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Freedom Within Structure: An SDT-Informed Analysis of the Structured Self-Discipline Mechanism in the Forest Application

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Abstract. This paper examines how digital focus applications support sustained self-regulation through a theoretical case analysis through the lens of Self-Determination Theory. Addressing a gap in existing research that often treats static motivation as an outcome, neglecting its dynamic nature, the study introduces the concept of a Structured Self-Discipline Mechanism to explain how design structures facilitate the internalization of disciplined behavior. Using the Forest application as a case, the paper adopts a theory-driven design analysis to explore how interaction features influence users' autonomy, competence, and relatedness. The findings reveal that while design elements in Forest, such as time constraints, feedback systems and social features, can effectively initiate and sustain engagement, they also create tensions between external control and psychological need satisfaction. These tensions may lead to reduced autonomy, performance-oriented competence, or weakened connection. Based on these results, the study proposes design guidelines that emphasize autonomy-supportive interactions, process-oriented competence feedback, collaborative social structures, and reflection-oriented systems. The paper asserts that sustainable self-discipline emerges from a balanced integration of structure and freedom, offering theoretical and practical implications for designing digital self-regulation tools.

Keywords: self-determination theory, digital focus applications, motivation internalization, interaction design, self-regulation

1. Introduction

Recently, self-improvement applications with a focus on self-discipline have grown at an alarming rate and have gained considerable acceptance as tools that can help promote concentration and self-discipline. The applications are intended to assist users in building up their self-regulatory strength and improving the efficiency of their time management. It is widely implemented by students, office employees, and people who want to minimize digital interference and has been found to improve the productivity level during a short period. Nevertheless, even though they have low barriers to entry

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and visible short-term advantages, numerous digital behaviors change interventions fail to achieve lasting long-term outcomes [1].

The recent studies have been exploring more about how digital design affects the motivation of users, their engagement and wellbeing especially by using theories like Self-Determination Theory (SDT) [1,2]. Nevertheless, most of this literature is conceptual or general. Conversely, there are still few studies that focus on systematic empirical or theoretical studies on applications that are particularly focus-oriented or manage time. Also, there is the absence of detailed discussion of the impact of particular design attributes on the fulfillment of the psychological needs of users, i.e., autonomy, competence, and relatedness [3].

There are two gaps that can be observed in the current literature. Theoretically speaking, the works on digital behavioral change tend to consider motivation as an outcome variable rather than a dynamically changing phenomenon dependent upon design structures. Design-wise, even though earlier research has underscored the significance of motivational elements in digital environments, theoretical or case-based studies that explore how application design facilitates the internalization of motivation and psychological need fulfillment have not been fully developed when it comes to the focus applications.

In order to fill these gaps, this paper will present the notion of a Structured Self-Discipline Mechanism which means a group of design structures that support the slow internalization of self-regulatory behavior among users. The idea is advanced with the help of an SDT-based review of the Forest app. SDT offers a robust conceptual model of how outside influences can be used to enhance or detract from the autonomous motivation. Through the reinterpretation of the design logic and user experience of focus applications under this theoretical framework, the goal of this study is to reveal the connection between the design of applications and the internalization of motivation, and to examine its consequences on sustained use and psychological health [2,4]. In terms of methodology, the research will take on a theory-based design analysis approach whereby SDT will be used as an analytical model to explain the motivational structure that is incorporated in the Forest application.

Thus, there are two major goals in the current article. To begin with, it examines Forest as a prototypical focus and self-regulation implementation in terms of motivation and psychological needs fulfillment. Secondly, it presents directions of future research, especially in terms of how psychological theory might be better applied to digital intervention development. The analysis will help the research to link the field of technology design studies with the area of motivation research in psychology and highlight theoretical and practical importance of internalization of motivation in perceiving sustainable engagement with the digital focus tool.

2. Literature review

2.1. SDT and motivation internalization in digital interventions

The main conceptual tool used in this work is SDT. According to SDT developed by Deci and Ryan [4-6] human behavior is based on three basic psychological needs: autonomy, competence, and relatedness. Upon the satisfaction of these needs, individuals are more inclined to internalize external norms and progressively slide over the continuum of motivation, starting with extrinsic motivation (e.g., behaviors initiated by rewards, supervision, or social pressure) to intrinsic motivation (that is, behavior motivated by intrinsic values or identification). These principles have become more widely used in digital intervention research to investigate the role of technological design in supporting the motivational internalization of users.

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One of the significant reasons why SDT has been chosen as the theoretical framework of this study is that it can explain, based on psychological processes, the use of digital applications over the long term. One critical distinction that sets SDT apart from behavioral control models, including the Theory of Planned Behavior [7] or operant conditioning models [8], which are mainly dependent on external rewards (e.g., points, penalties, or reminders), is SDT focusing on how self-regulation can be sustained due to the internalization of motivation and fulfillment of needs. Examples include research indicating that when app design is compatible with the autonomy, competence, and relatedness of users, they are more prone to internalize motivation and remain engaged over time [1,6].

2.2. Limitations of existing SDT-informed app research

In spite of the fact that SDT has been extensively researched in the sphere of digital interventions, especially in health promotion, education, and digital game environments [9,10], its use to focus and manage time-based applications is still relatively sparse. Available SDT-related works usually focus on behavioral indicators, including the rate of completing tasks, increasing productivity, or a decrease in screen time [11] instead of investigating the way particular elements of design promote or prevent the internalization of motivation with time.

In addition to this, motivation is usually measured as an observable outcome [6] instead of a process that is influenced by interaction patterns and design patterns. Consequently, it is common that the link between psychological needs fulfillment and specific design factors (e.g., feedback systems, constraint mechanisms, or forms of social interactions) is poorly researched [1].

Furthermore, although the research on gamification and motivation often examines the individual components like rewards, points, and leaderboards [12,13], there are few systematic studies exploring how combinations of design features can affect autonomy, competence, and relatedness simultaneously under one overarching theoretical perspective. This gap indicates that there is a necessity to interpret SDT in a more design-centered manner, which links psychological need fulfillment to the logic of organized interaction in digital self-regulatory systems. To conclude, these limitations indicate that the connection between design structures and internalized motivation has not been sufficiently theorized regarding its application in focus and self-regulatory processes. Furthermore, even among this small amount of literature, explicit design-level analyses are rare [1,3]. Specifically, it is also poorly discussed how interaction structures in such apps might both facilitate and restrict user's autonomy, competence, and relatedness across time.

This research intends to build on the current knowledge in the field by using an SDT-based design viewpoint to examine focus applications, exploring the relationship between app-level interaction mechanisms and the processes of motivation internalization and long-term self-regulation.

2.3. Forest as an analytical case

Forest has been chosen as the analytical case in the present research because of its popularity and the fact that it explicitly incorporates gamified focus mechanisms. Being one of the best-known focus apps in the online stores, having more than 10 million downloads on Google Play, Forest is a combination of time-based constraints, visual progress feedback, and optional social interaction functionality, which makes it especially applicable in investigating how design configurations overlap with SDT psychological need framework.

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In contrast to productivity-based tools, Forest incorporates the regulation of behavior into the symbolic and emotional world of growth and loss, providing a plentiful source of studying how autonomy, competence, and relatedness are influenced at the same time by the structured interaction logic. Its hybrid structure, which is both user-directed and consequence-directed, makes it an analytically fruitful example of examining conflicts in need-supportive digital worlds.

2.4. Analytical dimensions within Self-Determination Theory

Although SDT views autonomy, competence, and relatedness as three separate strands, these aspects can also be perceived as sequential processes that take place through the internalization of motivation. Autonomy typically drives people to act in digital self-regulatory systems, competence enables people to continue acting, and relatedness is used to establish the overall meaning of continued practice. This process-oriented view is applied in the following analysis to see how Forest organizes the creation, continuation, and stabilization of focused behavior.

2.4.1. Autonomy

Autonomy can be seen as the initial stage of motivational internalization within the framework of process-oriented SDT. Autonomy can be defined as the perception of choice and control that people perceive when they make decisions about their actions, which is also the process of motivational internalization [4]. Research has indicated that digital interventions that give individuals autonomy, allowing them to choose and create their own goals, are more capable of creating long-term engagement and internalized motivation [4,6]. Nevertheless, gamified design tends to suggest a conflict between behavioral constraints and incentive control and the balance between these two is what constitutes the core conflict of autonomy support [2].

Autonomy support is also evident because Forest allows users to determine the length of their focus time, whether or not they are using a to-do task and their break rhythm. But the tree-withering system of the app adds a sense of external pressure. The system gives visual punishment feedback when users quit the app before the timer expires by interrupting the task. Despite the fact that such negative reinforcement strengthens the short-term binding force, it can diminish the psychological sense of autonomy experienced by users. Consequently, the users might undergo some sort of passive self-discipline, whereby the external rules require specific focus times, whereas they wish to control the time of their focus according to their own discretion.

The duality indicates the existence of semi-autonomous design structure that can be considered as an autonomy-specific expression of the Structured Self-Discipline Mechanism. Applications directed towards the future must strike a balance between the aforementioned tension by offering reflective feedback (like pause summary or contextual reason of interruption recording) so that the interruptions become an element of self-consciousness instead of a form of punishment of failures, and this will facilitate the attainment of a higher level of psychological coherence between structure and freedom.

2.4.2. Competence

After engaging, competence is a key element in maintaining behavioral continuity. Competence as used in this context means the sense of mastery and effectiveness that people feel in their activities, which is one of the mechanisms that facilitate the long-term sustainability of motivation [6]. Studies have indicated that goal-setting, obtaining corrective feedback, active involvement, and rising

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challenge can enhance competence [1]. Nevertheless, concentrating excessively on external incentives or quantitative achievements can redirect the drive to intrinsic mastery and lead it toward external quest and eventually undermine the maintenance of psychological investment [14].

In Forest, the presence of tree growth as visual feedback is linked to the physical manifestations of success, which effectively transform the time invested into the accumulated results. The feeling of competence is reinforced by the immediate positive feedback on competence and it has a very strong motivational effect particularly on new users. Nevertheless, after a long period of use, other users move their attention to more external representations of the tree growth process, e.g., the number of trees, the size of the forest, etc., creating a focus on performance. It indicates that competence can be seen as a result of extrinsic motivation processes without the basis of intrinsic growth [4,6].

The future designs must thus enhance the aspects of growth trajectory and learning reflection. As an example, data visualization may depict how users change their patterns of concentration, how the type of tasks that they perform improves, or how they become more patient, which allows them to shift their attention to internal accomplishments rather than external ones. This process-oriented competence helps to recreate a psychological alignment between the users and their behavioral objectives.

2.4.3. Relatedness

Beyond initiation and maintenance, relatedness also plays a role in meaning integration in prolonged practice. Relatedness is the feeling of being understood, supported, and having a feeling of belonging to a social environment [4]. Literature on digital products states that social constructs with positive mechanisms could help engage users and enhance the sustainability of products [9]; however, features of social feedback, when converted into competitive and comparative factors, can lead to anxiety and changes in motivation [1].

Forest also promotes relatedness by providing users with team tree-planting options and friend leaderboards as social feedback measures. Social feedback leads to closer emotional ties between users and their actions are more consistent towards shared objectives and other users have an opportunity to gain benefits due to their social interaction. However, when users engage in a competitive mode by means of teams or individual rankings, they can feel stressed and negatively assess themselves, thus reducing the feeling of relatedness created via social support. It is evident that social support relatedness is not achieved by quantifying the number of social interactions, but by the emotional nature of the interaction.

Thus, the social design strategy used by focus applications could be improved with the shift of the focus of the competitive incentives towards more collective and empathetic patterns of interaction, since the research on gamification shows that competitive factors cannot always be relied upon to improve intrinsic motivation. Conversely, cooperative designs are more conducive to motivational quality [15]. An example is where instead of merely competing to earn points or social recognition (e.g., using friend leaderboards), participants form teams to encourage each other in their advancement, exchange information, and give encouragement. The collaborative social structures can amplify the personal resonance within social systems, stabilize the long-term motivation towards focus, and result in a positive shared self-discipline tendency.

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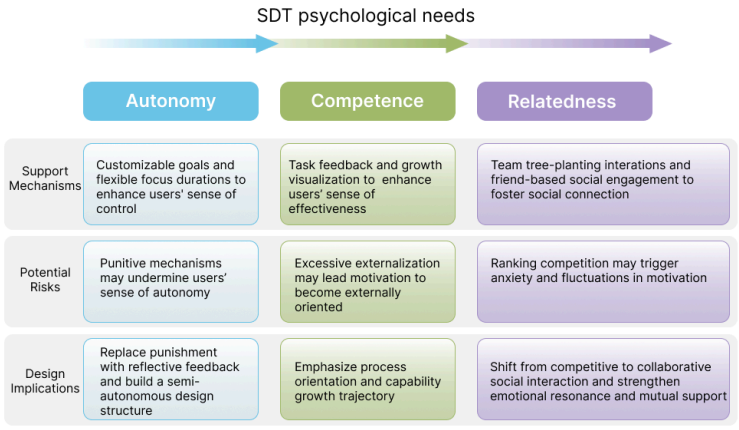


Figure 1. Analytical framework linking SDT psychological needs, design mechanisms, potential risks, and design implications in digital focus applications

2.5. Synthesis and integration

The study of the three psychological needs reveals that Forest design represents the motivation support principles of SDT, but also indicates the existence of the structural contradictions. Long term engagement is seen to be maintained through the use of two main mechanisms of supporting autonomy and providing feedback on competence, whereas extrinsic punishment and too much competition are found to create a feeling of motivational frustration. Three psychological needs are dynamically interconnected; autonomy triggers behavior involvement, competence is an intermediary of continued involvement, and relatedness is the emotional link that is needed to achieve prolonged internalization. This order explains why digital focus applications can sustain long term motivation.

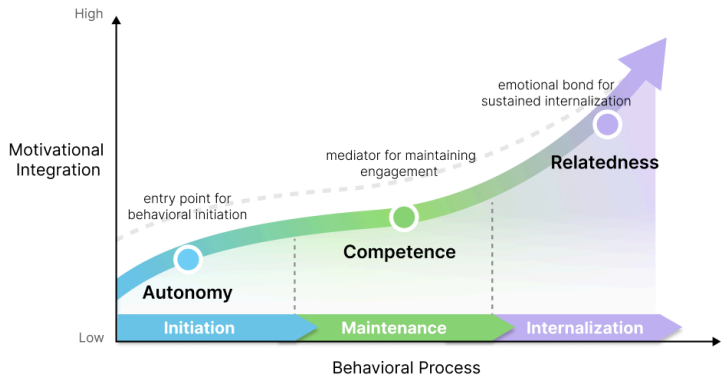


Figure 2. Dynamic interrelationship among the three psychological needs

Following this synthesis, this paper introduces the idea of a Structured Self-Discipline Mechanism, which is based on SDT and explains how the dynamic equilibrium between an external structure and psychological autonomy can be achieved in digital focus applications. App designs do not have to remove control elements but with proper structural design, they need to provide users with guided freedom, which is an experience that is structured as well as gives some space to self-

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regulation. The mechanism elucidates the reason why users may progressively acquire stable self-management behaviors when exposed to external rules and also reveals a new level of applicability of SDT to the design of digital self-discipline:

- Structure enabling choice;
- Feedback fostering competence;
- Relatedness through empathy.

The integrated framework is not only capable of explaining the motivational mechanisms in the Forest but also provides an organized theoretical view toward the subsequent emphasis and self-regulatory practice: Self-control based on sustainable self-discipline is not about stronger control but rather about a balanced design of structure and freedom. This concept of the structured self-discipline creates a new connection between motivational psychology and interaction design, which allows SDT to have increased explanatory power in the area of digital behavioral control.

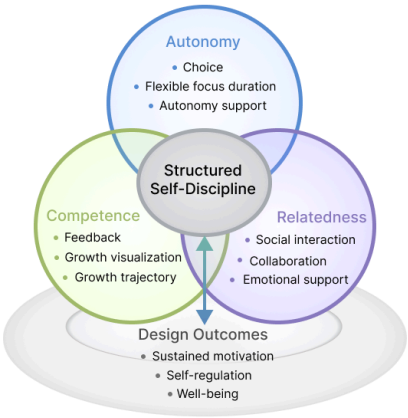


Figure 3. Conceptual model of the structured self-discipline mechanism

3. Design propositions or theoretical implications

3.1. Mechanism-level implications

This section elaborates on the consequences of the previous discussion of the Structured Self-Discipline Mechanism. Digital focus apps are presented as structured settings within which the internalization of discipline can be achieved through the use of the Structured Self-Discipline Mechanism. Based on SDT [4], this mechanism explains how external digital structures impact the three main psychological needs, i.e., autonomy, competence, and relatedness, at different phases of discipline development.

Initially, external structure creates orderliness in the behavior by setting guidelines, deadlines, and feedback systems. The issue of whether the structure supports autonomy will determine whether discipline remains externally directed or is internally embraced. Secondly, disciplined interaction is also sustained by competence feedback. Discipline is transformed into self-reinforcing instead of performance-oriented when users receive growth. Third, reflection and relatedness consolidate meaning. Once disciplined behavior is enabled by self-reflection and social interaction, it is not regarded as a duty anymore but as a part of one's identity.

Consequently, the Structured Self-Discipline Mechanism defines one as a progressive process: external structure externalizes interaction between psychological needs and internalization of

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disciplined behavior.

3.2. Design guidelines

The application of the Structured Self-Discipline Mechanism to design practice offers a number of recommendations to digital focus applications. The suggested design principles are: (a) Mechanisms to support autonomy during human-computer interactions are valuable. Users should be permitted to stop, recuperate, or reconsider instead of depending on punishment systems. When users are offered with multiple choices, they can begin to become disciplined; (b) Competence feedback is also based on thresholds. Staged presentation of progress allows users to stay disciplined as it highlights the development of their skills over time; (c) Collaborative social design is another aspect. Collaborative interaction enhances the level of connection between users and promotes long-term disciplined involvement. It is more efficient compared to competing with other people; (d) Lastly, reflective systems are crucial. These systems assist users in linking their values to discipline-based actions by using mechanisms like journaling, analytics, and reflective review. The process leads to the internalization of disciplined behavior.

3.3. Outcome-level consequences

The Structured Self-Discipline Mechanism predicts better results in terms of sustained motivation, usage stability and psychological well-being at the outcome level. The support of autonomy supports the internalization of motivation, the maintenance of competence helps to reduce dropout, and relatedness and reflection help to enhance the emotional attachment and identity integration. All these results suggest that a well-designed form of structured discipline can convert external regulation into long-lasting self-regulated conduct.

4. Conclusion

4.1. Critical reflections on structured self-discipline

In spite of the fact that the Structured Self-Discipline Mechanism focuses on the role played by digital design in facilitating the internalization of motivation, it can also create conflicts and undesirable consequences. As an illustration, the use of structured discipline systems might cause psychological stress or anxiety as the users feel like there are ongoing performance expectations. Some users might also perform the act of performing discipline, which means pretending to adhere to the focus structures without really doing what they were supposed to do. An example would be setting a focus timer while performing irrelevant tasks. These findings indicate that the structured discipline measures could unintentionally promote normative pressure. Future studies must then be directed towards studying the behavioral as well as emotional consequences of systematic self-discipline programs and to find out how the designs can raise motivation without being associated with unwarranted psychological distress.

4.2. Summary and contributions

In summary, literature review and analysis of this paper reveal that SDT is a solid and explanatory model to understand the motivational mechanisms of digital focus apps. Unlike other studies that concentrate only on behavioral outcomes or technical intervention effects, SDT focuses on the central importance of motivation, internalization, and psychological need satisfaction as a way of

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maintaining the engagement of users. Adopting this theoretical perspective, we can further explore how the design mechanisms of focus apps impact the autonomy, competence and relatedness of users to determine the sustainability of their long-term use.

Consequently, this paper conceptualizes a Structured Self-Discipline Mechanism based on the analysis of Forest, a focus application, through an SDT-based mechanism that conceptualizes the dynamic equilibrium between external structure and inner psychological freedom. This mechanism does not introduce a new motivational theory but extends the SDT principles into the design space of digital self-discipline systems. To be more precise, it extends the SDT description of the internalization of motivation as a collection of structured interaction mechanisms inherent to digital focus applications. This mechanism provides a design-focused perspective on motivational internalization through translating the satisfaction of psychological needs into structured interaction logic combining autonomy support, competence feedback, and social relatedness. The given mechanism states that sustainable self-regulation is neither a result of the absolute freedom nor of the stringent constraints, but rather a symbiotic organization that preserves choice under rules, develops over feedback, and promotes empathy in social connection. To add to this reasoning, four theoretical and practical propositions are introduced in the paper that include important design dimensions such as autonomy support, progressive feedback, collaborative social interaction, and reflection-oriented design.

The research adds to the theory in the context of incorporating motivational psychology in the research structure of digital self-regulatory tools, elucidating the relationship between external design factors and inner motivational constructs, and promoting the change in the area of research interest to the perspective of controlling intervention to the perspective of self-determination-oriented support. Practically, it gives the designers of focus apps instructions on how to operate by satisfying the basic psychological needs of the users so that the designs could change their emphasis on external constraints to encouraging voluntary engagement and enhance customer retention and mental health results.

4.3. Limitations and future research

There are a number of limitations to this study. To begin with, this study uses a conceptual analysis methodology where Forest will be used as a case study in order to demonstrate the suggested mechanism. Although this can provide a detailed theoretical discussion, the results have not been confirmed empirically by longitudinal or experimental investigations. Thirdly, the analysis is mainly centered on digital focus and self-discipline applications that might restrict the applicability of the suggested model to other forms of digital behavior intervention. Fourthly, there is no explicit examination of differences between users in terms of cultural background, motivational orientation, or use context in this work. Nonetheless, these variables could influence how self-discipline mechanisms are experienced in practice.

Future studies can also elaborate on motivational discrepancies in cross-cultural settings, long-term maintenance of behavior mechanisms, and the possibility of applying focus apps to educational and occupational self-discipline situations. Such guidelines can enhance SDT's explanatory capacity even more in the sphere of digital behavioral intervention and help create more human-oriented technological designs.

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