Go, WannaGo!

Research on Motivators and Barriers of Physical Activity, Promising Technologies and Game Design – A Summary Report

1. Background

Sedentary lifestyle, stress at work and omnipresent availability of industrialized food – collateral consequences of today´s civilization and economic growth – create new enormous challenges to the state of health of many people (1). Physical activity (PA) decreases, whereas sedentary behavior, obesity, cardiovascular diseases and other related health problems increase almost worldwide (2).

One of the major approaches to face this development and tackle common lifestyle diseases is to increase PA in the everyday lives of people. Although plenty of opportunities for sports and movement exist, only a few people make use of them. One reason might be that most opportunities offered by companies and governmental organizations do not reflect the actual needs of different target groups and are therefore not attractive to heterogeneous population groups. Subsequently, the populations` attitudes towards prevention, PA and health, individual interests, socio-cultural frameworks and physical resources are diverse and widespread. Three groups of people can be distinguished: 1) people interested in PA and being sufficiently physically active (“GoGos”); 2) people interested in PA-related topics but not being sufficiently physically active (“WannaGos”) and 3) people neither interested nor being physically active (“NoGos”). In the end, the following questions guide us through the theoretical considerations, but also the practical applications of our project:

A) What are the motives for people to be physical active or not?

B) What drives or motivates people to be physical active?

C) Which external factors influence their activities?

In the context of this report, we also want to present promising technologies and associated meanings for our work. The project “Go, WannaGo!” as one project of the international Sports-Innovation-Network (SINN-i) aims at the particular target group of the “WannaGo” people. In order to understand which group is addressed by the activities within our project and how they can be characterized, a brief definition of the "WannaGos" is necessary.

Furthermore, a short introduction to the Intention - Behavior – Gap (I-B-G) and the Self-Determination Theory (SDT) will give an insight into the psychological field of research upon which our project bases.

“WannaGo” people

“WannaGos" show an interest in PA and health, but are not sufficiently physically active. Despite their inactivity, they possess and demonstrate the need, motivation, will, knowledge of the meaning, purpose and benefit of PA. "WannaGos" nevertheless do not change their behavior. So-called "GoGos" (interested in and actually performing PA) and "NoGos" (neither interested in nor performing PA) can be distinguished from this group of “WannaGos”. We assume that for “WannaGos” it is of utmost importance to find movement opportunities near their home or workplace (3).

The Intention – Behavior – Gap

The I-B-G deals with the common phenomenon that although there is an intention to change behavior, practically no change in behavior takes place. Various theories deal with the relationship between intention and behavior. However, concerning PA, only two theories have empirical relevance (4). First, the Health Action Process Approach (HAPA) describes self-efficacy as the most important parameter of maintaining increased PA after the end of an intervention and points out that action as well as coping planning is potentially effective (5). Second, the Multi-Process Action Control model (M-PAC) points out the relevance of affective attitude-PA, extraversion-PA, habit-PA, perceived behavioral control-PA and self-regulation-PA (6).

The Self-Determination Theory

According to the behavioral psychological approach of Self-Determination Theory (SDT), different modes of motivation—also motivation for PA—underlie an action (7). External motivation has low temporal stability. Intrinsic motivation is more stable and therefore

necessary for lifelong PA. Intrinsically motivated people act out of their conviction and can maintain an action stable. The enjoyment of PA plays a major role within this process (8).

2. Scientific state

In the course of our literature search, we identified 29 publications that deal with motivators or barriers of PA. This included (systematic) reviews as well as individual empirical studies, but also theoretical considerations and discussions. Only few studies explicitly asked inactive people why they are not active. No study interviewed people that were inactive but showed intention and desire to be active. Furthermore, it can be assumed that in general, people already interested in the topic especially take part in surveys considering PA. Thus, we assume a certain basic bias. We do not consider our research as exhaustive.

General barriers and motivators for physical activity

It turns out to be difficult to characterize "WannaGos" directly from empirical findings. Reasons are high variance in the population, as well as the pool of test persons in the corresponding studies. Thus, the individual groups differ greatly concerning age, gender, origin, social status, socialization and environmental conditions.

In their cross-sectional study on the perceived barriers to physical activity and their associations with domain-specific physical activity and sedentary behavior, Koh and colleagues (9) revealed that the three most prevalent perceived barriers to physical activity were

- lack of time (65,3% of respondents),
- exhaustion (64,7% of respondents) and
- environmental pollution (56,1% of respondents)

Moreover, critical determinants affecting physical activity outcomes encompassed inadequate walkways, cycle paths, or recreational areas, financial considerations, safety apprehensions, pollution, unfavorable weather conditions, time constraints, age-related aspects, and exhaustion (9).

Hoare et al. (10) also compared a group of inactive and active people and found that men showed a higher overall inactivity rate, whereas genders did not differ in the reported barriers. It was concluded that identification (e.g. consciously valuing a goal) and intrinsic motivation

(e.g. succeeding at challenges, experiencing enjoyment) predict PA. These findings are consistent with SDT's assumptions (10).

Other studies further list the following barriers: lack of time and money, lack of appropriate (local) sports facilities, too old, lack of sports partners, (extreme) weather conditions (e.g. hot climate), lack of social support, lack of skills, traffic or lack of road safety, financial issues, embarrassment, gender norms, safety issues, lack of motivation, fatigue, sloth, health problems (e.g. joint issues) and temporary obligations. Considering cultural influences, involvement in physical activity tends to be lower among individuals of advanced age, females, those with less education, and married individuals (11, 12, 13, 14, 15, 16, 17).

Similarly, other recent studies examining already active people reported that the potential motivators can be both, extrinsic and intrinsic. Reported motivators here included enjoyment, stress reduction, body-related factors, "friends and fun", perceived self-efficacy, self-monitoring, behavioral goal-setting and weight management (8, 10, 18, 19, 20, 21). On the other hand, commonly reported facilitators and motivators of physical activity can be the motivation to gain health benefits (physical and mental), stress relief, enjoyment, losing/gaining/maintaining weight, cultural norms (societal standards of beauty and/or success), PA friendly environment, competence (PA knowledge and skills), social support/social-relatedness, active family-environment, competence (PA knowledge and or skills), access to sports-facilities (13, 15, 16, 17).

These findings indicate which benefits of PA can potentially play an important role in motivating "WannaGos".

Barriers and motivators of physical activity in the workplace

Interventions and programs promoting PA among adults should take place in different settings in order to reach a large number of individuals. The workplace is considered to be an important and ideal setting for health promotion interventions (22). Moreover, individuals often spend more than a third of their waking hours at work. Therefore, workplace interventions have great potential to reach large population groups (23). Unfortunately, most workplace activities are spent sedentary and do not lead to high amounts of PA. Thorp et al. (24) identified that working hours compared to non-working hours are mostly spent sedentary. Furthermore, workplace-intervention participants with a better health status at

baseline and already physically active before the intervention were found to have a greater likelihood of success in sense of getting the employees more active (24, 25).

Various studies indicate which specific barriers occur in particular settings. For example, barriers such as fear of physical discomfort (sweat), reduced productivity, or low acceptance by colleagues naturally play a role in interventions directly at the workplace. On the other hand, motivators such as improved cognitive efficiency at the workplace, improved social connection in the team and improved well-being and less stress at work can be countered (26).

Dalgaard et al. identified barrier that fall into three domains (27):

- Environmental Context and resources
- Social Influences
- Social and Professional Role and Identity

As further studies demonstrate, the way to work is also an area where interventions can have a major impact. Almost without exception, PA levels among participants were massively increased by changes in their mobility towards active transport, besides other healthy changes, which can be summarized as follows:

- General public health impact by increased PA (28, 29, 30)
- Reduced obesity levels and reduced risk of diabetes (29)
- Public health impact by reduced risk of traffic accidents (28, 31)
- Public health impact by reduced air pollution (28, 31)

However, special barriers also occur with active transport, which must be observed in detail when installing interventions. These could of course also become relevant if an attempt is made to adjust the way to work in the direction of active transport. Frequent doubts and considerations relate to the following and may interact with general barriers (e.g. age, fitness level):

- Provision of quality of parks and playground (31, 32)
- Multiple urban- and street-scape components for walking and cycling (32)
- Walkable neighborhood (30, 32)
- Neighborhood physical environment (33)
- Residential address density (34)

In a systematic review, Zhu et al. propose a conceptual framework for future research and practice that describes how environmental interventions regarding work station, work building, work environment, and residential environment can affect employee's personal and social factors (such as sedentary behavior and PA) directly and improve work performance (35).

As a conclusion of all studies mentioned above, it can be stated that a focus on clearly defined target groups is necessary. By not only focusing on the worker's individual motivation and behavior but also on corporate and environmental changes, interventions can become more sustainable (36). The individual barriers and motivators can sometimes vary distinctly. This can be seen e.g. in the barrier of fear of sweating, which does not play a role in a non-work context. Therefore, scientific insights into very specific situations and environments are of great value and indispensable for interventions of all kinds.

3. Pilot data: Physical activity and motives at Dunlop

In the first phase of our project, we were able to collect data with the help of our partners from Dunlop in Japan and we gained valuable insights into relevant motivators among their companies` employees. A total of 113 Dunlop's employees (evenly distributed among age groups) provided information about motivators in terms of PA. As major motivating aspects, they stated challenge, enjoyment, and appearance (see figure 1). Based on this information, valuable statements can be deduced, although they only apply in similar settings.

Inactive employees at Dunlop are motivated to be physically active

A) If they keep or improve their skill level
B) If they have fun and enjoy the exercises
C) If the exercises keep them healthy and fit (improves cardiovascular fitness)
D) If they have the chance to spend time with others, however not necessarily friends
E) If they lose weight, look better, improve appearance and body shape

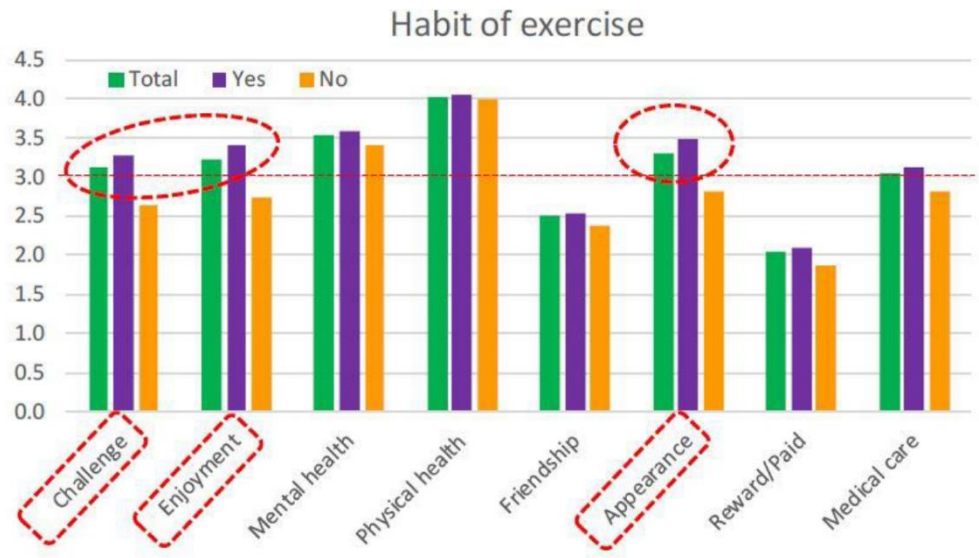

Figure 1: Results of the pilot study at Dunlop: Motivators for PA and sports.

Sports offers therefore need to fulfill mentioned criteria in order to assure the best possible outcome, considering the setting. Keeping in mind that the SINN-i network seeks innovation, it is crucial to use promising modern technologies to ultimately exploit their benefits.

4. Promising technologies

Several dozen publications deal with the topic of promising technologies in the promotion of PA, either in the form of theoretical considerations or by empirical studies.

Overall, some general trends can be observed, although mobile-based interventions are considered to be the most effective way to increase PA in individuals (37). As part of eHealth, so called mobile Health (mHealth) approaches were found to be effective, especially in higher age groups of 50 years and older (38) and considering long-term effects and can lead to small or moderate increases in PA (39). Furthermore, it is assumed that gamification will become an increasingly familiar instrument in health promotion (40). Despite the fact, that these game elements did not initially have the desired positive effect on older people (41) and the implementation for older people involves diverse barriers and also opportunaties that need to be taken into account (42). Nevertheless, many companies and researchers see a great opportunity in making health-promoting interventions enjoyable and playful and many findings prove them right. Active Video Games achieved a variety of positive effects in

different studies such as increases in energy expenditure, oxygen consumption and heart rate (43). The effect sizes here correspond to those of traditional PA. The success of such games certainly also bases on the fact that they are mostly played at home and thus a whole lot of the reported barriers become irrelevant. This, once again, underlines the importance of SDT in this context. It must be taken into account, however, that most of these studies focused on children and adolescents, so a further examination of the general population is necessary. Further, interventions aiming at outdoor activities have achieved positive effects in the past. "Pokemon Go", which is extremely well received and cited by the media, has also been subject of much research. It can be stated that the game shows a higher number of days with moderate PA and walking within its users than non-users, regardless of age, gender and fitness status, but depending on the interest in the game (44). In this context, it can also be observed that special activities are also based on special motivations. “Pokemon Go” users stated that they participated largely for recreation, nostalgia and boredom (45). These motivations were rarely mentioned in general studies on sports activities. “Beat the Street", a community-wide gamification-based intervention for PA-promotion, also increased the activity of its users. This included moderate activity as well as light activity and walking, and continued to have an effect even two years after the end of the intervention. The implementation of such games can furthermore reduce the motorized traffic in specific areas while the game takes place (46, 47, 48). However, even in this study, it remains unclear which motivational components are key to subsequent behavioral change. It is not always necessary to install completely new game ideas to recognize what is essential for sustainable movement behavior. In a large-scale study with over 1.4 million users of the "MyFitnessPal" application, Gordon and his colleagues identified how people set their fitness goals and patterns of whether or not they achieve them (49). This enabled them to identify tendencies in setting goals (aiming low, U-shaped curve on ambition with age, women set more ambitious goals) as well as warning signs on missing these goals (initial weight loss patterns like “too much too fast”, no self-monitoring, no commitment to food-logging) (49).

Nonetheless, technologies do not always have to include a playful gaming factor. Activity tracking on a self-paced app was found to be effective in terms of PA (50). Overall, participants showed a great increase of daily steps during a 4-week program of self-pacing (51).

Among children and youth, interactive technologies that combine health education and PA in a video were found to enhance knowledge, attitude and practice towards PA. Due to its playful and easy format, classroom-based PA intervention like Brain Breaks® can easily be integrated into the school setting (52).

5. How to design an enjoyable game and get "WannaGos" going

Obviously, valuable conclusions can be drawn from the examples of these applications and technologies. Certain aspects must be considered when creating an intervention that follows the principles of gamification and triggers enjoyment among users: Concentration, challenge, skill, control, clear goals, feedback, immersion, learning and social interaction are key elements of an intervention (53, 54, 55). It is also advisable to create certain rewards as motivational factors. These could be rewards of glory (e.g. score system), sustenance (e.g. health packs, armors, invincibility), access (e.g. keys, unlocking power items) or facility (e.g. to improve in-game character skills) (56). Considering different target groups from various social and educational background, a low threshold and a good accessibility are necessities when designing interventions that are accessible for every individual.

These general considerations will be incorporated into the further planning of our project, as well as knowledge regarding barriers and motivators; both, those that are general and those that are specifically tailored to the respective context (e.g. workplace). In our case, the concept of enjoyment, based on SDT, will be of particular importance. This is of great importance to get "WannaGos" physically active and maintain the initiated PA for a longer period.

Citation:

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