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Beyond Intrinsic Motivation: Why Researchers Should Consider the Full Motivation Continuum in Games for Health Research

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Abstract

Research within the domain of games for health has predominantly focused on individuals' intrinsic motivation characterized by an inherent enjoyment of the activity. Despite the apparent benefits of intrinsic motivation, we argue that it is imperative to adopt a more nuanced and refined perspective on motivation. Relying on the motivation continuum as outlined within Self-Determination Theory, research within this domain needs to distinguish between both intrinsic and extrinsic (i.e., external, introjected, identified, and integrated regulation) types of motivation. Researchers should, therefore, embrace instruments that assess a broader continuum of motivation rather than just intrinsic motivation alone. By doing so, future research can yield more insight into what fosters autonomous forms of motivation in the field of health-related games, including intrinsic but also identified and integrated regulation.

Keywords: Motivation, Self-Determination Theory, Games for Health, Exergames, Physical Therapy, Rehabilitation

Introduction

This perspective article aims to examine the limitations of solely measuring intrinsic motivation and explore the possibilities of incorporating a more comprehensive approach in games for health (G4H) research based on previously underexplored mini theories within Self-Determination Theory (SDT). The article includes a brief overview of SDT, a discussion of the existing literature and limitations, and considerations for future research within the field.

G4H and Exertion Games (exergames) have long been suggested as methods to encourage physical activity (1) and sustain motivation (2) in rehabilitation programs and physical therapy, where adherence is frequently low. (2–5) Many researchers have therefore investigated how technology-assisted interventions can foster patients' feelings of enjoyment and satisfaction while undergoing tedious (or even painful) exercises. (2,6) This has led to the emergence of novel uses of technology, including virtual reality (VR), and to new interdisciplinary fields composed of researchers from diverse domains who jointly seek to overcome the related challenges with low motivation in rehabilitation and physical therapy.(7) By doing so, researchers frequently rely on the SDT as an overarching theoretical framework when establishing game design requirements that seek to enhance user motivation, enjoyment, and effort. (1,2,6,8)

SDT is a broad macro-theory on human motivation, growth, and well-being,(9) which is (currently) comprised of six mini-theories that are continuously developed, expanded, and revised.(10) Regarding motivation, SDT seeks to explain why individuals decide to engage and exert effort in activities.(11,12) SDT is broadly utilized and applied in many diverse domains such as education, work, parenting, clinical practice, health behavior change, and Human-Computer Interaction (HCI).(1,4,5,9) Research on the benefits of G4H in physical therapy has largely emphasized the importance of intrinsic (versus extrinsic) motivation for health-related outcomes. (2,6,13) Intrinsic motivation refers to engaging in an activity for its inherent satisfaction and enjoyment, with SDT's first mini-theory entitled Cognitive

Evaluation Theory (CET) indeed outlining the benefits of intrinsic motivation. However, the second mini-theory, Organismic Integration Theory (OIT), provides a more refined perspective on motivation by distinguishing between different types of extrinsic motivation that fall along a continuum of increasing self-endorsement (see Fig. 1).(9,10,12,14) Although all types of extrinsic motivation involve engaging in an activity for instrumental reasons (i.e., that lie beyond the activity itself), these types differ in the degree to which individuals feel autonomous while engaging in the activity. First, *amotivation* refers to the state of lacking the intention to act, which is also viewed as the absence of motivation.(10–12) Subsequently, *external regulation* is apparent when individuals engage in certain activities to avoid threats and criticism or to obtain social approval or gain rewards (readers may notice that this is often erroneously applied as the overarching definition of extrinsic motivation).(9,10) Whereas *external regulation* is characterized by external pressure, *introjected regulation* is typified by pressure from within, such as avoiding feelings of shame and guilt or attaining self-esteem and pride.(10,11) A fuller form of self-endorsement is achieved when individuals pursue an activity because they find this personally relevant and thus display *identified regulation*. *Integrated regulation*, the extrinsic motivation type characterized by the highest level of self-endorsement or autonomous motivation (see Fig. 1), is apparent when engagement in the activity is perceived to be congruent with other important life values and interests an individual holds.(10,12,14)

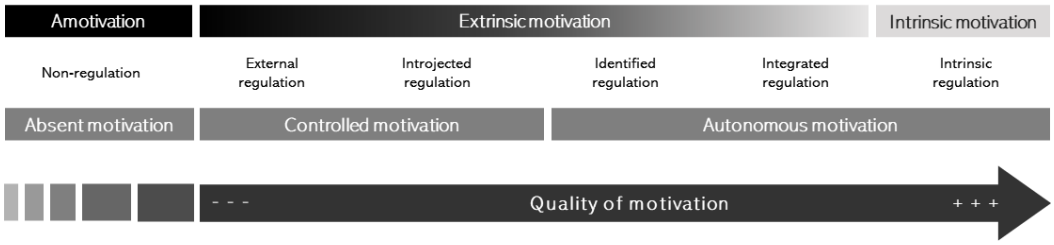

Figure 1: Graphical representation of the self-determination continuum based on the second mini-theory Organismic Integration Theory (OIT)'s taxonomy of regulatory types of motivation. Adapted from Ryan and Deci (2000).[11]

While SDT researchers are highly interested in the different types of motivation that regulate behavior, research within the field of G4H has mainly focused on the intrinsic properties of motivation (e.g., interest and enjoyment) based on the first SDT mini-theory, CET.(2,6,10) However, in the OIT mini-theory intrinsic motivation is only one of the three sub-types of autonomous motivation, which all indicate high levels of volition and choice. Researchers and clinicians investigating G4H and exergames will likely encounter patients who exhibit various regulatory types of motivation during an intervention. Additionally, multiple types of motivations may be present simultaneously throughout a single activity (see Supplementary Appendix SA1 for a more detailed overview of the different motivation types along with definitions and illustrative quotes). Indeed, research has consistently shown that all autonomous types are related to a higher quality performance and experience than controlling types of motivation.(11,15–17) For instance, Silva et al. demonstrated a direct relationship between autonomous motivation for exercise and increased physical activity,(18) Williams et al. found that autonomous motivation predicted medication adherence in adult outpatients,(19) and James et al. discovered that certain features of fitness technologies exhibited potential in promoting well-being outcomes, but only among participants who were more autonomously motivated. (20) To illustrate, while some individuals might indeed enjoy physical activity, it is likely that a substantial part of individuals in, for instance, rehabilitation programs engage in physical activity to sustain their health, comply with others' demands, or increase their self-esteem (all types of extrinsic motivation). Thus, solely focusing on intrinsic motivation within this domain provides an unnuanced perspective on motivation and may mislead

research on what fosters optimal motivation. This problem has previously been highlighted within HCI research by Tyack and Mekler, who identified several inconsistencies and misconceptions regarding how SDT concepts were interpreted in the field.(9) For instance, HCI research frequently conflates extrinsic motivation with external regulation.(9) Indeed, within G4H research, previous studies have posited that factors such as competition,(21,22) high scores and leaderboards,(23) and point scoring(24) can increase one's intrinsic motivation for physical activity. Yet, SDT's motivational framework would indicate that such factors are more likely to engender external (e.g., wanting to be better than others) or introjected (e.g., engaging in physical activity to maintain one's self-esteem) motivation.(25)

The limitations of only measuring intrinsic motivation

The most frequently used method to measure motivation in G4H research is through self-reported questionnaires,(6) and one of the most popular instruments is the intrinsic motivation inventory (IMI).(2) Indeed, the IMI has been broadly utilized to measure intrinsic motivation, for instance, in VR-based physical activities for nursing home residents,(26) in VR training for older adults,(27) the impact of specific game mechanics in a home-based virtual rehabilitation system for stroke survivors,(13) in VR-based high-intensity interval training for pulmonary rehabilitation for older adults,(28) and investigating the modulatory effect of single- and social exergames in young adults.(29) However, when the IMI is applied in studies that evaluate, for instance, G4H in the fields of physical therapy and rehabilitation, it poses a distinctive problem. Patients often do not experience feelings of interest or enjoyment from the therapy itself, which is evident from the frequently described low patient adherence.(3,4,13,28) By relying on the IMI to assess the participants' motivation, researchers may incidentally lose valuable insights into how the game interaction may be influenced by the other types of autonomous (and controlled) motivation. Arguably, the attitude towards a game is different among participants who are introduced to them in a rehabilitation context, for instance, during hospital admission. In such a scenario, instilling a sense of volition and enjoyment in otherwise repetitive exercises can likely lead to a positive shift in the quality of motivation. However, such a shift would not necessarily be detectable using an instrument that only focuses on intrinsic motivation. By adopting a more refined and comprehensive perspective on motivation through considering the full motivation continuum, researchers will likely gain a more profound understanding of the multidimensionality of the participants' motivational alignment. Therefore, we encourage researchers to simultaneously use other SDT instruments that measure the different types of motivation (amotivation, external, introjected, identified, and intrinsic motivation) in future research. Such instruments could be used repeatedly during an intervention involving prolonged use of G4H to detect potential changes in motivational quality. Several instruments based on the OIT mini-theory exist, but to mention a few that addresses OIT in the context of technology use, there is the User Motivation Inventory(30) and the Gaming Motivation Scale.(31) By using such scales instead of (or in addition to) the IMI, we believe that researchers will most likely reach a better understanding of why participants chose to engage, and make an effort, in therapeutic situations to enhance their physical activity.

Emerging questions in G4H research

Due to the current emphasis on intrinsic motivation in most studies, there is a dearth of research on the impact of technology use on the different types of motivation. Therefore, it is crucial for research to employ more comprehensive methods of measuring motivation to assess both the quantity and quality of motivation.(15) In interventions that introduces an exergame to solve the challenges of low adherence, the OIT mini theory is potentially a valuable approach to explore the transitional process in which motivation might evolve from controlled forms of motivation towards autonomous forms of

motivation. To achieve this, researchers will need to adopt more nuanced measures of motivation to determine the quality of motivation and possible changes herein.

Therefore, researchers will also need to consider alternative research questions that explores the quality of motivation. For instance: *How do exergames/games for health affect the quality of motivation in rehabilitation?* And changes in motivation over time, a research question could be: *How is the quality of motivation affected over time (by using exergames/games for health)?* And specifically, in relation to the potential of using OIT to understand the nuances of motivation in exergames and virtual rehabilitation in general, further research is needed to clarify its applicability and potentials. A possible research question could be: *(How) can Organismic Integration Theory (OIT) be applied to better understand user effort and motivation in therapeutic situations?*

Conclusion

With G4H technologies rapidly advancing and propagating, fast assessment of intrinsic motivation is often prioritized in the evaluation process. However, if only intrinsic motivation is an indicator of system fidelity, G4H may be easily discarded for the wrong reasons. It is crucial to recognize that other forms of autonomous motivation are equally vital in promoting long-term engagement in physical activity and therapy, especially once the initial novelty effect wears off, other types of autonomous motivation may persist. Although intrinsic motivation is indeed a sustainable and self-rewarding form of motivation, both extrinsic and intrinsic types of motivation are influential factors in an individual's self-regulation that ultimately drives human behavior. Thus, researchers should embrace instruments encompassing the wider continuum of motivation rather than just intrinsic motivation alone.

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Authors' Contributions

Emil R. Høeg: Conceptualization, Methodology, Visualization, Resources, Writing – Original Draft, Writing – Review & Editing, Project administration **Jolene Van der Kaap-Deeder:** Conceptualization, Methodology, Writing – Review & Editing

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