The Potential of Gamification in Changing Consumer Behaviour Towards a More Sustainable Nutrition Behaviour

Introduction
Nutrition and physical exercise together form an integral part of a healthy lifestyle. The global increase of overweight and obesity is dramatic (Keats & Wiggins, 2014) and unhealthy nutrition behaviour is a main reason for health-related consequences (Dubowicz, Camerini, Ludolph, Amann, & Schulz, 2013). Beside health-related outcomes, nutrition also triggers the development of ecological, economic and social effects (von Koerber & Kretschmer, 2000). For example in Switzerland nutrition accounts for 30% of total environmental impact (Jungbluth, Nathani, Stucki, & Leuenberger, 2011). Therefore, effective measures are needed that sensitize consumer and change behaviour towards a sustainable nutrition behaviour to reduce environmental impact and promote health (Freibauer et al., 2011). Nutrition behaviour is influenced by biological, economic and psychological factors like self-regulatory skills (Gholami, Lange, Luszczynska, Knoll, & Schwarzer, 2013), lifestyle, trends (Asp, 1999) and knowledge (Worsley, 2002) depending on the individuals and their respective life-cycle stage (The European Food Information Council, 2003). Among these factors especially the social context is vitally important for individual nutrition behaviour (cf. Stratton & Bromley, 1999; von Koerber, Männle, & Leitzmann, 2012) as well as for the formation and retention of nutrition habits (Leonhäuser, Meier-Gräwe, Möser, Zander, & Köhler, 2009). To break habitual nutrition behaviour it is necessary to develop measures to promote the desired behaviour and to elicit behaviour change by taking social factors into account. Existing approaches, such as educational interventions might be too narrow and not tailored to the consumers’ motivational preconditions (Renkl, 1996; Keller, 2004). One approach to initiate change may be the concept of «gamification». Recently there has been a growing trend in marketing, which is predicted to continue using elements from games in various non-gaming contexts like marketing, training, education or health initiatives (Gartner, 2011; Anderson & Rainie, 2012) with different objectives (Kapp, 2012; Koch & Ott, 2012; Deterding, 2001; Tillström, 2012; Leigh, 2012). This development makes gamification a possible tool to shape behaviour by applying game components such as rewards and feedback about goal achievement or social status (Blöss, 2013). To achieve a behaviour change towards sustainable nutrition, a more sophisticated approach is needed that engages people and support individual capabilities and beliefs for motivating change and maintain the «new» sustainable nutrition behaviour.

Thus, the question arises, if gamification has the potential to change consumer behaviour towards more sustainable nutrition behaviour. The purpose of this conceptual paper is to explore the important constructs of behaviour change models and to present an approach needed to find out how especially social mechanisms used in gamification, have to be designed effectively in order to engage people and to promote sustainable nutrition behaviour.

Game components as drivers for behaviour change
The term gamification originated in the digital media industry and was first documented in 2008 (Deterding, Dixon, Khaled, & Nacke, 2011) and is defined as «the use of game design elements in non-game contexts» (Deterding et al., 2011, p. 10), a definition which is commonly accepted in this area of research and will be used in this paper. Key game components widely used are points, achievements to provide positive reinforcement for high-value user behaviours, levels, missions to create a set of behaviours for users to perform and to receive rewards and leaderboards to facilitate comparison with other users (Sridharan, Hrishikesh, & Raj, 2012). Based on self-determination theory gamification may lead to personal development and well-being as well as intrinsic motivation (Deci & Ryan, 1993; Ryan & Deci, 2000), which is a decisive prerequisite to cope with a task.
The increasing number of users of Nike+, foursquare, Starbucks or Zombies, Run! (e.g. Coombe, 2013; Online Business Degree, 2013; Ruffino, 2014; Cortizo, 2013) indicates that the use of game components works in different contexts in various ways, while the empirical examination of the effectiveness of such applications is often missing or have methodical shortcomings (Hamari, Koivisto, & Sarsa, 2014). Game components are based on concepts from social psychology and theories related to motivation and emotion. Areas of application relevant for the topic of the present paper are for example environmental and health psychology where interventions are developed to either changing individual preferences for behaviour or activate and/or encourage behavioural change (Mosler & Tobias, 2007).

In the area of health psychology, why people do or do not engage in specific behaviour is described by social-cognitive health behaviour change models such as HAPA (Health Action Process Approach; appendix 1) (Schwarzer, 2004). Mapping gamification to this model may help to understand the social mechanisms behind game elements better and, therefore, help to apply them more effectively to maintain and intensify certain behaviour (Mehta & Kass, 2012). HAPA is one prominent model in health behaviour change that overcomes the limitations of continuum and stage models like the TTM (Prochaska, DiClimente, & Norcross, 1992). It bridges the gap between intentions and behaviour by planning, which was found to mediate the intention-behaviour relation (Schwarzer, 2008). The model shares the basic constructs with other prominent health behaviour change models (see e.g. Abraham & Sheeran (2000) for an overview), like self-efficacy, outcome-expectancies, risk perception, goals and plans. Depending on the stage of the behaviour change process, different social-cognitive factors are prominent (cf. appendix I). Risk perception, outcome expectancies and task self-efficacy are relevant in the motivation phase, which can be seen as antecedents for intention formation. Maintenance self-efficacy planning (action planning and coping planning) and recovery self-efficacy are key constructs in the volition phase, where the intention has to be transformed into detailed instructions (action plans) of how to perform the desired action. In this phase also self-efficacy helps to re-establish the efforts needed for the accomplishment of self-imposed goals. In addition, perceived situational barriers and social influence, like social support, are considered, but have been only marginally researched. Initial results indicate that instrumental and emotional social support has a positive effect on the behavioural change process in the field of health care (Scholz, Ochsner, Hornung, & Knoll, 2013) which encourages the integration of social influence into the model applied in the area of nutrition. Social norms have up to now not been taken into account in the HAPA (Mullan, Wong, & O’Moore, 2010).

We assume that the integration of social norms is an important point in order to promote a comprehensive understanding for the effect of social factors on health and nutrition behaviour via gamification. As according to HAPA, behavioural change goes through different stages (Lippke & Ziegelmann, 2004). It is deemed sensible to investigate the effectiveness of social factors context-specifically to design stage-specific interventions, which have proven successful to promote health behaviour (Lippke, Schwarzer, Ziegelmann, Scholz, & Schüz, 2010). HAPA distinguishes between non-intenders (unmotivated persons), intenders (motivated persons, goal is set, have the intention to change) and actors (acting persons). It is postulated that planning is a successful intervention in the motivation stage, which means that individuals need support to formulate plans for certain behavioural conditions. This raises the question how social norms have to be considered when formulating a planning intervention for sustainable nutrition behaviour. To maintain the target behaviour it can also prove advantageous to visualize the gap between actual and target behaviour (e.g. Kuhl, 1983). Coping plans (Sniehotta, Scholz, & Schwarzer, 2006; Lippke & Wiedemann, 2007), the consciousness-raising of experiencing positive consequences (Fleig et al., 2010) or rewards (Schwarzer, 2004) can also help to stabilize behaviour and to prevent a relapse. Here the question arises how social norms respectively social comparisons can be applied to allow action control. Social norms and the comparison with others play a decisive role to the factor of social influ-
ence. Social norms can be described as systems of beliefs that are an expression of common expectations regarding typical and desirable activities within groups (Jonas & Stroebe, 2007) and can be used as method of social influence to promote socially desirable behaviour (Aronson, Wilson, & Akert, 2004; Klöckner, 2012; Thøgersen, 2006; Cialdini, Reno, & Kallgren, 1990). Injunctive norms specify what ought to be done and imply a punishment by the social group if behaviour is unacceptable. Descriptive norms describe what most other do and informs about how individuals behave in similar situations. Both types of norms can influence behaviour, but they differs depending on the direction and context (Cialdini et al., 1990). If social norms are presented for orienting, the effectiveness of social norms on behaviour depends on the reference group used for individual comparison and the formulation respectively (Yun & Silk, 2011) the perceived similarity of the reference group (Festinger, 1954) and the extent of social identity with the reference group (Tajfel, 1978). The greater the degree of similarity concerning dimensions like age, gender and attitudes the higher the degree of the adoption of certain actions like environmentally friendly behaviour (e.g. Goldstein, Cialdini, & Griskevicius, 2008).

To design an intervention (gamified nutritional programme) that promotes sustainable nutrition behaviour, it is important to understand how social norms (descriptive and injunctive) differ regarding their effectiveness and how the reference group has to be designed to achieve maximum effects. Studies have shown positive influence of descriptive norms on intention and behaviour (Rivis & Sheeran, 2003). With regard to nutrition the positive influence of descriptive norm information on fruit consumption, but not on intention was shown (Stok, de Ridder, de Vet, & de Wit, 2014). The use of injunctive norm information had little influence on behaviour and even negative effects on intention (Stok et al., 2014). Nevertheless, how different reference groups influence the effectiveness of descriptive and injunctive norms on nutritional issues remains unclear (Stok, de Ridder, de Vet, & de Wit, 2012). Yun & Silk (2011) could demonstrate that the effect of descriptive and injunctive norms on the intention to eat a healthy diet differs depending on the reference group selection, but investigating the influence of different reference groups in connection with norm-based information (injunctive/descriptive) in the specific context of sustainable nutrition behaviour experimentally and stage-specific is new and we consider this as a vital first step towards the development of a gamified nutritional programme.

Therefore we will elaborate on game components, which may help to promote and strengthen social influences and support as well as self-efficacy, respectively: goals, rewards, leaderboards and feedback. These game components are based on social mechanisms so it will be important to take one step back and investigate the effects behind these elements to be able to successfully integrate them in such a programme. We argue that these game components support the individuals’ motivation and self-efficacy beliefs particularly in the volition phase and we will explain how they could work in the following: When coping with difficult tasks a sense of achievement is important (Bandura, 2004) for the formation of self-efficacy expectancies. To be able to experience this, goals can help. When goals are set or chosen autonomously, intrinsic motivation is boosted (Sridharan et al., 2012). Goals keep the person moving forward from one achievement to the next by making an effort in incremental steps (Kapp, 2012). This also requires the development of a combination of skills and their execution. People who achieved their goals can be encouraged with rewards like points or badges (Michie, Abraham, Whittington, McAttee, & Gupta, 2009). Rewards indicate that the goal is achieved and have a motivational effect. But, to develop a motivation and to initiate a novel behaviour in the behaviour change process it is important that users believe that a favourable performance will also result in a desirable reward (Lawler, Porter, & Vroom, 2009). When using rewards, the interplay between intrinsic and extrinsic motivation has to be considered. The mere use of extrinsic incentives such as points fails to increase motivation in the long run as habituation effects undermine their effectiveness. However, if reward systems allow for control, autonomy or feedback, positive effects on intrinsic motivation occur such as flow experi-
ences (see Csikszentmihalyi, 2008). According to that, extrinsic incentives like rewards can be used to activate intrinsic motivation (e.g. striving for appreciation) as well as flow (Ryan & Deci, 2000). First experiments also show that gamification affects performance and intrinsic motivation (Mekler, Tuch, Brühlmann, & Opwis, 2013). As achievements (e.g., scores) can be made visible to other users, social comparison and competition can be fostered (Sridharan et al., 2012; Reeves & Read, 2009) keeping people interested and adhered to a task (Law, Kasirun, & Gan, 2011; Mehta & Kass, 2012). For instance, leaderboards visually display and track the performance, relative to others. It enables to compete with others by sharing and comparing their achievements, which motivates engagement and improves position. This competitive behaviour among peers as well as social interaction promotes self-efficacy by comparing skills with others and triggers positive effects with regard to social support, which helps to strengthen confidence, especially in the area of nutrition behaviour (Michie et al., 2009). Especially in the volition phase of HAPA social interaction and friendly competition with others who have recently acquired the same new behaviour can have an impact, because peers reinforce each other’s new behaviour and hold each other accountable (Mehta & Kass, 2012). By applying the game components mentioned above, people receive immediate feedback, either towards goal attainment or how they performed in comparison to others (e.g. regarding quantity and quality of food intake). Providing continuous feedback regarding the individual progress makes the individual aware of his or her positive achievements which makes the individual aware of his or her positive achievements and will lead to increased self-efficacy and motivation and can prompt the user for immediate action (Hägglund, 2012).

Thus, we assume that gamification may help people to build intentions as well as to promote specific behaviour by enhancing self-efficacy in terms of self-management and behavioural control and therefore positively affect the behavioural change process in the domain of sustainable nutrition.

Methodical approach
Practice applications suggest that applying gamification in the behaviour change process can be effective (e.g. Mehta & Kass, 2012; Webb, Joseph, Yardley, & Michie, 2010; Gbangha, 2013; Graml, Loock, Baeriswyl, & Staake, 2011). A recent literature review shows that the majority of the studies yielded positive effects of gamification on engagement, increased motivation and enjoyment (Hamari et al., 2014), but no study was found that examined gamification in the context of behaviour change and sustainable food behaviour. It is undisputed that especially social aspects have a great influence on individual diet (vgl. Stratton & Bromley, 1999; Brombach, 2011; von Koerber et al., 2012). The use of game-design elements and components in the context of sustainable nutrition behaviour may support individuals to cope with new tasks in the behaviour change process and maintain the behaviour, but scientific results on how these mechanisms of social influence have to be designed in the gamification context to change behaviour patterns are missing. Therefore, the goal of the planned studies is to examine the question of how social norms have to be tailored in such a way that positive effects on changing eating habits can be achieved. Other game elements applied (e.g. quests, badges) are not considered in this study. With regard to HAPA, we focus on the volitional phase (individuals, which are motivated to change nutrition by meeting the criteria of sustainable nutrition behaviour as well as early actors who practice sustainable nutrition behaviour quite recently) because gamification is especially suitable for establishing and maintaining a behaviour, but less appropriate to raise awareness and building intentions. To operationalize sustainable nutrition according to von Koerber & Kretschmer (2000) and to quantify target behaviour we are going to focus on certain principles of sustainable nutrition (suggested criteria: food should originate from organic farming, predominantly plant derived and be produced regionally and seasonally).

To answer the general research question of How social norms have to be designed (i.e. type of norm, reference group) to support individuals to convert their intentions to eat sustainable
into concrete behaviour and to maintain this behaviour? we are going to conduct three individual studies. In the first study, we are going to investigate the effectiveness of injunctive and descriptive norms to influence individuals who want to convert their intentions into concrete sustainable nutrition behaviour.

We make the proposition (P1) that descriptive norm information has a stronger effect on the implementation of the intention in concrete behaviour than injunctive norm information. How effectiveness differs according to different reference groups (proximal: age/gender, lifestyle; distal: unspecific group; cp. Yun & Silk; 2011; Stok, de Ridder, de Vet, & de Wit, 2012 when considering the extent of social identity) by translating intentions into sustainable nutrition behaviour, is subject of the second study. (P2: The higher the degree of similarity between individual and reference group and the higher the identification with the reference group the more effective the social norm).

In this study we want to check, which reference group is most effective by converting intentions into actual behaviour and to replicate the results from the first study regarding the social norm. We propose a 2 (social norm: injunctive vs. descriptive) x 3 (reference group: similarity regarding age/ gender vs. similarity regarding lifestyle orientation vs. unspecific reference group) between-group factorial design. A field test will examine if a simple intervention (based on and designed according to results from the previous studies) changes nutrition behaviour. P3: Participants receiving the social norm intervention will show stronger effects regarding sustainable nutrition behaviour. P4: The intervention based on social norms has a more positive effect on translating plans in concrete behaviour (transition from intender to actor) and on building target behaviour.

Discussion and Limitations

The planned studies form the basis for future studies to develop an effective gamified nutritional programme. In particular, the following aspects will have to be taken into account in our future research. First, prior participation, the participants have to classified with regard to their stage in the behaviour change process to consider phase specific effects on the constructs mentioned. As we argue that gamification is especially helpful to motivate consumers in the volition phase (e.g., to set goals, to monitor progress and goal achievement), in our study we will focus on participants who have already developed the intention to change their nutrition behaviour to a more sustainable one, so that «pre-intenders» will already be corrected for. Second, to exploit the expected motivating effects of social influence, the question arises which reference group will act as normative or comparative (cf., theory of social comparison processes, Festinger, 1954) and how this can best be operationalized within game components. Third, as we intend to investigate the effectiveness of gamification in a context as realistic as possible, we have to figure out the best medium (e.g., website, application for smartphone) for implementing our study. People who have a passion for gaming or individuals who grow up with the internet the use of smartphones and social media (i.e., digital natives) will probably respond differently to gamified interventions. This means that the attitude towards such gamified systems have to also be considered when investigating the effect of gamification on behaviour change. We also anticipate different effects according to lifestyle (nutrition habits) and socio demographics (age, income).

To conclude, gamification offers promising opportunities to change consumer behaviour and to foster a more sustainable life style, especially among the generation of consumers, the digital natives, who grew up in a digitized and gamified environment. In future, as gamification originated mainly from practical applications, its effectiveness has to be demonstrated with academic approaches and methods.
Appendix I – Health Action Process Approach (HAPA)

Source: Schwarzer (2011) with gamification added.
Bibliography


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