Triggered Screen Restriction: Gamification Framework

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***Abstract*—The prevalence of sedentary lifestyles is increasingly becoming a significant public health concern, with numerous health risks ranging from obesity to heart disease. Several gamified interventions have been employed to counter sedentary behavior by promoting physical activity. However, the existing approaches have yielded mixed results, making it crucial to explore new methodologies. While existing approaches have utilized gamification elements to encourage activity, they often need a comprehensive blend of psychological elements and advanced technology to drive a meaningful behavioral alteration. This paper introduces the Triggered Screen Restriction (TSR) framework, an interdisciplinary approach integrating behavioral psychology, gamification, and screen-time restriction technologies. The TSR framework aims to elevate gamified physical activity by leveraging the psychological Fear of Missing Out phenomenon, encouraging users to meet specific activity goals to unlock social media applications. The TSR framework presents a promising avenue for future research. The proposed framework's unique approach is designed to motivate users to be more physically active. The proposed framework fills a literature gap in the current implementation of the gamified physical intervention. Further studies are needed to empirically validate the framework's effectiveness and potential to contribute to the gamification ecosystem.**

Keywords*—Gamification; physical activity; sedentary behavior; Triggered Screen Restriction (TSR) framework

I. Introduction

Engaging in regular physical activity is not just a lifestyle choice; it is a cornerstone for a high-quality life. Physical activity positively impacts not only your physical health but also enhances your mental well-being, enriches your social interactions, and boosts your self-confidence [1]. Despite the wide-ranging benefits, alarming data shows a global drop in levels of physical activity [2]. One factor amplifying this decline is the widespread use of smartphones. While these devices have made life easier in many ways, they have also unintentionally encouraged a lifestyle that involves minimal movement [3]. The issue is especially severe in countries with both high smartphone usage and alarming rates of obesity, such as Saudi Arabia [4]. For instance, in Saudi Arabia, a staggering 41.5% of young men are not engaged in any form of regular physical activity, contributing to an obesity rate that is higher than the global average [5], [6]. This trend is not just a national crisis but a global one, necessitating swift and effective solutions to promote active lifestyles [4]. Despite the continuous development, most of the existing gamified physical interventions still have untapped potential. Many of the current methods using gamification to encourage physical activity overly rely on positive rewards [7]. These constant rewards can eventually wear out a person's motivation, making these strategies unsustainable [8].

Gamified physical interventions are often perceived by users as either excessively complex or insufficiently supportive, leading to decreased levels of interaction [9]. Even the most popular fitness interventions available on Apple or Google stores are often too narrow in focus [10]. The proposed framework, aiming to leverage the Fear of Missing Out, addresses these limitations by motivating users to engage in physical activity using gamified intervention to access their social media applications. By leveraging insights from current research and integrating novel activity tracking with motivational game-like elements, the framework might offer a comprehensive solution in gamified physical interventions. The paper seeks to serve as a foundational framework for future gamified physical interventions. The following sections will explore the limitations of current frameworks and the potential of the novel approaches proposed in this framework. The remainder of this paper is organized as follows:

- Objective - Presents the main objective, which is to propose a theoretical framework that might enhance the application of gamification in encouraging physical activity.
- Literature Review - Examines existing gamification strategies and their application in diverse domains, particularly focusing on their role in enhancing physical activity.
- Previous Frameworks - Examines and evaluates popular gamification frameworks, including Octalysis, MDA, SGD, and FRAGGLE.
- Introducing the TSR Framework - Introduces the TSR framework, which outlines its interdisciplinary components for promoting physical activity through gamification.
- Components of the TSR Framework - Explores the four key pillars of the TSR framework: screen time restriction, notification triggers, computer vision model, and reward engine. Describes how these aspects work together to help encourage physical activity through gamified intervention.
- Conclusion - Summarizes the study, emphasizing the TSR framework's potential as a gamified framework to promote physical activity. The conclusion highlights the necessity for empirical validation and proposes future research directions.

II. Objective

The main objective is to propose a theoretical framework that might enhance the application of gamification in encouraging physical activity. This enhancement could be achieved by exploring innovative intersections between behavioral psychology and current technological approaches. The paper seeks to identify novel tools and methods that might increase the effectiveness of gamified interventions, with a particular focus on the potential application of the fear of missing out phenomenon.

The significance lies in the potential impact of gamified physical interventions. By offering a novel perspective on gamification, this paper desires to address the limitations of motivating physical activity in various settings. Its insights are especially relevant in societies where traditional methods to promote physical activity have had limited success, highlighting the need for more innovative and engaging approaches.

This paper's contribution is laying down a theoretical groundwork for a new approach to gamification, focusing on behavioral and technological aspects rather than empirical data. The exploration of the fear of missing out phenomenon as a motivational tool represents a fresh perspective in gamification research. The paper seeks to inspire further academic inquiry, discussion, and development. Ultimately, the proposal in this paper might open up new possibilities for research and application, leading to the creation of more effective and engaging gamified physical interventions for promoting physical activity in the future.

III. Literature Review

The idea of gamification, which incorporates game design elements into non-gaming contexts, offers an innovative method to foster behavioral change. By including elements such as points, rewards, and challenges, gamification has been observed to elevate user engagement and motivation [11].

Further, within the context of gamification, components like badges, progress indicators, and stages hold a pivotal role. These elements, far from being just aesthetic enhancements, act as central motivational tools. Their presence invigorates users, encouraging sustained interaction and consistent effort towards reaching defined objectives [12].

Moreover, the utilization of gamification strategies has been examined across various sectors, including educational institutions, professional environments, and health-related centers. The efficacy in enhancing the user experience by making products and services more engaging has received substantial empirical support [13], [14]. For instance, a study that employed a randomized design explored the impact of a gamified intervention strategy. This strategy was further enhanced by adding elements of social support and financial incentives framed as potential losses. The study demonstrated a moderate yet promising increase in levels of physical activity among veterans who are struggling with weight issues, including obesity [15].

Another study focused on the efficacy of immediate financial rewards given out on a variable schedule. This study found that such financial incentives could significantly encourage people to engage more with mobile health applications [16]. Several studies further corroborate the sustainability of such interventions, especially when participants select their own goals [17], [18].

Despite these positive findings, it's critical to acknowledge that the effectiveness of gamification is not a one-size-fits-all solution. A study that used a randomized design with three different groups showed that although all participants lost a significant amount of weight, the groups that were exposed to gamified intervention did not outperform the control group in a statistically significant manner [8]. Moreover, a separate study aimed at exploring the role of personalized goal-setting in gamified mobile health interventions reported an initial increase in user engagement and performance, but this positive trend appeared to diminish over time [19]. These divergent findings clearly indicate an urgent need for more nuanced investigations to further refine and possibly explain the variability in outcomes associated with gamification in physical health interventions.

When examining the specific techniques and methodologies that are part of gamification, a rich tapestry of strategies reveals itself. One of these strategies involves the real-time monitoring of user metrics and the provision of immediate feedback, which has been shown to elevate the likelihood of successfully encouraging physical activity [20]. Similarly, allowing users to set their own physical activity goals introduces a competitive spirit that invigorates the user's motivation to be physically active [7]. Tangible systems of rewards, often implemented through the use of badges and points, provide compelling reasons for users to not only meet their activity goals but also to exceed them [21]. Creating a sense of community and social interaction is another essential feature of gamified fitness interventions, often achieved through leaderboards that enable users to compare their progress and celebrate their achievements [22], [23]. Additional strategies include sending out notifications and text messages as reminders, which act as consistent nudges to help users stay aligned with their fitness objectives [24], [25].

Psychological theories also play a significant role in how gamified interventions are designed. For instance, Self-Determination Theory is commonly used to ensure that the needs for competence, autonomy, and social connection are adequately addressed, thereby serving as a continual source of motivation [26], [27], [28]. Balancing intrinsic motivations, such as the innate enjoyment derived from an activity, and extrinsic motivations, such as rewards, is critical [26], [27], [28]. Another significant psychological theory that has been applied in gamified intervention is Flow Theory, which suggests that the most engaging and motivating experiences occur when there's a balance between the challenge at hand and the individual's skill level [29], [30]. While the Fear of Missing Out has been criticized for encouraging potentially addictive behaviors [31], recent research suggests that it can also have a positive impact, particularly for individuals who might otherwise be disengaged [32]. These psychological theories, although promising, require further study to confirm their effectiveness in gamified physical interventions.

Conclusively, a systematic review encompassing an examination of 1680 health applications available on the Apple

and Google App stores, including (Nike+ Running, Zombies, Run!, Strava Run, MyFit Fitness, Fitbit, and RunKeeper - GPS Track Run Walk) [10]. Astoundingly, the research found that a mere 4% of these applications employed gamification elements to enhance user engagement and promote healthier behaviors [10]. This relatively low number represents a monumental opportunity for advancement and innovation. Most of the existing gamified applications prioritize self-monitoring components and combine them with goal-setting features to maintain user engagement [10].

The current implementation of gamified interventions mainly relies on positive feedback and personal determination to encourage users. But this approach has limits. There are still unexplored ways to use technology and psychology to keep people interested and involved in physical activities. A promising avenue in employing on-device computer vision models that can detect and report user activities, offering a more immersive and interactive experience while preserving user privacy [33]. Using gamified intervention could boost users' interaction with physical activity applications and significantly increase user engagement and effectiveness.

Furthermore, there's a need to evolve beyond merely using positive reinforcement. The emphasis should shift towards a balanced approach, incorporating both positive and negative reinforcement mechanisms to create a more captivating, or even addictive, user experience [34]. By doing so, there is an incredible opportunity to develop novel frameworks that are not only engaging but also effective in battling sedentary lifestyles and encouraging physical activity among various population groups. The following subsection will focus on previous frameworks to provide a more comprehensive understanding of gamification's frameworks and their current state.

A. Previous Frameworks

1) Octalysis Framework: The Octalysis framework emerged from the realization of the need for a tool to devise strategies and evaluate the implementation of gamification [35]. The Octalysis framework identified eight distinct core drives that propel individuals to engage in certain activities. The Octalysis framework, visually represented as an octagon, encapsulates these core drives at each of its corners (see Fig. 1). The Octalysis framework emphasizes the importance of identifying whether core drives lean towards extrinsic or intrinsic motivation.

The Octalysis framework considers the core drives as essential components, which are defined in the following manner:

- Epic Meaning and Calling: This drive encapsulates the desire to be part of something larger than oneself or to pursue a higher purpose.
- Development and Accomplishment: This is the drive to improve, overcome challenges, and achieve goals.
- Ownership and Possession: This is the drive to own or control resources and protect one's investments.
- Scarcity and Impatience: This drive is about the desire to obtain rare or exclusive items or act before an opportunity passes.

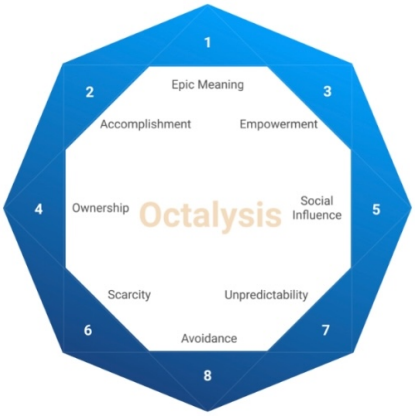

Fig. 1. [35] Octalysis framework.

- Loss and Avoidance: This is the drive to prevent loss, negative outcomes, or maintain one's status quo.
- Unpredictability and Curiosity: This drive encapsulates the desire for novelty and unexpected outcomes.
- Social Influence and Relatedness: This drive encompasses the need to connect with others and belong to a group.
- Empowerment of Creativity and Feedback: This drive covers the desire to express oneself, experiment, and receive feedback.

The Octalysis framework divides core drives into two impactful categories: Black Hat Gamification and White Hat Gamification. White Hat drives, found at the top, motivate positively, inspiring creativity, control, and purpose. These include Epic Meaning, Development, and Empowerment of Creativity.

In contrast, the lower drives, or Black Hat, are linked to negative motivations like urgency or addiction. They encompass Scarcity, Unpredictability, and Loss. The side drives, Ownership, and Social Influence can swing either way based on context. For effective gamification, the Octalysis framework recommends balancing both Black and White Hat techniques. White Hat fosters loyalty but may not prompt immediate reactions. Black Hat encourages immediate action but might cause burnout. An ideal gamification design balances both aiming for sustained motivation and a rewarding experience.

2) MDA Framework: The Mechanics, Dynamics, and Aesthetics (MDA) framework provides a comprehensive approach to game design and analysis, aiming to bridge different areas like game development, game criticism, and technical research in the gaming industry [36]. The MDA framework categorizes games into three main elements: Mechanics, Dynamics, and Aesthetics (see Fig. 2). These components represent various aspects of game design and player involvement [36].

- Mechanics: The core elements of a game that include data representation and algorithms used to support the game's framework.

- Dynamics: The real-time mechanics of responding to player inputs, which evolve during gameplay.
- Aesthetics: The emotional reactions players have while interacting with a game system, emphasizing the experiential aspect of games.

The MDA framework has been found to be effective in increasing user engagement in various platforms, including donation-based crowdfunding. Applying the MDA framework has resulted in higher levels of interaction from users, indicating the potential for increased funding for charitable initiatives [37].Furthermore, the MDA framework has been used as an educational tool to enhance learning experiences and comprehension of mathematical concepts in elementary students [38].

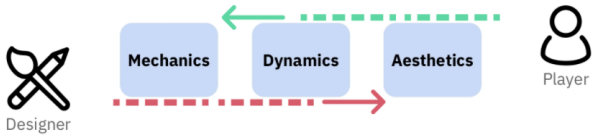

Fig. 2. [36] The MDA framework.

3) Sustainable Gamification Design Framework: The Sustainable Gamification Design (SGD) framework is a systematic approach to creating gamified systems with a focus on sustainability in user engagement, environmental impact, and social responsibility. The SGD framework emphasizes ethical and human-centered design principles [39]. The framework is structured around four key stages:

- Discover: This initial phase involves comprehensively understanding the setting and the individuals or groups that the system will impact.
- Reframe: In this stage, designers evaluate the gathered information to spot opportunities and develop potential solutions.
- Envision: Decision-making is key in this phase, as designers choose the most fitting solution for the system.
- Create: This final step sees the design and implementation of the gamified system, bringing the concept to fruition.

The integration of values and ethical considerations is central to the SGD framework, ensuring that the gamified systems produced are not only captivating but also responsible and considerate of broader impacts. The framework guides designers in creating systems that are beneficial for users (see Fig. 3).

4) FRAGGLE Framework: The FRAGGLE framework is an agile methodology tailored for enhancing learning experiences through gamification. The framework is designed to align gamified activities with educational goals, content, and assessment criteria, ensuring that game elements support the intended learning outcomes [40]. The framework consists of four phases:

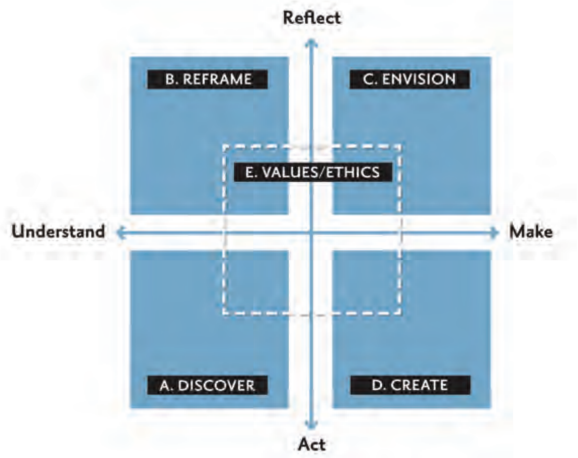

Fig. 3. [39] The SGD framework.

- Declaration: Identifying problems, user stories, and acceptance tests to define the project's scope and requirements.
- Creation: Designing engaging game elements like players, mechanics, stages, actions, and triggers that meet user needs.
- Execution: Implementing and deploying the gamified learning experience to deliver an MVP for user feedback.
- Learning: Measuring and analyzing the gamification's impact on learning outcomes and user satisfaction, with a focus on continuous improvement.

The framework emphasizes learning experiences rather than complete gamified systems. The framework-structured approach is helpful for creating engaging and educationally effective gamified activities. The step-by-step process of the framework, from conception to evaluation, facilitates the agile development of gamified learning experiences that align with educational goals and respond to learner feedback (see Fig. 4).

B. Overview and Comparison of the Models

Gamification has gained popularity as a strategy to increase engagement in different fields. Several frameworks guide how to incorporate game elements into non-game settings. The MDA framework provides a way to understand the relationship between game mechanics, dynamics, and aesthetics. However, the MDA framework has been criticized for focusing too much on mechanics and not considering other aspects like user experience and narrative elements in games [41].

The Octalysis framework offers valuable insights into the various factors that drive people's engagement in activities. However, the Octalysis framework doesn't provide a structured design process, and the generic approach may not cater to the diverse motivations and backgrounds of all users.

Similarly, the FRAGGLE framework is agile and learner-centered, designed to align educational activities with gamification elements efficiently. However, the FRAGGLE framework does not address real-world challenges, such as

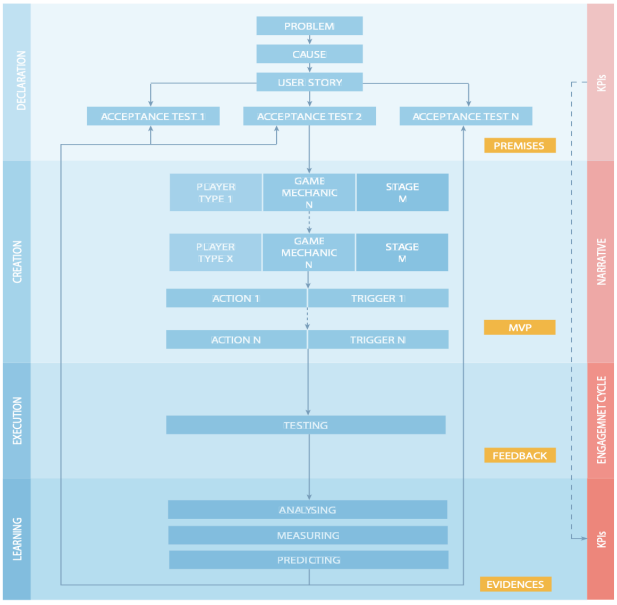

Fig. 4. [40] The FRAGGLE framework.

technical issues or navigating organizational culture, that can arise in the implementation of these systems. These frameworks provide valuable insight into gamification, but they also show the need for a more comprehensive model that can address some of their limitations.

As interest increases in using gamification to encourage physical activity, there is an exciting chance to develop a new framework. The novel framework could be customized to encourage physical activity by considering the specific needs and motivations of various population groups. The novel framework has the potential to lead to greater and more widespread adoption of healthy habits by harnessing gamification's ability to create a positive impact on users (see Table I).

TABLE I. Overview of Gamification Frameworks

Framework	Target	Implementation
Octalysis [35]	General	Transforming into a game-like process
MDA [36]	General	Connects game design to gamified development
SGD [39]	Design	Conceptual framework focused on design
FRAGGLE [40]	Education	Uses gamified agile to enrich learning
The Proposed Framework (TSR)	Physical Activity	Interdisciplinary approach for gamified physical intervention

IV. Introducing the TSR Framework: A Multidisciplinary Approach

The need for a novel approach to address the growing issue of physical inactivity is evident [34]. While existing gamified physical interventions offer a range of features to promote physical activity, they often fail to achieve lasting user engagement. Many such interventions rely too much on continual positive reinforcement, and their heavy reliance on willpower can deplete the user's motivation over time [7], [8]. Additionally, current approaches frequently overlook crucial aspects that could drive engagement [9].

Against this backdrop, the TSR framework is introduced as a conceptual solution to these pressing concerns. Central to the TSR framework's aim is using the Fear of Missing Out phenomenon to inspire a meaningful change by using gamified physical activity intervention, combining the latest technology with fundamental elements of behavioral psychology.

In contrast to existing gamified interventions, the TSR framework employs a balanced system of both rewards and restrictions to encourage increased physical activity. At the core of the TSR framework are four integral components: Screen Time Restriction, Notification Triggers, Computer Vision Model, and Reward Engine. These pillars serve specialized functions that collectively offer a well-rounded user experience:

- Screen Time Restriction: Restricts access to distracting social media applications unless specific physical activity goals are met, thus leveraging the Fear Of Missing Out phenomenon.
- Notification Triggers: Customizable alerts remind users of their activity goals and offer motivation at opportune moments.
- Computer Vision Model: Detects the user's physical activity in real-time, providing instant feedback while ensuring data privacy.
- Reward Engine: Offers tangible rewards like points and unlocks varying levels of exercise challenges, making the whole gamified experience more engaging.

The proposed framework builds upon existing research, which supports the efficacy of these elements. For example, goal-setting strategies have been proven to increase physical activity, improve well-being, and lower health risk factors like Body Mass Index (BMI) [42]. Similarly, studies show that the balanced use of gamification can indeed boost a person's intrinsic drive to exercise [21]. To provide a comprehensive understanding of the TSR framework's capabilities and how it differentiates itself from existing interventions, the following sections will dive into the technical and psychological aspects of each foundational pillar in detail (see Fig. 5).

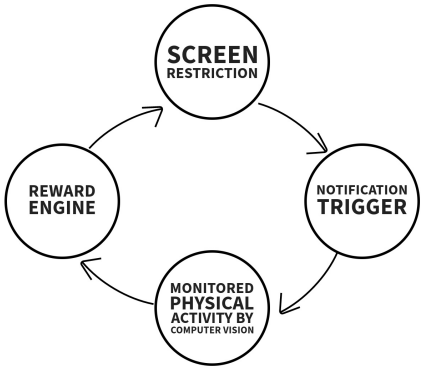

Fig. 5. The Proposed TSR's Workflow.

A. Screen Time Restriction: Tackling Physical Inactivity Through Behavioral Incentives and Technological Limits

The first foundational pillar of the TSR framework is Screen Time Restriction, a feature designed to balance screen-based activities with gamified physical activity. The mechanics of Screen Time Restriction are straightforward yet effective. Once the user crosses a predetermined time limit on social media or other distracting applications, the framework triggers a lockout mechanism. This restriction can be lifted only when the user achieves certain physical activity goals, which are recorded and verified in real-time by the framework's other components like the Computer Vision Model and Notification Triggers. This approach turns a usually passive screen time experience into an active pursuit of physical milestones.

Besides merely cutting off access to applications, the TSR framework utilizes the Fear Of Missing Out psychological phenomenon to make this strategy even more compelling. Users are enticed to achieve their physical activity goals not just for the sake of better health but also to regain access to their social circles online. This adds a rich social layer to the otherwise technology-focused Screen Time Restriction feature, elevating it beyond a simple tech-based solution.

To ensure user privacy, the framework operates under stringent privacy policies. The framework only accesses screen-time data in real-time and does not store any of this sensitive information, thereby adhering to top-level privacy standards. By combining technological control with behavioral psychology, the Screen Time Restriction component creates a multi-dimensional approach to encouraging physical activity. The Screen Time Restriction is not just about limiting screen time but about turning those limitations into a motivational force that encourages physical activity.

B. Notification Triggers: Steering User Attention Through Timely Reminders

The second pillar of the TSR framework is Notification Triggers. The Notification Triggers component is designed to provide real-time engagement through a system of push notifications. These reminders serve as nudges that propel users toward physical activity, filling the spaces in their day with opportune moments for exercise. The operational backbone of Notification Triggers is its interoperable system architecture. By leveraging Firebase Cloud Messaging (FCM) for Android and Apple Push Notification Service (APNs) for iOS, the framework ensures that notifications reach users irrespective of their choice of operating system. This universal approach guarantees that all users have equal opportunity to benefit from the framework, regardless of their device preference. The framework provides a range of pre-set messages, which can be as simple as a reminder.

While the content of these messages is standardized, the timing, frequency, and types of notifications can be personalized according to each user's needs and lifestyle. This degree of customization fosters a more personal connection between the user and the framework, increasing the likelihood of sustained engagement. Although the Notification Triggers start as external cues, the ultimate goal is to transition users from needing these reminders to developing intrinsic motivation for physical activity. This shift aligns with the objectives of the TSR framework, combining screen time restriction and notification triggers to promote gamified physical activity. By harmoniously integrating the notification triggers with the Screen Time Restriction component, the TSR framework might create a continuous loop of motivation and action, making strides toward more engagement in physical activity (see Fig. 6).

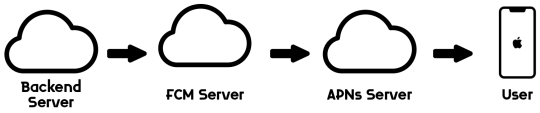

Fig. 6. The proposed notification workflow.

C. Computer Vision Model: Real-time Tracking and Feedback for Optimized Physical Activity

Building on the synergy of Screen Time Restriction and Notification Triggers, the next cornerstone of the TSR framework introduces an advanced technological interface—the Computer Vision Model. The Computer Vision component combines a machine learning model with the camera capabilities of mobile devices to offer real-time assessment and feedback on a gamified physical activity. Employing the power of the computer vision model, the component can identify and quantify a wide array of exercises, such as jumping jacks, in real-time. As users execute these exercises, the model counts the number of repetitions and assesses them, thus providing immediate, accurate metrics to inform more effective workout sessions.

What distinguishes the computer vision approach from traditional methods of tracking physical activities is its commitment to user privacy. While the traditional method relies on the usage of GPS data or accelerometer, the proposed framework performs all data processing directly on the device, ensuring that user data remains secure and private. This eliminates the need for data transfer and limits storage requirements, thus reducing the risk of unauthorized access and data breaches. The provision of instant feedback creates an environment of positive reinforcement. The instant feedback strengthens the user's engagement, as the immediate data allows for immediate adjustments, maximizing the effectiveness of the gamified workout [33]. The computer vision approach thus might enhance the interactive experience, making the TSR framework not just a novel approach but an engaged companion in promoting gamified physical activity. Integrating this advanced Computer Vision Model might add another layer of interactivity and personalization to the TSR framework. It not only advances the framework's primary aim of promoting physical activity using gamification but does so while prioritizing user security and data privacy (see Fig. 7).

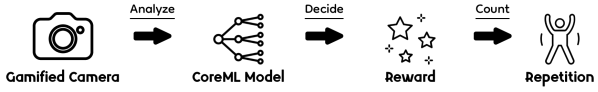

Fig. 7. The proposed computer vision workflow.

D. Reward Engine: An Approach to Sustaining Physical Activity and Reducing Screen Time

Capping off the TSR framework's multi-dimensional approach is the Reward Engine, a dynamic system designed to foster ongoing user engagement. Unlike traditional models, which often employ a one-size-fits-all strategy for physical activity, the Reward Engine employs a responsive mathematical model to tailor tasks and rewards according to the user's specific metrics and performance levels. Utilizing a two-variable formula, the system calculates task difficulty and reward value as follows:

$$Reward = valueReward \times difficultyFactor$$

$$DifficultyFactor = max(min(numberRepetition * valueReward, 0.9), 0.1)$$

Through the application of this equation, the reward engine dynamically adjusts both the challenge and rewards of each task based on real-time performance metrics. By doing so, the reward engine might ensure that activities are optimally engaging—without being overly difficult or too simplistic—creating an ideal balance that sustains user motivation over time. What sets the Reward Engine apart is its focus on providing a highly personalized experience. It offers a mix of intrinsic and extrinsic motivators, making physical activity not just a routine but a rewarding pursuit. This goes beyond merely distributing rewards and plays a crucial role in sustaining behavioral change. This aspect of the TSR framework is critical for the potential of encouraging users to integrate regular physical activities into their lives, potentially leading to a reduction in screen time and promoting more physical activity.

V. Conclusion

The TSR framework, as discussed in this paper, is a conceptual gamification framework awaiting actual deployment. The proposed TSR framework, emphasizing the Fear of Missing Out phenomenon, presents a potential comprehensive strategy to encourage physical activity through gamified activity goals linked to social media application access. The proposed framework has four main components: Screen Time Restriction, Notification Triggers, Computer Vision Model, and Reward Engine. The TSR's components initiatives aim to work together in order to bring a potentially significant change in our approach to gamification and physical activity.

While this paper outlines the blueprint of the TSR framework, it remains essential to mention that this is a concept framework—a proposal that is yet to be brought to life and measured against real-world scenarios. The importance of thoroughly evaluating the proposed framework in future research cannot be overstated. A well-considered plan for evaluation becomes a cornerstone for future research to turn this conceptual model into a tangible framework. This evaluation would leverage both numerical data and human experiences to provide a full-spectrum analysis of the framework's performance. For the numerical data, metrics such as user engagement, time spent on physical activities, and program adherence could be good starting points.

On the other hand, understanding human experiences could be achieved through qualitative methods, like interviews or surveys, to understand user satisfaction and program perception in depth. The duality of these methods provides a well-rounded look at the framework's effectiveness or areas requiring refinement. While this is still theoretical, the concept itself calls for a future academic inquiry that dives into its practical applicability.

The adaptability and modular design of the TSR framework serve as a launching pad for future research. The framework's capacity to be customized to fit a wide array of user preferences makes it a strong candidate for various real-world applications. Potential applications could range from educational settings targeting younger populations to workplace environments aiming to boost employee efficiency. Exploring the removal of boundaries between sectors could also be an interesting area of study.

To conclude, while the TSR framework remains a theoretical model at present, its potential applications and impact need further investigation. This paper does not claim to have achieved these outcomes but seeks to set the academic and practical communities a task: rigorously test, refine, and eventually implement the TSR framework.

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Disclosure of Interest

The authors report there are no competing interests to declare

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