped [21, 22]. The need to overcome resistance to exercise adoption due to negative sentiments, fear and/or unconscious processes necessitates the adoption of new approaches to PA literacy. DT has been proposed as an effective approach able to provide new proposals to health promotion as it is prioritising empathy for service users, brings together collaborative multidisciplinary teams and provides the opportunity to assess various solutions via iterative practices [55, 56]. Testing proposed solutions based on the needs of various populations (i.e. clinical, older adults) is the product of further scrutiny and exploration through the applications of DT.

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Conflict of interest

The author declares no conflict of interest.

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