

GetAMoveOn Network

Leveraging Technology to Enable Mobility and Transform Health

Exploring the Relevance of Social Practice Theory to Inform the Design of
Technologies for Supporting More Physical Activity in Everyday Life

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EXPLORING THE RELEVANCE OF SOCIAL PRACTICE THEORY TO INFORM THE DESIGN OF TECHNOLOGIES FOR SUPPORTING MORE PHYSICAL ACTIVITY IN EVERYDAY LIFE

Background: the GetAMoveOn Network+

The GetAMoveOn Network is an interdisciplinary UK community that is addressing the EPSRC Grand Challenge of transforming community health and care through the delivery of tested technologies that promote wellbeing by providing timely, individualised feedback that encourage appropriate activities. We are focusing on movement as a locus for health: it is our test case as it drives so many other benefits that are of value: economically, socially and culturally.

When we move more, we become smarter; as we become stronger, chronic pain decreases. Greater movement, especially in social contexts, improves collaboration. As we move, not only do we reduce stress: we improve our capacity to handle stressful situations and to see more options for creative new solutions. Movement enhances both strength and stamina, improves bone mineral density and balance, reducing incidence of falling and associated hip injuries (causes of death in the elderly). Movement complements other functions, from assisting with sleep and therefore memory and cognition, to helping with diet and associated hormones - improving insulin sensitivity and balancing cortisol. There are recent studies showing benefits of movement related to dementia. And yet, physical inactivity is the fourth leading cause of death worldwide; sedentarism has been called the "new smoking". Meanwhile costs to UK GDP from sedentarism and associated disease are increasing - from sick days lost to work, to elders losing mobility and having to move into care homes.

We have designed ourselves into our sedentarism: sitting during our commute, at desks while we work and at home on the sofa. There is a critical need to design ourselves back into the natural effects of health accrued simply by moving more. We need solutions that will help build both the evidence and the experience that movement can enhance and benefit people's lives.

New technologies are transforming our ability to capture lifestyle data on individuals in real time. Consumer technologies such as step counters and wifi scales are the tip of an iceberg - research programmes worldwide are proposing lifestyle data capture from devices ranging from video cameras to electricity meters to wearables. Meanwhile pervasive connectivity allows that data to be transmitted, processed through powerful machine

learning tools and provided back to people in a heartbeat. While we understand the potential technologies, we do not yet know how to leverage the technology effectively to support transformative health. Current approaches in ehealth generally only reach a small part of the population that is already interested in fitness, personal data capture, or both. Their uptake is, furthermore, of dubious effect as two recent medical reviews have shown. To have a national impact on health and wellbeing, to reduce the crippling burden of long-term health conditions and to move healthcare from the clinic to the community, we need to reach everyone, across a range of abilities and aspirations. We need to connect the potential of the technology with the potential of people and realise the benefits of a healthy, brilliant, population.

Realising this potential requires research on novel technical solutions, supported by theories from sports and health sciences on blending appropriate movement strategies for particular performance aspirations to behavioural and cognitive sciences on ways to engage people to make effective and meaningful progress. We need to understand what measures are appropriate not just to evaluate progress, but to guide it and adapt to it. To have meaningful impact across these dimensions we need to combine a range of expertise including sensor networks, data analytics, interactive visualisation, human computer interaction, online citizen engagement, behaviour change, sports, exercise. The GetAMoveOn Network is a response to this research challenge.

Abstract

This paper provides a review on the relevance of Social Practice Theory (SPT) to the challenge of designing digital health technology to facilitate more physical activity in everyday life. Digital interventions for promoting ‘health behaviours’ like physical activity have traditionally employed behaviour change approaches aimed at persuading people to become more physically active in their everyday lives. However, the discourse of ‘behaviour change’ in interventions has been widely criticised for its emphasis on individual responsibility for change, while tending to pay little attention to the wider social and material context in which physical activity takes place. Scholars within public health and sociology have recently argued for a shift beyond individual behavior change, suggesting that SPT offers an alternative approach that conceptualizes physical activity as a set of social practices embedded in the historical and socio-cultural fabric of society. Therefore, this paper explores the potential of SPT in offering a perspective for examining the role of design in supporting transition towards more physical activity in everyday life.

Introduction

Regular physical activity is widely recognised as being significant for health and wellbeing. An accumulation of at least 150 minutes of moderate-intensity physical activity a week has been shown to reduce the risk of long-term chronic conditions such as cardiovascular diseases, type-2 diabetes, cancers, and chronic respiratory diseases (Warburton et al., 2006; Kohl et al., 2012). However, there has been a significant global decline in physical activity and increase in time spent in sedentary activities in recent decades (Ng & Popkin, 2012). Promoting increased levels of physical activity has thus been recognised as a global health priority (Kohl et al., 2012).

Physical activity is typically defined as “any bodily movement by skeletal muscles that result in energy expenditure” (Caspersen et al., 1985). However, by implication, this encompasses virtually every human activity that occurs in the waking hours of everyday life. More specifically, the term ‘health-enhancing physical activity’ constitutes any form of physical activity that benefits health and wellbeing (Edwards & Tsouros, 2006). Health-enhancing physical activities are not limited to structured or planned physical exercises, but also a range of activities that occur as an integrated part of everyday routines, such as cycling or walking for daily commuting, climbing the stairs, and engaging in household chores (Edwards & Tsouros, 2006). Therefore, for the purpose of this paper, physical activity is conceptualized in terms of health-enhancing physical activity as part of everyday practices.

Designing digital technologies to promote health and wellbeing has been an area of growing interest in Human Computer Interaction (HCI). Over the past decade, there has been a wave of

research on everyday technologies designed to encourage increased levels of physical activity and other health-related behaviours (Hekler et al., 2013; Munson & Consolvo, 2012; Khalil & Abdallah, 2013; Mathews et al., 2016; Orji & Moffatt, 2016). Studies have traditionally employed behaviour change and persuasive strategies based on social-psychological theories to inform the design of these so called 'behaviour change' or 'persuasive' technologies (Hekler et al., 2013; Lupton, 2014). A relevant example of a behaviour change approach that pervades research in this area involves the concept of 'self-tracking' of daily physical activities (also referred to as activity tracking) using smartphones and wearable devices (Lupton, 2016; Orji & Moffatt, 2016).

Everyday life is increasingly permeated by ubiquitous sensing technologies [smartphones and wearable devices] that enable continuous tracking and real-time feedback of users' daily physical activity through the use of built in sensors such as pedometers, accelerometers, GPS and altimeters (Piwek et al., 2016). Such self-tracking technologies provide a means for individuals to set goals, collect, analyse, share, compare and reflect on information about daily physical activities, with the idea that this increased 'self-knowledge' will serve as a catalyst for making informed choices towards 'self-improvement' and behavior change (Li & Forlizzi, 2011; Lupton, 2016). The implicit assumption of the behaviour change approach that informs the design of these technologies is that individuals are rational decision-makers with the ability to change their behaviours through their own volition (Biddle & Mutrie, 2007; Buchan et al., 2012; Hekler et al.; 2013). Hence, behaviour change is conceptualised as a linear process of rational decision-making with predictable outcomes (Biddle & Mutrie, 2007; Buchan et al., 2012).

However, this perspective has been widely criticised for its limiting emphasis on individual choice as the basis of behaviour change (Buchan et al., 2012; Hekler et al., 2013; Lupton, 2014; Cohn, 2014). Critics argue that health behaviours like physical activity are not only a matter of individual choice, but also involve the broader social, cultural, economic and material forces that shape patterns of activity in everyday life (Buchan et al., 2012). It has been argued that performing health practices like physical activity is not a single or one-off event that is solely based on rational-decision making (Blue et al., 2016). Physical activity is made up of various activities that are embedded and routinely performed within the various domains of everyday life including work, transportation, leisure and household domains (Bauman et al., 2012). Hence, relying on approaches that position the individual as the primary 'thing' that needs to be changed provides a narrow framing of human activity, which may lead to short-term impacts (Cercos et al., 2016; Spotswood, 2016, Buchan et al., 2012).

In response to such critiques, researchers within public health and sociology have recently argued for a shift in theoretical perspective, suggesting that social practice theory (SPT) provides an alternative approach for conceptualising everyday health related practices including physical activity (Cohn, 2014; Blue et al., 2016; Maller, 2015). This perspective decenters the analytical

focus on the individual as the primary unit of change, towards an understanding of how social practices emerge, stabilize and change within the broader context of society (Watson, 2012). Recent studies are starting to examine health related practices such as smoking (Blue et al., 2016; Keane et al., 2016), eating (Twine, 2015), alcohol consumption (Supski et al., 2017) and physical exercise (Blue, 2016; Harries & Rettie, 2016) to explore the relevance of a practice-based approach and its implication for public health research and intervention.

This paper builds on this emerging literature to examine the relevance of Social Practice Theory (SPT) to the challenge of designing technology to facilitate more physical activity in everyday life. To the best of our knowledge, there are no publications related to design for health and well-being that have focused on social practices and the role technologies (and their design) can play in influencing patterns of physical activity in everyday life. This knowledge will lay the foundations for discussions critically examining the implications of SPT for studying and designing for physical activity. This shift in theoretical perspective has the potential to guide future research, providing researchers and designers with an approach for examining physical activity within the changing patterns of everyday life and the role that design can play in facilitating transitions towards more physical activity in everyday life.

Social Practice Theory

Social practice theory is a sociological approach grounded in the early works of social theorists, Bourdieu (1990) and Giddens (1984), and more recent developments by Schatzki (1996), Reckwitz (2002), Warde (2005) and Shove et al. (2012). SPT is not a unified or coherent theory, but rather a synthesis of theoretical perspectives that share a focus on social practices such as walking, cycling, swimming, or climbing the stairs, as the fundamental unit of social analysis (Nicolini, 2012). Different scholars have defined social practices differently (Maller, 2015). A widely cited definition of a social practice is that by Reckwitz (2002a) who defines it as:

“A routinized type of behaviour which consists of several elements, interconnected to one another: forms of bodily activities, forms of mental activities, ‘things’ and their use, a background knowledge in the form of understanding, knowhow, states of emotion and motivational knowledge”.

Schatzki (1996) describes a social practice as a “temporally unfolding and spatially dispersed nexus of doings and sayings”. More recently, Shove et al. (2012) – building on Reckwitz (2002) and Schatzki (1996) – provide a conceptual understanding of how social practices are produced, reproduced and transformed in society. The authors simplify Reckwitz’s observation of how social practices are constituted, into three interdependent elements: *materials*, *meanings* and *competences* (Shove et al., 2012).

Whilst different practice theorists have approached the idea of social practices and how they change over time from different (complementary and sometimes conflicting) perspectives (see Schatzki, 1996; Reckwitz, 2002; Warde, 2005; Nicolini, 2009), this paper primarily follows Shove et al's conceptualization of the dynamics of social practices, which they highlight in their book, *The Dynamics of Social Practice: Everyday Life and How It Changes*.

Elements of Social Practice

Materials refer to all physical (human and non-human) elements utilised to perform a practice, including objects, infrastructure, technologies, and the human body itself (Shove et al., 2012). In swimming, for example, these can include a body of water (swimming pool, ocean, lake, river), the swimmer's own body, a swimsuit and other swimming equipment.

Meanings are the 'social and symbolic significance' attached to why a particular practice is performed at any given moment (Shove et al., 2012). For example, swimming is performed for various reasons including for recreation, fitness and health, competition, travel and spiritual cleanliness.

Competences include the knowledge and skills required to perform that practice (Shove et al., 2012). Competences necessary for swimming can include having aquatic skills (e.g. breathing regulation, floating, swimming strokes and moving in water), and knowledge about water safety.

When carrying out a practice such as swimming, individuals - regarded as 'carriers' or practitioners of practices - actively bring together combinations of certain materials available, meanings they attach to performing the practice in that moment, and their competences in performing that practice (Shove et al., 2012). These combinations of elements are never static; they are constantly reproduced and transformed through recurrent performances (Shove et al., 2012).

Dynamics of Social Practices

According to Shove et al. (2012), practices emerge, persist, shift and disappear when links between these elements are made, sustained and broken. Therefore, the emergence, reproduction and transformation of social practices can be analysed by examining the dynamic relationships between the elements that constitute specific practices and relations between them.

Shove et al. (2012) draw on Schatzki (1996) to introduce the concepts of *practice-as-entity* and *practice-as-performance* to describe how practices exist both as social entities and as individual performances. Practice-as-entity refers to the composition of interconnected elements that is recognisable and socially shared across time and space, whereas practice-as-performance is the active integration of the elements, through the specific act of doing a specific practice, by a

practitioner, in a given moment in time and space (Shove et al., 2012). While practice performances are shaped by practice-as-entity, it is through recurrent performances that practices (as entities) emerge, persist, and transform over time (Warde, 2005).

To illustrate, the practice of swimming is a popular water locomotion activity practiced by a wide range of people across the world. It involves formed relationships between the human body and body of water, knowledge and skills on how to swim, and the different reasons for swimming (i.e. practice as entity). All of these elements are integrated when a person performs the act of swimming (i.e. practice-as-performance). Swimming performances vary, as different people swim in different bodies of water, for different reasons, under different conditions, and using different swimming techniques. However, the varied performances can still be recognised (by an observer) as a practice of swimming. Moreover, swimming has existed since ancient times until today because people across societies have continued to perform, and in the process transformed it from a means of survival, to a recreational activity and even a competitive sport. The recursive relationship between practice-as-entity and practice-as-performance highlights the dynamics of practices over time: how the links between the three elements are made, re-made, and broken (Kuijer, 2014).

How Practices Emerge and Persist

A single instance of performing an activity -by a single practitioner- on its own does not immediately constitute a social practice (Shove et al., 2012). When a group of people continually perform an activity in (more or less) similar ways over time and space, interdependencies between all three elements are formed, reproduced and reinforced. Over time, this establishes a pattern of activities - held together by a relatively stable combination of elements - which people can recognise and talk about as an entity (practice-as-entity) (Shove et al., 2012). Thus, a social entity emerges when links between particular meanings, materials and competences are established and reproduced through continual performances.

Moreover, a practice-as-entity exists and persists as long as the links between the constituting elements are constantly reproduced through repeated and 'more or less faithful performances' by practitioners across time and space (Shove et al., 2012). Consequently, the survival of a practice is dependent on its ability to capture and retain a population of practitioners committed to continue performing a practice in a particular way. When a significant number of practitioners who were previously committed to performing a practice persistently fail to re-enact it (across time and space), the links between the constituting elements begin to disintegrate (Shove et al., 2012).

How Practices Change

According to Shove et al. (2012), “Practices change when new elements are introduced or when existing elements are combined in new ways”. When a new element is introduced to a practice, for instance, introduction of new a technology, this may form new meanings to the practice, and may require new competences, which can potentially cause a disruption to how a practice is normally performed, or the emergence of a new practice over time (Shove et al., 2012). For instance, prior to the industrial revolution, household practices such doing laundry were primarily performed manually (hand washing) and demanded considerable muscle power to be performed. However, the introduction of “labour saving” devices such as washing machines into household practices in the 20th century has reduced time and the level of physical exertion required to perform these practices, forging new meanings of ease, time-saving, and convenience (Cowan, 1985; Lanningham-Foster et al., 2003).

Furthermore, while recurrent performances relatively stabilise a practice entity over time, they can also potentially bring about change in the practice (Shove et al., 2012). Every performance of a given practice is slightly different from the others, as practitioners combine different sets of elements of the practice depending on the situation in time and space, materials available, the competences of the practitioner, and meanings attached to their performance (Shove et al., 2012; Hui, 2016). Also, once recruited to a practice, practitioners start as novices and, as they develop their competences through performances, they adapt, improvise and experiment with different ways of performing a practice (Warde, 2005). Over time, slight modifications in performances can lead to variations in practice-as-performance or change in practice-as-entity, as old links are broken and new links are established (Shove et al., 2012).

Relationships between Practices

According to Shove et al. (2012), practices do not occur in isolation from each other: they often link with other practices in the organization of everyday life. The daily life of people is made up of a wide range of practices, coordinated in time and space. When practices co-exist or take place in the same location, they may overlap and influence each other to form “loosely connected bundles” (Shove et al., 2012). Individual practices may also bundle together through shared elements, and changes in elements in one practice can lead to changes in another (Shove et al., 2012). For instance, kitchen practices such as cooking and doing the dishes are often connected by shared space, materials, and meanings. Cooking a meal may mean washing the dishes after, even if cooking and doing the dishes are two different practices. However, practice bundles may form tighter co-dependent relationships (referred to as complexes), where it becomes difficult to separate them as distinct entities (Shove et al., 2012). Like elements of practices, the relationship between practices requires continual reproduction (through performances) to persist over time (Shove et al., 2012).

Practice bundles and complexes are formed and broken as a result of collaboration and/or competition between practices (Shove et al., 2012). Practices require limited resources of time and space for their performance: Since only a limited number of practices can be performed at the same time and/or space, the spatio-temporal arrangements of people's daily lives may support or inhibit the performance of certain practices (Shove et al., 2012). In a collaborative relationship, practices share limited resources and mutually support each other (e.g. cooking and doing the dishes), while in a competitive relationship they compete for these resources or elements, and the performance of one practice may rule out the performance of another (e.g. driving to work vs. cycling to work) (Shove et al., 2012).

To conclude, a social practice perspective allows us to think about physical activity as a configuration of interrelated elements that is constantly reproduced and transformed over time, and exists as part of a wider nexus of practices in the organization of everyday life. It is, however, important to note that SPT does not explain causal relationships nor prescribe strategies for change, but rather provides a set of key concepts to guide us in generating empirical research questions about how certain practices emerge, persist and change over time and space (Warde, 2005; Shove et al., 2012; Nicolini, 2017). Next we provide a brief overview of some recent works related to studying social practices in HCI and design literature.

SPT and Design Research

Over the past decade, researchers within the HCI and design research communities have drawn on concepts from SPT to explore design problems, particularly in the area of sustainable design (Pierce, 2013; Kuutti & Bannon, 2014; Pettersen et al., 2013). They have mainly explored problems related to resource consumption practices such as cooking (Clear et al., 2013), commuting (Hasselqvist et al., 2014), bathing (Scott et al., 2012), laundering (Pink, 2015), and domestic heating (Kuijter & Watson, 2017). Kuijter (2017) highlights four major ways sustainable design research projects have drawn on SPT to study consumption practices which include: analysing situated performances of practices, tracing and comparing practices in space and time, disrupting existing practices through design, and reflecting on practices of design.

Some scholars have also proposed the notion of 'practice-oriented design' as an approach for taking social practices as units of analysis and design (Scott et al., 2012; Kuijter et al., 2013; Pettersen et al., 2013). Practice-oriented design approaches were first advocated by a multi-disciplinary team of sociologists and design researchers, led by Elizabeth Shove, in a workshop series titled 'design and consuming' (Shove & Panzar, 2006; Julier, 2007; Kuijter et al., 2013). As an outcome of the workshops, a 'Practice Oriented Product Design' (POPD) manifesto was developed to describe the implications of the SPT perspective for design research (see Shove & Panzar, 2006). Based on multiple design projects related to everyday consumption practices,

design researchers have since built upon the POPD manifesto, to develop practice-oriented design approaches and frameworks for studying and re-configuring consumption practices through design (e.g. Scott et al., 2012; Kuijjer et al, 2013; Entwistle et al., 2015).

Although SPT has gained increased prominence in the area of sustainable design, it has yet to be explored in the area of design for physical activity. In the next section we review what a social practice perspective may offer for understanding and designing for transition towards more physical activity in everyday life.

Relevance of SPT for Studying Changing Patterns of Physical activity

In recent decades, there has been a rapid decline in physical activity levels across the world (Ng & Popkin, 2012). Ng and Popkin (2012) used time-use data to examine trends in the amount of physical activity and sedentary time over the past six decades (from 1965 - 2009) in five countries (UK, US, Brazil, China and India). The authors reported substantial decline in physical activity -in varying degrees- at home, in the workplace, and in transportation domains, with a shift towards more sedentary time, across all four countries. In the US and the UK for example, physical activity declined by 32 percent and 20 percent respectively from 1965 to 2009, while China reported the a 44 percent decline in physical activity between 1991 to 2009 (Ng & Popkin, 2012). Thus, if we want to understand how digital technology might support transitions towards a more active society, it is crucial to first understand how and why transitions away from active lifestyles, towards more sedentary ones are occurring in society.

Taking a social practice perspective allows us examine how and why patterns of physical activity in daily life have evolved over time, within a given society. This requires an analysis of the history and development of the practices under scrutiny, over certain spatial and temporal scales: studying the shifting configurations of the elements that constitute them, and their shifting relations with other interrelated practices (Rokpe, 2009; Shove et al., 2012; Nicolini, 2017). Scholars have argued that understanding transitions from a historical perspective can help unravel key socio-cultural, political, economic and technological developments that impact the status quo, which have key implications for designing for future transitions (Hirsh & Jones, 2014).

History and Development of Staircases

In order to give a practical illustration of examining transitions in social practices, and the role of design in such transitions from a historical perspective, we provide a brief narrative of the architectural history and development of staircases and the meanings associated with practices of climbing stairs, from ancient times to the 21st century. We focus our analysis on staircases because climbing stairs instead of riding the lifts in everyday communities such as offices,

department stores, university buildings, and residential apartment buildings provides a means for people to integrate more physical activity in their daily lives. However, contemporary architectural designs of these structures, especially in the metropolitan cities of the world, give more prominence to lifts (Campbell & Tutton, 2014; Bernard, 2014). The staircases are typically isolated and relegated to a primary role of providing a means of fire exit, making the climbing the stairs less accessible than riding the lift (Senft & Templer, 1994). Thus, a historical analysis of staircases and their social significance, can serve as a starting point in understanding how they have evolved through time and across societies, as well as how the development of the seemingly competitive relationship between climbing stairs and riding the lift has changed the way people travel between floors in their everyday lives.

Staircases have been considered as one of the oldest elements in architectural history (Senft & Templer, 1994; Campbell & Tutton, 2014). While the primary function of the staircase has been for vertical transportation, they have served different purposes and carried varied symbolic meanings in different parts of the world and throughout history (Senft & Templer, 1994).

In ancient times and cultures, staircases were a significant part of religious structures (Campbell & Tutton, 2014). The use of staircase symbolized ascension to heaven to promote spirituality (Campbell & Tutton, 2014). A renowned example includes the stepped tower 'Ziggurat' a grand religious monument in ancient Mesopotamia (Campbell & Tutton, 2014). The temple stood on a platform at the top of the tower and worshippers climbed a long flight of stairs to access it, and bring them closer to the heavens, metaphorically (Campbell & Tutton, 2014).

During the middle ages, between the 5th and 12th century, spiral staircases were a common feature of medieval castles across Europe (Senft & Templer, 1994; Campbell & Tutton, 2014). They were mainly used for military purposes during warfare (Senft & Templer, 1994). The narrow spiral design of the staircase provided a military advantage that facilitated defence against an invading army fighting their way up during a siege (Senft & Templer, 1994).

In the 17th and 18th centuries, the renaissance and baroque period witnessed the appearance of freestanding, grand staircases in the interiors of palaces and foyers in Europe (Senft & Templer, 1994; Campbell & Tutton, 2014; Bernard, 2014). These embraced a ceremonial look and served as a means for displaying grandiosity, status and power (Campbell & Tutton, 2014; Senft & Templer, 1994).

Throughout the 18th and 19th centuries, grand staircases became popular in homes and multi-storey public buildings including hotels and apartments around the world (Campbell & Tutton, 2014). The grand staircase stood as a prominent architectural element at the centre of hotel and apartment lobbies, inviting people to climb the stairs and providing visual access to floors above (Campbell & Tutton, 2014). The grand staircase remained the primary means of vertical

transport between floors until the emergence of the passenger safety lift in the late 19th century in the US (Campbell & Tutton, 2014; Bernard, 2014). The emergence of the first passenger lift in New York in the late 19th century enabled buildings to be built higher than five stories, which led to a dramatic shift to high-rise buildings and skyscrapers in large cities across the US, particularly New York and Chicago (Priwer & Phillips, 2014).

Although for centuries, vertical transportation had depended primarily on use of the human bodily movement as a device to reach higher levels, in the modern architectural era of high-rise offices, hotels, department stores and apartment buildings, climbing the stairs to reach floors more than a certain threshold became very demanding for people because of the greater levels of energy expenditure involved (Christ, 2009). This made people reluctant to use them. Christ (2009) notes that “extreme heights represent a traumatic level of exertion for the gravity-accustomed body; without an elevator, such heights hold the prospect of fatigue, and exhaustion”. The lift - a much less physically exerting means for vertical transport - allowed for ease of access to higher floors, making them more appealing to people to use (Christ, 2009).

From the end of the 19th century onwards, lifts became the primary architectural element for vertical transportation (Seft & Templer, 1994; Bernard, 2014). They also replaced the grand staircases typically situated in lobbies and close to the building entrance, to become the only visible access point for vertical transportation (Campbell & Tutton, 2014; Bernard, 2014). This competing relationship between climbing the stairs and riding the lift led to the transformation of the staircase, from a grand structural element and a traditional means of vertical transportation, to a means of fire exit, built and hidden away in the corners of the building (Seft & Templer, 1994; Bernard, 2014).

In response to the decline in physical activity in modern times, due to the introduction of technology such as lifts, there has been increasing efforts to support climbing stairs in public spaces (Lewis and Eves, 2012). In the last decade, architectural design practices are beginning to promote a shift towards ‘active design’ to encourage physical activity such as cycling, walking, climbing stairs and active recreation (Herrick, 2009). Active design involves constructing the built environment in a way that provides more opportunities for physical activity (Herrick, 2009). Repositioning the location of staircases in public spaces to increase their visibility, accessibility and convenience of use in new and renovated buildings, is included in the active design guidelines and strategies to support more stair climbing (Herrick, 2009).

In the 21st century digital age, there have been a number of attempts to adapt public spaces to encourage climbing stairs instead of riding the lift using digital technological installations in these spaces (Volkswagen, 2009; Miller et al. 2009; Rogers et al., 2010). For example, a ‘piano staircase’ was designed at a train station in Stockholm to encourage commuters towards taking

the stairs instead of the neighbouring escalator (Volkswagen, 2009). The staircase was covered in a material and sensors were installed on the steps to simulate the look and sounds made by the piano when stepping on the stairs, in order to add an element of fun for people who take the stairs. Miller et al. (2009) installed a sequence of LED “fireflies” on the walls of a building that lights a path towards the staircase when people press the lift button, to capture people’s attention to climb the stairs. A similar example includes a study that installed different types of ambient displays including twinkly lights (on the floors) at a work place to draw the attention of people towards taking stairs instead of the lift (Rogers et al., 2010). All of these interventions had some meanings of fun attached to them to make them more ‘enjoyable’ or interesting than taking the lift.

Conclusion

In this review, we have argued for a social practice perspective to understanding and designing transitions towards more physical activity in everyday life. We discuss relevant concepts from SPT to guide our understanding of how practices emerge, persist and change over time. Tracing the history and development of social practices - in relation to other supporting and conflicting practices - can help unravel key influences of stability and change.

The brief historical analysis of the co-evolution of staircases and lifts sheds light into broader societal forces and socio-material relationships that have impacted how people travel between floors in their everyday lives. It also reveals how social practices and the elements that constitute them mutually influence one another and co-evolve over time. For example, the emergence of a new technology (the lift) in buildings not only transformed vertical transportation, but also inspired the transformation of the design of spaces, buildings and cities around the world. The relationship between material elements that constitute social practices has implications for examining the role of design in co-shaping the patterns of activity in everyday life. Future research might ask the question: how might design challenge the dynamic interplay between everyday places, spaces, objects, people and technologies to create meanings that support more physical activity in everyday life?

The age of ‘ubiquitous computing’ presents opportunities for digital technologies to transform everyday practices. Digital technologies are increasingly being interleaved into the fabric of our everyday activities and routines. Even our physical environments are being embedded with networked interactive systems such as ubiquitous and context-aware technologies, ambient intelligent systems, and interactive architectures to support everyday activities (Wiberg & Stolterman, 2008). However, when introducing new forms of digital technologies into everyday practices, it is important to note that they do not exist in isolation, but as one element of a

practice that becomes part of a wider material arrangement in the organization of everyday life (Shove & Watson, 2006; Ingram et al., 2007).

Therefore, design researchers should not limit the role of design to only technology design, but consider an analysis of how these material arrangements (technologies, objects, spaces, places and bodies) and their design interact and co-evolve to support (or hinder) physical activity in everyday life (Ingram et al., 2007). Although SPT does not propose explicit methods for analysing dynamics of social practices, and the choice of methods ultimately depends on the research questions to be explored (Shove, 2017), future studies should aim for combinations of methodologies that are able to capture the spatio-temporal and relational dimensions of social practices.

Summary of impact

The significance of this review is that it challenges the dominant paradigm for designing to facilitate physical activity: namely, theories of behaviour change that focus on the individual as the agent of change. We propose an alternative, or complementary, focus on social practices, which emphasises the importance of the broader historical, social and material relations in shaping what people do. To date social practice perspectives have been drawn on to examine design problems related to resource consumption, but not physical activity. In our work, we propose to use this perspective in design research for facilitating increased physical activity (and reduced sedentarism) for people at risk of clinical conditions such as hypertension and type-2 diabetes, for whom such lifestyle changes can have a significant impact on their health outcomes. It will be important to examine the practical outcomes of future physical activity interventions taking this theoretical perspective to assess its potential to be transformative.

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