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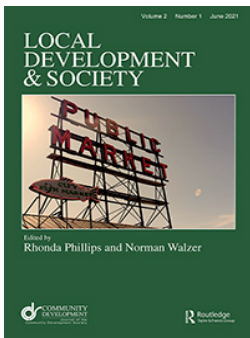
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Using gamification in development interventions: Evidence from a multidimensional poverty alleviation initiative in rural Paraguay

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ABSTRACT

Interventions focusing on behaviors and overcoming behavioral barriers have recently gained prominence in the global effort to overcome multidimensional poverty. This paper presents an innovative approach to addressing some poverty dimensions using the gamification technique, which aims at improving the wellbeing of impoverished rural communities and at empowerment of its members. Based on the iterative gamification experiments conducted in rural areas of Paraguay, we develop a gamification-based framework for the gamification-enabled intervention process and discuss the context in which this approach can be best applied, such as where the primary barrier to change is psychological reasons rather than a lack of resources.

Introduction

The *elimination of poverty in all its forms* is a stated objective of the international community, captured in the first Sustainable Development Goal. However, the dynamics of the progress show that the goal might not be achieved, as even before the Covid-19 pandemic, the rate of decrease in the number of extremely poor people slowed down to a pace at which the goal is unlikely to be met by 2030 (UNDP & OPHI, 2020). The global pandemic has pushed that goal even further out of reach. The trends are similar for a multidimensional perspective on poverty, as measured by the Global Multidimensional Poverty Index (MPI). Before the pandemic, only about half of the countries included in the MPI database were on track to halve their levels of poverty by 2030. Simulations suggest that the pandemic set the countries back by three to 10 years (United Nations, 2020).

Thus, the question of how to enable everyone to lead a life out of poverty is as relevant as ever. What seems likely given the stubborn persistence of poverty is that new strategies are required to reach the ambitious goal of global poverty elimination; even more so as our understanding of what it means to be poor is expanding supported by different theories that address wide-ranging sources of poverty. Consensus has been formed

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around the idea that *poverty in all its forms* is fundamentally multidimensional, and thus, approaches to addressing and assessing different dimensions of poverty should effectively vary (Alkire et al., 2015; Stiglitz et al., 2009).

This paper suggests an alternative perspective on addressing some of the dimensions of poverty, namely, health and living conditions. It presents an approach that uses the gamification technique to initiate a behavioral change in rural communities so as to mobilize available resources and achieve improvements in living conditions. The proposed intervention is based on the assumption that poverty is not always a result of a lack of material resources (Alkire et al., 2015). Therefore, improvements can be achieved without additional resources, but rather through the mobilization of available ones (Majee & Anakwe, 2020).

Gamification has been widely researched as an approach to generate behavioral change in various areas (Hamari et al., 2014), for example, to promote sustainable behavior (Froehlich, 2014). For this reason, it is considered a suitable technique in the focus area of this study. This paper presents a new context for applying this technique, investigates the effect of a gamification approach on impoverished and vulnerable rural communities in Paraguay, and explores the conditions for using it to alleviate multidimensional poverty. This paper proposes a framework for addressing experiences of poverty where constraints consist primarily of psychological barriers.

The rest of the paper is structured as follows. The remainder of the introduction reviews the links between mental processes, behaviors, and poverty, arguing that behavior-focused strategies can indeed have an impact on poverty. Then, the paper provides an overview of gamification as a trigger for behavioral change. Subsequently, the paper discusses the methodological approach and the context of the study. This is followed by the analysis of the results, the discussion of findings and the development of the conceptual framework, and the conclusions.

Theoretical framing

Behavior, mind, and poverty

In recent years, the connections between mental processes, behaviors, and poverty have become clearer, as have the potential contributions of behavioral sciences in poverty elimination efforts. A growing body of research points toward a circular relationship between poverty and certain behaviors, exploring mediating factors and neurological processes responsible for the emerging links (Bryan et al., 2017; Mullainathan & Shafir, 2013). Crucially, this new literature does not assume that poverty is the result of poor character or bad behavioral choices or that people experiencing poverty only have themselves to blame for their situation – a historically prominent idea in the poverty discourse (Watkins-Hayes & Kovalsky, 2016). Instead, this body of interdisciplinary research analyzes the root causes of behaviors that are associated with poverty, understanding them as both the cause and the consequence of material or other deprivations (Bernheim et al., 2015; Bertrand et al., 2004). Unfavorable structural or environmental factors and unfavorable behaviors come to be seen as intrinsically linked and can become poverty traps, keeping individuals stuck within the same vicious cycle. From a policy and project design perspective, this research is interesting because it suggests that certain

unfavorable behaviors can be discouraged (and certain favorable behaviors can be encouraged), thus helping those experiencing poverty overcome barriers and escape their poverty trap.

An implication of this new way of thinking is that improvements in wellbeing can be achieved by addressing mental or behavioral aspects of the problem, rather than following a more traditional approach of simply providing resources. In particular, the close relationship between aspirations and well-being has been widely researched and documented (Appadurai, 2004; Dalton et al., 2016; Genicot & Ray, 2017; Hong et al., 2020; Ray, 2006). Similarly, different researchers explore how systematic psychological tendencies arising from scarcity or from the decreased mental bandwidth cause people to adopt behaviors that effectively keep them in the poverty trap (Bryan et al., 2017; Mullainathan & Shafir, 2013). This shows that programs and policies can and should be designed in a way that directly or indirectly helps those experiencing poverty to address these tendencies, for instance, by nudging them toward certain behaviors (World Bank, 2014).

At this point, it is worth noting that there is no broadly accepted definition of what "multidimensional poverty" exactly means or which dimensions and/or deprivations form part of the phenomenon. It is beyond the scope of this paper to review these definitions; we simply define multidimensional poverty as encompassing the multiple disadvantages that people are exposed to (Alkire et al., 2015). While the literature on behavior, mind, and poverty in its majority adopts a monetary definition of poverty, there is little reason to believe that the experience of scarcity and disadvantage arising from other dimensions of well-being would have different effects. In fact, the groundbreaking work of Mullainathan and Shafir (2013) explicitly explores experiences of scarcity in a wide range of contexts and argues that its effects on mind and behavior are basically domain-independent. Further research in this area provides examples of the effects of discrimination on aspirations stressing the income-independent pathways through which poverty can be self-perpetuating (Spencer et al., 2016). We therefore propose that deprivations in the poverty dimensions explored in this paper (health and living conditions) can equally be addressed through interventions focusing on mental or behavioral aspects, as the relevant mechanisms are similar: a general experience of scarcity, feelings of inadequacy, adaptive preferences, or similar mental barriers prevent people from forming aspirations to improve their situation, which results in the failure to adopt behaviors that would help to improve the underlying condition.

In conclusion, mounting evidence suggests that interventions that encourage behavioral changes can have the potential to support those experiencing poverty on their pathway to overcome their deprivations. The question thus becomes how such behavioral changes might be most effectively initiated.

Gamification as a trigger for behavioral change

Our proposed approach to poverty alleviation employs a relatively new technique, gamification, with limited existing applications in the specific field. Gamification refers to the use of game elements in a non-gaming environment (Deterding et al., 2011) and has already attracted considerable attention in different areas as a technique that can drive engagement (Robson et al., 2016) and influence the behavior of the users of a gamified system (Landers, 2014). In particular, it has been successfully applied to

encourage more sustainable or pro-environmental behavior (Spanellis & Harviainen, 2021). For instance, Opower designed a gamified personalized reporting to engage customers in demand response programs, leading to a 2% reduction of energy consumption (Robson et al., 2015). The behavioral change was achieved through a gamified eco-feedback loop and descriptive social norms, i.e. comparison with neighbors.

Gamification emphasizes playfulness in the system's design (Deterding et al., 2011), changing the perception of an incentive or a service (Froehlich, 2014). At its heart is a process which initiates behavioral change through game elements – gamification affordances that lead to psychological outcomes and result in behavioral outcomes (Hamari et al., 2014). Gamification design enables psychological change by drawing from different principles and techniques in behavioral psychology. Some of the most commonly used and powerful techniques include comparison, incentives and rewards, goal setting, and feedback (Allcott & Mullainathan, 2010). In particular, feedback can provide a basis for social comparison or self-comparison against set goals and is often used in aspiration-centered intervention programs (Dalton et al., 2016). Gamified rewards can help to decouple the goals from material gains or reduce motivation in them by emphasizing fun and playfulness, which in turn reduces coercive behavior, for example, trying to play the system (Froehlich, 2014).

What distinguishes gamification from other persuasive techniques is its playful design, which makes the users perceive an action as fun and entertaining, and thus creates positive connection with the action. In such a playful environment, social comparison and contests create a friendly competitive dynamic. Competition is not always deliberately embedded in the design, but the playful visualization provides an environment for informal friendly competitions to emerge (Kurani et al., 2010; Spanellis et al., 2021).

The dynamic of team-based gamification initiatives might be more complex than just competition between the participants. When teams compete with each other, this creates opportunities for participants to cooperate at the team level (Robson et al., 2016). Such design acknowledges that winning is not the only motive and creates a wider spectrum for participation. It provides conditions for the participants to freely share their knowledge and openly work together, which proved to lead to higher overall community performance (2011). As is shown in the findings section, such dynamics between the participants were also essential for the success of the studied initiative.

Furthermore, gamification empowers users by offering support and encouragement toward a shared behavioral goal (Froehlich, 2014). Goalsetting combined with the pathways to achieve these goals, such as a contest, can give the users new meaning and a sense of purpose for engaging in the initiative and exhibiting a desired behavior. Clear milestones with goals can also help to create a perception that the ultimate goal is achievable. This aspect of gamified systems is particularly useful in healthcare and is what practitioners believe to be so attractive in games for gamers (McGonigal, 2015).

Examples of using gamification for addressing issues in impoverished rural areas of developing countries are scarce. Part of the reason might be that the majority of gamification applications are embedded in information technology. However, "analogue" examples can also be found, particularly suitable for rural environments (Spanellis et al., 2021), and the analogue nature of their implementation makes gamification equivalently powerful. For instance, a board game that was developed for water management among smallholder farmers in rural areas of China promoted collaborative behavior between the farmers, who

are driven by their personal goals, but rely on shared water resources (Kocher et al., 2019). Therefore, we believe that gamification can be a powerful way to address some of the dimensions of poverty that require the change of perception as much as additional resources to achieve the change. In this study, among others, we explore the causal channel through which the gamification intervention might impact the wellbeing of the participants as well as lead to poverty alleviation in some of the poverty dimensions.

Methodology

Research approach

This study adopts an action research approach, which offers a flexible spiral process and advances the theory through an action (for example, an improvement), the results of which can then be examined so as to understand the process of change (Dick, 2002). This approach was considered suitable for the purpose of this study, because it can be applied to exploring a complex phenomenon through iterations, where individual parts cannot be decoupled and tested in controlled environment (Eden & Huxham, 1996). The setting of this study can be characterized as the context for complex theory testing, such as multi-dimensional poverty and approaches to its alleviation. Furthermore, action research that is focused on institutional development can also be used for social change (Chisholm, 1998; Eden & Huxham, 2006). Its distinguishing feature is the involvement of researchers with the community members over matters of genuine concern to the latter and an intent to take an action together (Eden & Huxham, 2006). This approach was considered appropriate, as it allowed for testing of an emergent theory in the environment that was not conducive for a controlled experiment.

The notion of action research was first outlined by Lewin (1946), who described it as a combination of studies of general laws and diagnostics of a specific situation through the cycle of action and reflection. The inferences about the behavior are more likely to be valid and enactable when participants make free and informed choices and have internal commitment (Argyris & Schön, 1989). This approach overlaps with a broader notion of citizen participation, e.g. in community action programs (Arnstein, 1969). Citizen partici-pation can be fulfilled on different levels from the lowest level of manipulation to the highest level of citizen control. Similarly, action research can vary in the degree of involvement of the participants in the construction of the research. In this study, the engagement with the communities was conducted at the consultation level, whereby iterative cycles of consultation and refinement allowed the team to improve the inter-vention. In action research interventions, the action happens through an iterative cycle (Eden & Huxham, 2006); however, each intervention has to be slightly different, reflecting the changes in the context:

(1) Theory exploration and development. This study drew on the theory of multidimen-sional poverty and psychological barriers to alleviation of certain aspects of it.
(2) Application of emergent theory. This study then proposed to use the theory of positive influence and gamification as a medium to enact this theory as a novel approach to addressing the identified psychological barriers and ultimately leading to a behavioral change in the participants.

(3) Action-focused intervention. This phase included the application of the developed gamification intervention in several iterative cycles with subsequent methodological reflections on the results of each cycle.

(4) Methodological reflection. This phase follows each cycle of iteration of the intervention with subsequent changes to the intervention for the next cycle.

Action research draws on the methods of phenomenology. The methods in use include observations, interviews, field notes and document analysis (Mctaggart, 1991). The use of different methods allows for triangulation, but the triangulation gains new meaning in the context of action research. The data are not expected to necessarily agree. Rather, variations in interpretation open multiple perspectives on the studied phenomenon (Eden & Huxham, 2006).

The methods used for **data collection** in this study included observations, interviews with the participants, field notes and routinely collected administrative data. Regarding **data analysis**, the transcripts of interviews and field notes capturing observations were analyzed using content analysis in search for common themes and patterns. The numerical results were analyzed using descriptive statistics.

Context of the study

The study was conducted in Paraguay, where a gamified approach to poverty alleviation was successfully tested and deployed in rural areas.

Paraguay is a middle-income country which has a Human Development Index of 0.724, ranked 98 of 189 nations (UNDP, 2019). In recent years, Paraguay's economy has been among the fastest growing economies in South America with an average annual growth rate of 4%. However, this growth has not necessarily trickled down to benefit everyone. 24.2% of the total population and 34.6% of the rural population still live below the poverty line (DGEEC, 2019). Women in particular are more likely to be in (monetary) poverty than men (Serafini, 2019).

As anywhere in the world, poverty in Paraguay is multidimensional, meaning that people experience more than one type of deprivation (such as lack of employment, education, health/water/sanitation, among others). Based on a multidimensional poverty index proposed by Ervin et al. (2018), 17% of the population is estimated to be multidimensionally poor, and this level is four times higher in rural areas than in urban areas.

One NGO addressing multidimensionality poverty in Paraguay is Fundación Paraguaya (FP). FP started as a microfinance institution providing loans and business training to microentrepreneurs. However, when it became apparent that providing microloans was not enough to elevate clients out of poverty, the Poverty Stoplight program was launched in 2010 (Burt, 2019). The program seeks to activate the potential of individuals to eliminate their own poverty. Its self-evaluation survey that measures multidimensional poverty across 50 indicators shows that people experience different deprivations and combinations thereof (Burt, 2019) and that families that are above the monetary poverty line can experience other forms of deprivation. This further supports the argument that the strategies for combating poverty require a holistic approach.

This study was conducted among FP's woman village banking clients, who belong to the most vulnerable communities in the country. These clients fall into the country's poorest income quintile, with around 30% living below the monetary poverty line. 17.7% of the clients have not completed primary school (compared to the national average of 10.9%) and about a third of clients cannot read and write well (MFR, 2018). About two-thirds of these clients are self-employed (typically in informal microenterprises).

Using the results of the Poverty Stoplight survey, participants co-developed solution strategies by defining priorities and steps to achieve personal goals (Burt, 2019). This study focuses on some of the indicators that were improved through a participatory intervention that took the form of a gamified competition. The next section provides an overview of the intervention design and discusses the results achieved.

Results: Competition as an intervention to address poverty issues

Competition procedures

The pilot studies focused on the multidimensional poverty dimensions of health and living conditions, tackling inadequate bathrooms and kitchens. Inadequate bathrooms can pose a health risk. According to Fundación Paraguaya's definition, they lack a water cistern and proper evacuation system, are shared or are pit latrines, common in rural Paraguay. Inadequate kitchens do not have a stove above the ground, use wood, dung, or charcoal, or are insufficiently ventilated. For instance, many poor families in Paraguay cook on small wood- or charcoal-fired stoves, often outside, which can pose health and safety risks.

Fundación Paraguaya uses the theory of positive influence (Bandura, 1997; Grenny et al., 2013), drawing from positive psychology that has already been highlighted in the community development literature as necessary for consideration. This framework guides interventions to improve the state of bathrooms or kitchens. According to this framework people will change their behaviors in positive ways if the goals are desirable (motivation) and achievable (skills) for the participants. Additionally, each of these two dimensions can be influenced on the personal, group and structural level. The six sources of positive influence are summarized in Table 1. Competitions were perceived as a suitable form of engagement based on this theory and the prior experience of Fundación Paraguaya: The NGO had witnessed the motivational potential of competitions in its Youth Entrepreneurial Education programs and experimented with the use of the six sources of positive influence to address multidimensional deprivations, so that the use of prizes and awards as structural motivators seemed like a promising new approach. It is important to note that this does not imply that reasons for and solutions to poverty are located exclusively at the individual behavioral levels; however, behavioral change is the aspect that this intervention aims at initiating.

Table 1. Six sources of positive influence (adapted from Grenny et al., 2013).

	Motivation	Skill
Personal	Doing what is not (per se) fun	Surpassing personal limitations
Group	Peer pressure	Group support
Structural	Incentives, prices, awards	Physical changes in the environment

It is possible to identify multiple connections between gamification and the theory of positive influence. For instance, gamification can emphasize social context for the participants (Spanellis & Pyrko, 2021), which can create social pressure and lead to psychological outcomes. Competitions can be a form of structural motivations: incentives, prices, and awards help to nudge or reinforce specific desired behavior (Werbach & Hunter, 2012). Additionally, they can also informally create support on a group level through peer pressure and peer support, if winning the competition requires group work and collaboration (Kumar & Herger, 2013; Witt et al., 2011), which can lead to the desired behavioral outcomes.

In 2014, the concept was piloted through a competition among the microfinance clients participating in the Poverty Stoplight program called "My bathroom, my kitchen, my pride", designed to address the problem of inadequate bathrooms or kitchens. The competition was conducted at the loan-committee level. Micro-finance loan committees consisting of 12 to 25 women each competed against each other, by helping one of their members who had an inadequate bathroom or kitchen, to remodel it. The committees did not receive any outside help or grants for these upgrades but rather worked internally to mobilize resources and co-ordinate the work. "Before" and "after" photos were taken of the bathroom or kitchen, respectively, and were then uploaded to Facebook for public voting to determine the winner in each category. The winning committee received cash prices.

Since the pilot study, the design of the competitions underwent several iterations, which were co-created with the participants. The changes in design including the gamification components in each cycle are presented in Table 2.

Competition outcomes

The progress of the competitions was monitored regularly through the loan officers (*asesoras*) in the context of regular loan committee gatherings. At the end of each competition, Fundación Paraguaya conducted phone interviews with each committee to assess various aspects of the competition. This included activities carried out to complete the task at hand, the costs incurred, whether these costs were above/below/as expected, the resources used, and the parties involved. Additionally, Fundación Paraguaya gathered feedback from the loan officers.

The main measure of success of the competition is the number of families who have completed the challenge, which indicates how many families elevated themselves from deprivation in a particular poverty indicator. In the "My kitchen, my bathroom, my pride" competition, the number of participating families increased each year, as shown in Figure 1. The number of participating families increased 6.3 times since the pilot competition. The number of families completing the competition increased both in absolute (7.2 times) and relative (34% of the participating families) numbers. The participants were considered to have completed the competition, if they had submitted an "after" photo as evidence of the achieved improvements.

Apart from the increased outreach and improvements in the targeted poverty indicators, these competitions also contributed to the overall development of the participating communities. A competitive dynamic helped to change the perception of what is a "norm", for example, what a normal bathroom should be like. To reach a new norm,

Table 2. Iterations in the design of the "My bathroom, my kitchen, my pride" competition.

Year	Gamified competition design	Participant feedback
2014	The competition is organized as coopetition: each team cooperates to help the candidate win, while teams compete with each other. The winner is determined by voting with likes for "before-after" pictures on Facebook. The winning team receives a cash prize. Social recognition as another form of reward: the winners were announced and received their prizes at large events or local celebrations	Participants voiced frustration that those with most Facebook friends were most likely to win, regardless of the changes implemented
2015–2016	A two-step model was implemented to determine the winner: 1. Pre-selection of finalists based on: a. Level of participation of whole committee in the process b. Initial level of poverty ("red" or "yellow" in Stoplight indicator) c. Visual assessment of the before/after comparison 2. before/after photos are uploaded for voting The cash prize was increased	The amount of Facebook friends still influenced the results
2017	The voting was moved to a special digital voting platform. An element of chance was added: giveaways and/or cash prizes are raffled off among committees who completed the challenge	

the participants had to find creative ways to gather resources for the necessary improvement. The participants engaged in new micro-entrepreneurial activities to fund their quest (for example, baking bread for a Sunday fair), asked for help from local tradesmen and looked for alternative ways to acquire necessary resources, which also provided micro-boosts to the local economy. Most importantly, achieving the end goal of the competition increased their self-esteem and helped them to gain confidence and sense of control over their lives.

> Once one has made the plan, it can be done! You can do it. We did it, we made it. Eva Da Silva, 2014

> Thanks to Fundación Paraguaya and my Committee for this help, for the push they gave me to be able to have the decent bathroom I have now. Adolfina Saldívar, 2016

The key elements that helped these competitions to be so successful are a team-based structure of the competitions, the voting mechanics to determine the winner, clear goals and winning states (for example, getting up-voted the most) and a combination of different types of rewards (monetary and status rewards). The team-based structure, where a team was responsible for achieving the goal by one member of the team, helped to create cooperation within the team and encourage the team through
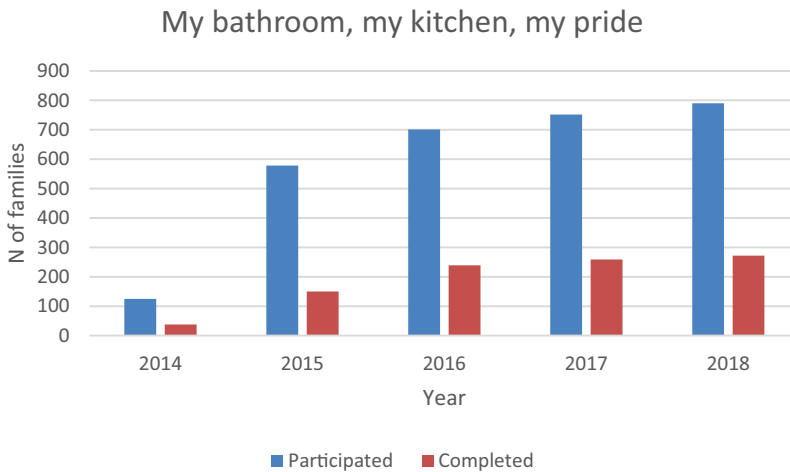
My bathroom, my kitchen, my pride

Figure 1. Results of the 'My kitchen, my bathroom, my pride' competition.

competition between the teams. Voting by non-participants helped to engage more people in different capacities in the competition, while a variety of rewards appealed to people with different drives. Additionally, the mechanics of chance and surprise were added by randomly allocating some of the rewards, deepening the participant engagement further.

Discussion

As several rounds of competitions demonstrated, gamification elements helped to create an intervention that led to a behavioral adaption that is making an effort to improve a kitchen or bathroom. This resulted in a change in a physical environment, i.e. an improved kitchen or bathroom. Reportedly, some participants also experienced psychological improvements, for example, feeling of confidence and higher self-esteem, the sense of pride and empowerment from being able to complete a seemingly difficult task and from peer recognition for such accomplishments. Thus, believing in oneself can improve psychological wellbeing, empowerment, and have a broader range of positive outcomes, for example, being able to improve one's own wellbeing along other poverty dimensions. This early evidence opens a new avenue for future research, to confirm these observations. Specifically, a study focused on the psychological aspects of such interventions would also need to examine the impact of competitions on those who were not able to complete them. This will contribute to the existing literature that suggests that the link between social participation and health in vulnerable communities is complex and non-linear (Satariano, 2021) and unsuccessful completion of projects might have a negative effect on perception and self-efficacy (Markantoni et al., 2019).

The cases demonstrated how gamification elements can enable some of the sources of positive influence, i.e. group (through competing teams) and structural (through a clear goal and winning states, voting and various rewards) influence, and group skill support (through peer support within competing teams). Group influences enabled through

formalized teams create peer pressure and support that help the key participants to achieve the desired outcome. These findings support evidence of the influence of groups on not only access to various forms of resources (Othman et al., 2020) but also the feeling of empowerment (Othman et al., 2021). Structural influences outline the pathway to the desired result through clear goals, winning states and the rules for determining them. Group skill support enabled through the dynamics of intra-team collaboration and inter-team competition for the win, provide the teams with reasons to give support in achieving a specific goal and find creative solutions to make it possible. All these influences affected motivation to adapt and adopt a new behavior, which led to the changes in the physical environment.

The impact of gamification elements is captured in a theoretical framework describing the intervention process in Figure 2. Table 3 provides a more detailed account of the specific elements of the initiative that correspond to each element of the framework.

The resulting framework is aligned with the conceptual framework of gamification described in the literature review (Hamari et al., 2014), which supports the external validity of the model. The alignment is evident in the first part of the framework, where gamification elements enable psychological outcomes (motivation-targeted intervention), leading
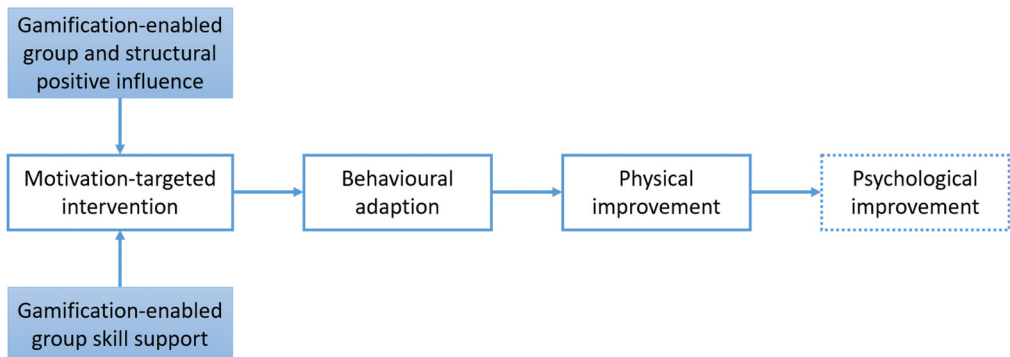

Figure 2. A framework of gamified intervention process.

Table 3. Elements of the initiative reflecting elements of the framework.

Elements of the framework	Corresponding elements of the gamified initiative
Gamification-enabled group and structural positive influence	Group: competing teams Structural: a contest with a clear goal and winning states, nation-wide voting to determine a winner, material and status rewards including elements of chance and surprise
Gamification-enabled group skill support	peer support within competing teams to achieve team goals
Motivation-targeted intervention	Participants have a new reason to make the necessary improvements. The activity is given a new meaning
Behavioral adaption	Participants engage in various activities to achieve the desired outcome, i.e. inquiring about the costs, finding creative ways to pull resources from friends and family, calling for help to complete the task
Physical improvement	The targeted indicator is improved (for example, an elevated kitchen or a tiled bathroom)
Psychological improvement	Reported feeling of improved self-esteem and sense of pride for being able to achieve the goal and having a visible improvement in the surrounding environment

to behavioral outcomes (behavioral adaption). This framework demonstrates how the conceptual gamification framework can be extended in a particular context, suggesting that the gamification intervention ultimately leads to physical improvement and possibly to psychological improvements. Further testing of the proposed framework in other contexts is required to further evaluate its validity.

The results of the competition thus suggest that the gamification approach might be useful in a wide range of contexts. Gamification is typically used as a trigger for behavioral change. However, the lack of a modern bathroom is not commonly considered a behavioral problem, but rather an issue related to the lack of resources. The present analysis reveals that gamification does have the potential to alleviate these types of deprivations, thus supporting the growing body of the literature that documents the manifold links between behaviors and poverty (Bertrand et al., 2004; Bryan et al., 2017; World Bank, 2014).

Furthermore, the results of the intervention illustrated that such interventions can also catalyze micro-entrepreneurial activities to mobilize community resources and achieve the goal. This early evidence calls for further research in the link between behavioral interventions and rural wealth creation (Rahe & Hause, 2020).

The presented type of intervention has natural limitations as to the context in which it can be applied. Since the intervention targets internal factors, such as motivation, which can help mobilize available resources, the proposed intervention is likely to be effective in addressing those dimensions for which available resources are sufficient. If a poverty dimension requires a country-level structural change, such as a change in policy, applying a gamified approach might not be meaningful. However, in the contexts where physical resources to improve specific indicators are available, and it is the psychological barriers that prevent the rural community members from mobilizing these resources, gamification elements act as enablers of lowering these barriers. For example, when trying to address the education dimension, such minimum required physical resources would be a local school. Therefore, this study suggests that gamification can be used as a complementary approach to other approaches addressing poverty dimensions, rather than a substitute.

Conclusions and further research recommendations

This work adopts a multidimensional view of poverty and aims to address some poverty dimensions using an innovative approach based on the gamification technique, which ultimately aims at improving the wellbeing of impoverished rural communities. The technique was applied in a multidimensional poverty alleviation initiative in Paraguay with good levels of success, effectively managing to trigger behavioral changes through enabling some of the sources of positive influence that led to physical improvements linked to poverty alleviation. Thus, it can be concluded that gamification is a promising technique for reducing multidimensional poverty.

Based on the analysis of the case study initiatives, a gamification-supported framework was developed. The framework can serve as a blueprint for supporting the journey through the different phases of a poverty alleviation intervention process. This framework is most suitable for cases where the key resources required for the intervention exist and it is rather internal factors, such as motivation or established social norms that prevent these interventions from happening organically.

The proposed approach, captured in the developed framework, can potentially find application in other contexts. For example, it could support farmers facing difficulties putting new knowledge obtained through extension services in practice, such as new production methods. The adoption could be incentivized with similar gamified contests, where farmers form informal groups of support and help each other. The gamification approach can potentially also be used to support community building and joint decision-making for the mutual benefit, as in the cases of managing shared resources such as land or water.

The associated challenge of this approach is to increase the proportion of competition entrants who actually finish the competition, as it is evident from the examples of the presented interventions. Further research is required to understand the potential (negative) implications for those who did not complete the projects.

The results of this study also have policy implications. They suggest that under some circumstances, deprivations can be overcome by efficiently using small budgets, by creating (gamified) incentives to leverage existing resources. Organizations and government institutions should look for such opportunities to improve resource allocation. Furthermore, in order to design more effective policies, an analysis of psychological and behavioral factors should receive more importance, so that the effectiveness of existing and new anti-poverty programs can be maximized.

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