GAMIFYING PROSOCIAL GOALS:

THE ROLE OF COMPETITIVE AND COOPERATIVE DYNAMICS

A Thesis

Presented to the Faculty of the Graduate School

of Cornell University

In Partial Fulfillment of the Requirements for the Degree of

Master of Science

by

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August 2023

ABSTRACT

Extensive research has explored the impact of social interactions, namely competition and cooperation, on goal pursuit. However, there is a dearth of studies examining these dynamics within the context of prosocial goal settings. Addressing this gap, we investigated the influence of gamified interactions on individuals' pursuit of prosocial goals, as well as their enjoyment and overall well-being. Our research involved two correlational studies: one with 499 users across 116 apps, and another with 440 users of Alipay Ant Forest. Surprisingly, in the prosocial goal setting, characterized by cooperative and altruistic intentions, competition emerged as a significant positive and dominant predictor across almost all examined variables, while cooperation displayed more varied effects. Additionally, the findings from Study 2 underscore the distinction between perceived competition/cooperation and actual competitive/cooperative behaviors. Marketers can leverage gamification, particularly gamified competition, to foster user engagement, continued engagement intention, performance, enjoyment, and overall well-being in prosocial goal contexts.

Keywords: Gamification, Prosocial Goal Pursuit, Competition, Cooperation, Engagement, Continued Engagement Intention, Performance, Enjoyment, Well-being

BIOGRAPHICAL SKETCH

Jing Ma is a Master of Science candidate at the Nolan School of Hotel Administration, Cornell University, specializing in behavioral marketing. With a research focus on prosocial consumptions, customer well-being, goal pursuit, incentives, and gamification, she is passionate about finding ways to improve the consumer experience. Jing earned her Bachelor of Science degree in Hotel Management from the School of Hospitality and Tourism Management at The Hong Kong Polytechnic University. In addition to her studies, Jing has gained valuable work experience in consultancy at Horwath HTL Singapore and Cushman & Wakefield Guangzhou from 2019 to 2020. These practical experiences have given her insights into the industry and complemented her academic knowledge. Jing's passion for research and practical experiences have inspired her to pursue a PhD degree in Behavioral Marketing at Cornell. She is committed to deepening her expertise and making meaningful contributions to the marketing field.

ACKNOWLEDGEMENTS

First and foremost, I extend my deepest appreciation to my esteemed committee chair, Professor Helen Chun. Her unwavering support, both emotionally and academically, has been invaluable throughout my journey as a master's student at Cornell University. Her guidance and mentorship have been instrumental in shaping my research, and I am grateful for her immense support in my master's thesis journal, as well as my PhD application journey.

I am also deeply grateful to my committee member, Professor Emily Zitek, for her invaluable guidance during my research method and data analysis classes. Her expertise and invaluable suggestions have greatly influenced the quality and rigor of my work.

Lastly, but certainly not least, I am deeply grateful to my beloved parents, Mr. Ma and Mrs. Wang, my boyfriend, Duo Sun, and my extended family for their constant love, encouragement, and unwavering belief in me. Their support and understanding throughout my academic journey have been my pillars of strength.

I extend my gratitude to my dear cousin, Yuan Wang, and my friends, Ziyue Deng, Lynn Lin, Yiming Dai, Sijie Chen, Priscilla Zhang, and a special thanks to Xuan Zhang, who sparked the initial idea that led to this research. I am incredibly grateful for their love, support, and encouragement throughout this journey.

To all those mentioned and countless others who have contributed to my growth, I offer my heartfelt thanks. This thesis is a testament to the collective support, love, and inspiration I have received, and I am forever grateful for each and every one of you.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

Social interaction, through the cultivation of competitive or cooperative relationship with others (Deutsch, 1949a; Liu et al., 2021), plays a pivotal role in motivating individuals to achieve their goals (Saleh et al., 2005; Tauer & Harackiewicz, 2004; Urdan & Schoenfelder, 2006). These interaction schemes, also known as social incentives, serve as catalysts for goal attainment (Chen & Pu, 2014).

An extensive body of research has examined the effect of competition and cooperation on goal pursuit. In the last three decades, more than 3,000 studies have been published based on a Google Scholar search using the keywords "goal pursuit", "competition", and "cooperation". This significant number of published studies, spanning diverse contexts including work (e.g., Drago & Turnbull, 1991), fitness (e.g., Chen & Pu, 2014; Peng & Hsieh, 2012; Ring et al., 2022; Tauer & Harackiewicz, 2004), healthcare (e.g., Goršič et al., 2017; Westhoff et al., 2012), education (e.g., Dindar et al., 2021; Pesout & Nietfeld, 2021), and others, reflects the widespread scholarly interest in comprehending the dynamics of goal pursuit within the realm of social interaction.

The significance of social interaction in goal pursuit has also garnered great attention from industry professionals. It is evident that the widespread adoption of gamified competition and/or cooperation in consumer-focused industries has significantly surged in recent years (Bitrián et al., 2021; Wolf et al., 2020). Industry practitioners have actively embraced these gamification approaches, substantiated by research, to augment engagement levels (Suh et al., 2018; Zhang et al., 2023), cultivate stronger goal commitment (Hinsz, 2005; Peng & Hsieh, 2012), and drive overall performance improvements (Landers et al., 2019; Tauer & Harackiewicz, 2004). For example, Fitbit employs gamification elements such as challenges, badges, and social features to foster competition and cooperation among users, encouraging them to achieve their fitness goals.

Duolingo, the language-learning platform established in 2011, also leverages gamification techniques to motivate its users. It creates an environment where learners can engage in competition with friends and collaborate through study groups. Similarly, Waze, the community-based navigation app, gamifies user contributions by enabling competition for points, badges, and rankings. Users earn rewards by reporting accidents and providing real-time traffic updates, fostering active participation in improving the app's data accuracy.

Despite significant research exploring the influence of competition and cooperation across various domains, such as education and fitness, the majority of studies have primarily focused on proself goal setting. This focus revolves around individuals pursuing their own goals, such as improving their health. Limited attention has been given to investigating the effects of competitive and cooperative dynamics on individuals' motivation to achieve greater good, such as charitable donations. As a result, the exploration of competition and cooperation in the context of prosocial goal pursuit remains scarce.

Delineating divergent orientations in goal pursuit, proself goals prioritize the individual's own interests, while prosocial goals involve actions and efforts aimed at promoting the well-being of others, contributing to the greater good, or advancing societal goals (Bénabou & Tirole, 2006; Dai & Zhang, 2019; Trötschel & Gollwitzer, 2007; Wang et al., 2023). At its core, the distinction between prosocial goals and proself goals lies in the contrast between altruism and self-interest (Khan et al., 2020). Given the inherent distinction, it is expected that the effects of competition and cooperation would vary in prosocial goal pursuit compared to proself goal pursuit. However, the exploration of competition and cooperation in prosocial goal setting remains limited, with only a few studies touching upon this area without fully examining its intricacies. Kistruck et al. (2016) conducted a community construction field experiment to examine the effectiveness of competitive

and cooperative goal structures in motivating communities within a Base-of-the-Pyramid (BOP) field setting, where resources are limited, to contribute towards a collective good. Similarly, Morschheuser et al. (2019) investigated the impact of cooperation, competition, and inter-team competition on crowdsourcees' participation, perceived enjoyment, and willingness to recommend the system within the context of gamified crowdsourcing. In a recent study conducted by Cao et al. (2022), the investigation focused on how cooperation and competition, two commonly used gamified interactions, can motivate low-carbon actions within the context of a popular online payment platform in China. These scarce studies, although touching upon a narrow scope of prosocial goal settings, are confined to specific contexts such as green finance, crowdsourcing, or community construction within resource-scarce environments. As a result, their findings cannot be extrapolated to encompass the entirety of prosocial goal pursuit.

Another prevalent issue observed in the literature, regardless of whether it pertains to proself goal or prosocial goal settings, is the lack of consistent alignment among the findings of previous studies. Early studies did not reveal significant differences in terms of their effects on task involvement, motivation, and performance (Deutsch, 1949b; Goldman et al., 1977; Tauer & Harackiewicz, 2004). Only in recent years has research begun to uncover distinctions between these two goal structures. Certain studies have concluded that competition is more effective in motivating individuals to achieve their goals (e.g., Kistruck et al., 2016; Morschheuser et al., 2019). However, other studies have argued that cooperation fosters higher levels of goal persistence or participation compared to competition (e.g., Cao et al., 2022; Chen & Pu, 2014). Notwithstanding these findings, the field of research still lacks conclusive results in this regard.

Furthermore, these studies primarily emphasize behavioral engagement and performance, leaving many areas of goal pursuit unexplored. Notably, there is a lack of empirical research

exploring the impact of competition and cooperation on individuals' well-being, despite the significance of well-being in the context of goal pursuit (Wolf et al., 2021).

Considering the identified gaps, there is a need for further exploration into the impact of gamified interactions in prosocial goal settings. This study aims to address a crucial research question: What are the roles of gamified competition and cooperation in individuals' pursuit of prosocial goals? Specifically, given the inherent cooperative nature of prosocial goals and the strong association between cooperation and altruistic behavior documented in the literature (DeMarree et al., 2014; Hinde et al., 1991; Niven et al., 2019), our curiosity lies in understanding whether competition enhances or inhibits individuals' goal pursuit, enjoyment, and overall well-being in the prosocial setting.

The current study is expected to have notable theoretical and practical implications. Theoretically, it will contribute to the ongoing debate surrounding competition and cooperation by providing comprehensive insights that extend beyond the scope of previous research. This study will be the first to thoroughly investigate the role of social interactions in prosocial goal pursuit, going beyond the limitations of previous studies that focused primarily on proself goal settings. Furthermore, it will enhance our understanding of prosocial goal pursuit by examining not only engagement and performance but also factors such as enjoyment and customer well-being. From a practical perspective, the findings of this study will have implications for various industries. As businesses increasingly adopt gamified interactions and prosocial elements to incentivize customers (e.g., Strava, Forest), the insights from this study can guide effective utilization of these strategies and offer valuable insights to marketers aiming to incorporate gamification or prosocial elements into their own strategies.

This paper is structured as follows. First, we review the literature on prosocial goals and social interdependence structures, along with empirical findings that link the two. Building on these insights, we propose hypotheses regarding the effects of competition on various aspects of goal pursuit in prosocial contexts. We conduct two studies — a broad online survey across various domains and a targeted survey centered on the green finance program "Alipay Ant Forest" — to explore how social interactions contribute to achieving prosocial goals. Finally, we conclude the article with a comprehensive discussion of the theoretical and practical implications arising from the findings.

2 BACKGROUND LITERATURE

2.1 Prosocial Goals

Goals, defined as the desired outcomes individuals strive to attain through their actions (Kruglanski, 1996), encompass a broad spectrum ranging from short-term tasks to lifelong aspirations. These goals can be broadly classified into two main types: prosocial goals and proself goals, representing distinct orientations (Moskowitz & Grant, 2009). Proself goals, alternatively referred to as "self-centered goals" or "self-interested goals," typically center around the fulfillment of personal ambitions and desires. In contrast, prosocial goals prioritize the well-being and welfare of others, reflecting a focus on making positive contributions to the lives of others and promoting collective welfare (Bergin, 2019). Examples of prosocial goals include making charitable donations, actively engaging in environmental conservation activities, and regularly performing random acts of kindness.

In contrast to proself goals, which are characterized by straightforward egoistic motivations (Cropanzano et al., 2005), the motivations behind prosocial goals are inherently complex. In-depth research has uncovered a wide array of motivations that drive individuals to engage in prosocial goals. These motivations encompass factors originating from within the individual, such as altruistic motives, other-regarding preferences, and prosocial emotions. Additionally, external social forces, including norms, reputation systems, and social networks, also play a significant role in shaping these motivations (Grueneisen & Warneken, 2022; Lay & Hoppmann, 2015; Martin & Olson, 2015; Padilla-Walker & Carlo, 2015; Simpson & Willer, 2015).

The pursuit of prosocial goals is frequently associated with positive outcomes. Engaging in prosocial behaviors not only enhances individual well-being, including happiness and life satisfaction (Dunn et al., 2008; Kim et al., 2022; Klein, 2017; Lyubomirsky et al., 2005; Thoits &

Hewitt, 2001), but also has broader societal implications. By actively pursuing prosocial goals, individuals contribute to the development of meaningful relationships, the establishment of social connections, and the strengthening of communities (Reis et al., 2004).

The recognition of these benefits extends beyond individuals and has also influenced organizational practices. Many businesses have integrated prosocial elements into their reward systems. For instance, the Forest app, a productivity app, incentivizes users with virtual and real trees as rewards for maintaining focus on their tasks. Moreover, there are organizations that prioritize prosocial goals over financial gains, such as AliPay Ant Forest, KickStarter, and Free Rice. These initiatives not only bring individual benefits but also contribute to the overall well-being and cohesiveness of society.

2.2 Social Interdependence Theory

Social interdependence theory is a psychological framework that explores the interconnectedness and interdependence of individuals within social contexts (Deutsch, 1949a). It investigates how individuals' behaviors, attitudes, and ultimate achievements are shaped by their interactions and relationships with others. Central to this theory is the recognition that individual outcomes are not solely the result of independent actions but are also influenced by the actions and outcomes of those with whom they share interdependence (Johnson & Johnson, 1989).

According to the theory, there are two types of interdependence: positive interdependence, characterized by individuals working together towards shared goals, and negative interdependence, which involves competition and conflicting interests (Johnson & Johnson, 2005; Wolf et al., 2021). Competition creates a sense of rivalry where individuals or teams strive to outperform each other, while cooperation entails working together towards a common goal or

mutual benefit (Tauer & Harackiewicz, 2004). Competition arises when individuals' goal achievements conflict, whereas cooperation occurs when their goal achievements are compatible (Deutsch, 1949a; Deutsch, 1949b; Johnson et al., 1986). These interdependence structures of competition and cooperation are inherent elements in most digital games and a widely used design pattern that has been applied to various non-game contexts (Leclercq et al., 2018). Over time, a variety of sectors, notably education and businesses, have increasingly incorporated gamified competition and gamified cooperation (Johnson & Johnson, 2005). These strategies are implemented with the aim of satisfying three fundamental psychological needs: autonomy, competence, and relatedness (Suh et al., 2018). By addressing these needs, these strategies can stimulate individuals' intrinsic motivation and, consequently, foster their active engagement within these specific contexts (Mekler et al., 2017).

2.3 Competitive and Cooperative Dynamics in Prosocial Goal Setting

Table 1 presents a summary of the key studies that have investigated the effects of competition and cooperation on individuals’ goal pursuit in both proself and prosocial settings.

Table 1. Competitive and Cooperative Dynamics in Goal Pursuit in Published Literature

Study	Independent Variables		Dependent Variables					Key Findings
	COM	COO	ENG	CEI	PER	ENJ	WLB	
Proself Goal Setting								
Chen & Pu (2014)	√	√	√					• Cooperation motivates users to participate in physical activities, while competition reduces engagement. • Competition motivates dyads if they have equivalent availabilities but is likely to demotivate them if otherwise.
Deutsch (1949b)	√	√	√		√	√		• No significant difference between the effects of competition and cooperation on interest, involvement, and performance.
Dindar et al. (2021)	√	√			√	√	√	• No significant difference between competition and cooperation in terms of learning achievement and interests. • Cooperating facilitates higher social relatedness compared to competition.
Peng & Hsieh (2012)	√	√	√		√			• Both competition and cooperation had no impact on performance. • Cooperation was a stronger motivator compared to competition.
Stanne et al. (1999)	√	√			√		√	• Cooperation resulted in greater performance, social support, and self-esteem than competition.
Tauer & Harackiewicz (2004)	√	√			√	√	√	• No significant difference in task enjoyment nor performance was found between cooperation and competition. • Participants in competition reported higher levels of competitive excitement, whereas participants in cooperation reported higher levels of interpersonal enthusiasm.

Study	Independent Variables		Dependent Variables					Key Findings
	COM	COO	ENG	CEI	PER	ENJ	WLB	
Proself Goal Setting								
Wolf et al. (2021)	√	√	√		√		√	• Both competition and cooperation increased behavioral engagement. • Competition is more effective in driving performance and personal growth, while cooperation is superior in terms of behavioral engagement and life satisfaction.
Prosocial Goal Setting								
Cao et al. (2022)	√	√	Low-carbon actions			√[a]		• Gamified competition and cooperation both encourage low-carbon actions, with cooperation being more effective. • Both competition and cooperation stimulated users' low-carbon actions, mediated by perceived environmental responsibility, perceived enjoyment, and social gain.
Morschheuser et al. (2019)	√	√	√			√		• No significant difference in perceived enjoyment was found between competition and cooperation. • Competition engaged users more compared to cooperation.
Kistruck et al. (2016)	√	√	√					• Competition generally led to higher levels of motivation within a resource scarce environment compared to cooperation.

Note. COM = Competition; COO = Cooperation; ENG = Behavioral Engagement; CEI = Continued Engagement Intention; PER = Performance; ENJ = Enjoyment; WLB = Well-being.

[a] Enjoyment was measured as a mediator.

The summarized table highlights that a considerable number of studies, irrespective of the goal context, have primarily focused on examining the impact of social interactions on areas such as performance and behavioral engagement, while giving relatively less attention to well-being aspects. Additionally, the ongoing debate among researchers regarding whether activities should be structured in a cooperative or competitive manner to enhance engagement and performance has yielded inconclusive results (e.g., Deutsch, 1949b; Goldman et al., 1977; Johnson & Johnson, 1989; Stanne et al., 1999). Notably, Table 1 reveals that the majority of studies have been conducted within the framework of proself goal setting, with only a limited number of studies exploring the realm of prosocial goal settings.

To gain insights into motivating communities to contribute towards the collective good, Kistruck et al. (2016) conducted a field experiment in resource-scarce rural Sri Lankan communities. In this study, 44 communities were tasked with contributing resources for the construction of a school building. The findings, supported by follow-up interviews and focus groups, indicate that competitive goal structures generally foster higher motivation levels in resource-scarce environments. Additionally, cooperative goal structures can be highly motivating when groups are unfamiliar with each other, as cooperation with unfamiliar groups grants access to valuable and scarce knowledge in such contexts.

In the context of crowdsourcing, which serves as a mechanism to pursue prosocial goals, Morschheuser et al. (2019) conducted a field experiment to investigate the effectiveness of competition-based and cooperation-based designs in motivating users. The study explored the impact of three gamified conditions (competitive, cooperative, and inter-team competitive gamification) on users' perceived enjoyment, perceived usefulness of the system, and their behaviors, including system usage, crowdsourcing participation, engagement with the

gamification feature, and willingness to recommend the crowdsourcing application. The results revealed that inter-team competition was associated with higher enjoyment and increased crowdsourcing participation. However, no significant difference in perceived enjoyment was found between competitive and cooperative designs. Furthermore, the competitive design exhibited significantly higher engagement with gamification features compared to the cooperative design, while users were more likely to recommend crowdsourcing approaches when the gamification included cooperation.

In a recent study by Cao et al. (2022), the impact of gamified competition and cooperation on consumers' low-carbon actions was explored through the lens of goal-framing theory. The researchers collected survey data from users of Ant Forest on Alipay, a popular online payment platform in China, and utilized a structural equation model for analysis. The findings revealed that gamification design effectively promoted consumers' pro-environmental behavior. Both competitive and cooperative interactions stimulated users' low-carbon actions, mediated by perceived environmental responsibility, perceived enjoyment, and social gain. Notably, the incentive effect of cooperation outweighed that of competition.

While Cao et al.'s (2022) study focused on users of Ant Forest, our study has a broader sample scope, encompassing users from diverse apps across various domains. Furthermore, we not only assess perceptions but also collect data on actual behaviors, ensuring a more objective and accurate dataset. Additionally, our study expands the investigation beyond enjoyment and general low-carbon activities to include users' performance, continued engagement intention, and overall well-being. These differences underscore the significance and necessity of our current study.

Given the increasing adoption of both gamification and prosocial elements across various industries, there is a pressing need for a comprehensive study to examine the impact of gamified

competition and cooperation on individuals' engagement, continued engagement intention, performance, enjoyment, and well-being within the context of pursuing prosocial goals. In the following section, we will provide detailed explanations of the proposed research hypotheses.

3 HYPOTHESES DEVELOPMENT

The objective of this paper is to conduct a comprehensive examination of the impact of social interactions within the context of prosocial goal setting. In light of this, we present separate hypotheses for each aspect under investigation. While both competition and cooperation have been explored in this study, it is important to note that prosocial goals and cooperation are inherently interconnected (DeMarree et al., 2014; Hinde et al., 1991; Niven et al., 2019). As a result, our primary emphasis is on competition, and the subsequent hypotheses presented specifically address the impact of competition on individuals' pursuit of prosocial goals.

3.1 Engagement

Competitive dynamics are often linked to increased behavioral engagement. Research has consistently shown that competition taps into individuals' intrinsic motivation, prompting them to showcase their competence and surpass others (e.g., Banfield & Wilkerson, 2014; Burguillo, 2010). The desire to win or achieve success fuels greater engagement and commitment to the task or activity. Furthermore, competition fosters social comparison, whereby individuals evaluate their performance in relation to others, creating a sense of urgency and motivation to improve, thereby heightening engagement (Davis et al., 2017; Garcia et al., 2013).

While previous studies have highlighted the positive role of competition in fostering behavioral engagement in general goal pursuit, it is important to recognize that competition may actually conflict with prosocial goals (Puffer, 1987). This is because competition is often associated with individual success and outperforming others, which can undermine prosocial behavior engagement by promoting a self-centered focus and reducing cooperation (Coleman, 1987). Additionally, competition can diminish intrinsic motivation when the emphasis shifts

towards winning rather than the intrinsic enjoyment of the activity itself (Deci et al., 1981; Vallerand et al., 1986) or when opponents are unequally matched (Liu et al., 2013). In the specific context of crowdsourcing, Massung et al. (2013) have highlighted that pure competitive structures can demotivate users, particularly when they directly compete with highly skilled crowdsourcees.

Considering the inherent cooperative nature of prosocial goals, it becomes apparent that competition can have a dual impact, potentially both undermining and enhancing intrinsic motivation in the prosocial context (Tauer & Harackiewicz, 1999). Taking this complexity into consideration, we propose two competing hypotheses regarding engagement:

H_{1a}: Competition augments behavioral engagement in prosocial goal setting.

H_{1b}: Competition diminishes behavioral engagement in prosocial goal setting.

3.2 Continued Engagement Intention

Continued engagement intention refers to the inclination to maintain active involvement and sustain engagement in a specific domain or task. It can be seen as a post-adoption decision driven by lifestyle choices (Bhattacherjee, 2001). Previous research has shown a positive association between continued engagement intention and user motivations (Kim et al., 2013; Kulta & Karjaluoto, 2016). Furthermore, it is regarded as an interrelated construct with current behavioral engagement, where the latter influences and reinforces the former, while continued engagement intention motivates and sustains ongoing behavioral engagement (Tarute et al., 2017). Taking into account the potential influence of competition, as discussed earlier, which can either enhance or inhibit user motivation and current behavioral engagement, we propose two competing hypotheses regarding continued engagement intention:

H_{2a}: Competition increases continued engagement intention in prosocial goal setting.

H_{2b}: Competition decreases continued engagement intention in prosocial goal setting.

3.3 Performance

There is ongoing debate among researchers regarding whether competition enhances or impairs performance. Some scholars argue that competition boosts motivation and improves performance (Abra, 1993; Smith, 1937; Worrell et al., 2016). For instance, in the context of gamification, Burguillo (2010) highlighted that competition-based learning can effectively motivate students and enhance their performance. Likewise, Ives et al. (2020) discovered that a clearly defined competitive environment can result in enhanced physical performance when compared to a non-competitive environment. However, a number of researchers hold an opposing perspective, contending that competition undermines motivation and has a negative impact on performance (e.g., Deutsch, 1949b). Campbell and Furrer (1995) found that competition within a goal setting condition had a detrimental impact on task performance, potentially due to the interference it caused in cognitive processes such as decreased concentration or increased anxiety. To synthesize these two divergent perspectives, Murayama and Elliot (2012) conducted a comprehensive meta-analytic review on the relationship between competition and performance. Their findings align with the opposing processes model, which suggests that the absence of a direct effect is due to the inconsistent mediation through achievement goals. Specifically, competition stimulates performance-approach goals, which in turn facilitate performance, while also prompting performance-avoidance goals that undermine performance.

In the specific context of prosocial goals, the mechanism underlying the relationship between competition and performance is analogous to the competition-engagement dynamic that

we discussed earlier. On one hand, competition can drive performance by instilling a sense of urgency, motivation, and increased effort to outperform others (Davis et al., 2017; Garcia et al., 2013). On the other hand, competition may hinder performance in prosocial goal settings by diverting attention away from cooperation and collaboration, resulting in a more self-centered approach and reduced cooperation among individuals (Deci et al., 1981). Therefore, we propose two competing hypotheses regarding performance:

H_{3a}: Competition improves performance in prosocial goal setting.

H_{3b}: Competition impairs performance in prosocial goal setting.

3.4 Enjoyment

Competition has the potential to enhance enjoyment in prosocial goal setting under certain conditions. Studies suggest that competition can foster excitement, engagement, and motivation among individuals (McCarthy et al., 2008; Tauer & Harackiewicz, 1999). This positive effect on enjoyment is further bolstered when the competition is structured in a manner that promotes collective progress, as demonstrated by the study conducted by Kistruck et al. (2016). Additionally, Cao et al. (2022) conducted a study on Ant Forest users, which provided evidence that when the competitive element encourages participants to strive for higher levels of environmental impact, it creates a stimulating environment that amplifies enjoyment. In such cases, competition serves as a means to inspire and challenge individuals to contribute more effectively towards prosocial goals, resulting in a greater sense of fulfillment and satisfaction.

However, it is important to note that competition can also diminish enjoyment in prosocial goal setting. As we discussed earlier in the “engagement” and “performance” sections, when the

competitive aspect becomes the primary focus, it may divert attention from the underlying prosocial goals and the intrinsic motivation to make a positive impact (Coleman, 1987). If individuals prioritize winning or outperforming others over the collective benefit, it can undermine the cooperative spirit that is often crucial in prosocial endeavors. This shift in focus may reduce the overall enjoyment of working towards the shared goal, as the emphasis moves away from the intrinsic satisfaction of making a difference and towards extrinsic rewards or recognition (Deci et al., 1981; Epstein & Harackiewicz, 1992; Vallerand et al., 1986). Moreover, competition can also trigger negative emotions such as fear of failure, stress, and anxiety, which can further undermine enjoyment (Murayama & Elliot, 2012; Wolf et al., 2021).

Here, taking these factors into account, we present two competing hypotheses regarding enjoyment:

H_{4a}: Competition enhances enjoyment in prosocial goal setting.

H_{4b}: Competition diminishes enjoyment in prosocial goal setting.

3.5 Well-being

Affective Social Identity. Affective social identity refers to an individual's emotional attachment and identification with a specific social group (Chiu et al., 2013). It encompasses the subjective feelings of belongingness and emotional connection that individuals experience towards the group (Bagozzi & Dholakia, 2006). While some researchers (e.g., Bitrián et al., 2021; Van Roy & Zaman, 2019; Wee & Choong, 2019) argue that competition can enhance affective social identity by promoting feelings of relatedness and social connections, we propose that competition typically weakens affective social identity. Competition often activates a differentiation mindset,

emphasizing self-distinctiveness and individuality (Stapel & Koomen, 2005). In this mindset, individuals may feel less inclined to identify with or feel connected to a larger social group. Furthermore, competition can trigger the "I" priming or self-priming effect, which contradicts the cooperative mindset typically associated with prosocial settings that emphasize "We" priming (Riar et al., 2023). This can lead to a decreased sense of connection or affiliation within the specific group. Based on these considerations, we propose the following hypothesis regarding affective social identity:

H_5: Competition weakens affective social identity in prosocial goal setting.

Self-esteem. Self-esteem encompasses an individual's subjective evaluation of their self-worth, self-confidence, and self-acceptance, playing a vital role in shaping their thoughts, emotions, behaviors, and overall well-being (Crocker & Wolfe, 2001; Stanne et al., 1999). While some argue that competition can potentially enhance self-esteem, asserting that winning or excelling in a competitive environment validates one's abilities and competence, thereby boosting self-esteem (Ames & Ames, 1978), we contend that competition poses a threat to self-esteem in prosocial goal settings. Kohn (1992) explicitly states that competition undermines self-esteem and damages relationships. Specifically, in prosocial goal settings that emphasize cooperation, a highly competitive environment can create heightened pressure, fear of failure, and, significantly, negative social comparisons (Murayama & Elliot, 2012; Wolf et al., 2021). These factors contribute to feelings of inadequacy, self-doubt, and ultimately lower self-esteem (Aspinwall & Taylor, 1993). Vogel et al. (2014) examined the relationship between social media use, social comparison, and self-esteem, finding that frequent social media use is associated with lower trait

self-esteem mediated by upward social comparisons. In other words, as competition involves social comparisons, these comparisons are likely to lead to reduced self-esteem. Therefore, in the context of prosocial goal settings, we propose:

H_6: Competition undermines self-esteem in prosocial goal setting.

Life Satisfaction. Life satisfaction refers to an individual's subjective evaluation or judgment of their overall happiness, contentment, and fulfillment in life (Landesman, 1986). It encompasses various dimensions, including physical, emotional, social, and psychological aspects (Charlemagne-Badal et al., 2015). While some argue that competition can positively influence life satisfaction by eliciting excitement, engagement, and motivation (Wolf et al., 2021), particularly when achieving victory over others (Tjosvold et al., 2008), we contend that competition in prosocial goal settings can potentially diminish life satisfaction. In such settings, where the focus is on collective well-being, competition that prioritizes individual success can undermine the cooperative spirit of community. This shift from intrinsic satisfaction derived from making a positive impact to seeking extrinsic rewards or recognition can diminish overall life satisfaction (Deci et al., 1981; Vallerand et al., 1986). Additionally, competition may give rise to negative emotions such as stress, anxiety, envy, and fear of failure (Eslami & Arshadi, 2016; Murayama & Elliot, 2012), further eroding life satisfaction. Therefore, we propose the following hypothesis:

H_7: Competition diminishes life satisfaction in prosocial goal setting.

4 STUDY 1

4.1 Study Goal

Study 1 had three main objectives. Firstly, by collecting data from app users across various domains, it served as a pilot study for subsequent research, offering insights into how social interactions impact consumers' behaviors and well-being in real-life scenarios. Secondly, the study sought to comprehensively understand the features of these apps and create a mapping that demonstrates their distribution along two dimensions: competitive-cooperative spectrum and proself-prosocial spectrum. Lastly, recognizing that gamified competition and cooperation are distinct constructs rather than a continuum, the study also explored the interaction between competitive and cooperative dynamics in goal pursuit.

Our primary focus was on examining the impact of competitive and cooperative dynamics within a prosocial goal setting, while also exploring their effects within neutral and proself goal settings as additional conditions.

4.2 Method

4.2.1 Data Collection and Sample

Adhering to the methodology proposed by Wolf et al. (2021), we developed an online questionnaire and utilized CloudResearch to gather data from actual users of different mobile applications. By analyzing real user interactions with mobile application platforms in their goal pursuit, this study uncovered the influence of gamified interactions on various dimensions, including behavioral engagement, continued engagement intention, performance, enjoyment, affective social identity, self-esteem, and life satisfaction.

To incentivize respondents from CloudResearch, we followed the suggested compensation

amount of $.65 for each response. A total of 500 samples were collected, and after removing one sample that failed the attention check, we retained a valid sample of 499 respondents (48.9% female, M_{age} = 38).

In contrast to Wolf et al. (2021), who collected data from actual users of six specific apps in education, fitness, and nutrition contexts, we took a different approach. We asked respondents to indicate a mobile app of their choice that they have recently used, which incorporates competition and/or cooperation features. There are two reasons behind this approach. Firstly, we aimed to explore consumers' real-life app usage experiences in a more open-ended manner. This allowed us to analyze the data based on respondents' own perceptions of the app's competitive and cooperative features, rather than relying on a predefined list based on our own understanding of the apps. Secondly, we intended to compile a comprehensive list of mobile apps that incorporate at least one design element promoting competition or cooperation. This was done to gain a better grasp of the app landscape and how they embrace the "competitive-cooperative" and "proself-prosocial" aspects. As a result, we obtained a sample of 499 valid responses, encompassing reports on 116 distinct apps spanning various contexts.

4.2.2 Survey Design and Measures

The survey followed the following structure: Initially, respondents were prompted to indicate a mobile app they had recently used that included competition (e.g., leaderboards ranking or contests) and/or cooperation features (e.g., shared goals or group activities). Examples like Forest, Habitica, Strava, and Duolingo were provided to stimulate their thoughts. From that point on, all subsequent questions were centered around the app they had initially indicated.

Participants were then asked to assess the level of competitiveness and cooperativeness they

perceived in the app's tasks. To measure these two constructs, we employed a four-item scale for each construct adapted from Gerpott et al. (2018). Additionally, respondents were asked to determine whether the type of incentives or benefits the platform offers to users were primarily self-benefiting, primarily other-benefiting, or somewhere in between. For measuring goal orientation related to the app as perceived by individual users, we created a seven-point scale (1 = "benefit me", 4 = "equally benefit me and others", and 7 = "benefit others").

In the subsequent section, dedicated to measuring criterion variables, participants were presented with questions pertaining to their usage behaviors on the app. These questions encompassed various aspects, including behavioral engagement, continued engagement intention, performance, enjoyment, affective social identity, self-esteem, and life satisfaction. To assess behavioral engagement, respondents were asked to indicate the frequency of app usage using a six-point ordinal scale, ranging from "less than once per month" to "more than once a day". To gauge continued engagement intention, we devised a two-item scale that evaluated users' willingness and likelihood to continue using the app. The remaining constructs related to usage behaviors were measured using seven-point Likert scales, where 1 indicated "strongly disagree" and 7 indicated "strongly agree". Performance over the four-week period was measured using four items adapted from Greguras and Diefendorff (2010). Enjoyment was assessed using two items adapted from Morschheuser et al. (2019). Affective social identity was measured using a two-item scale, adapted from Bagozzi and Dholakia (2006). Self-esteem and life satisfaction were evaluated using three items each, adapted from Rosenberg (1979) and Diener et al. (1985), respectively.

In the final section, an attention check question was included to ensure participants' attentiveness, followed by a request for demographic information, such as age and gender.

The measurement model in this study exhibits acceptable reliability, convergent validity,

and discriminant validity (see Appendix A). Cronbach's alphas exceed the widely used threshold of .70, indicating reliable constructs (Nunnally, 1978). All indicator loadings are above .70, affirming the items' strong relationship with their corresponding constructs. AVE values exceed the threshold of .50, demonstrating satisfactory convergent validity, while CR values surpass .70, indicating high construct reliability (Fornell & Larcker, 1981). Furthermore, discriminant validity is confirmed as all correlation values are lower than the square root of the AVEs.

4.2.3 Data Analysis

The data analysis was conducted using R version 4.1.0. Considering the data collected from 116 apps, we standardized both the predictor variables (perceived competition, perceived cooperation) and the criterion variables (behavioral engagement, continued engagement intention, performance, enjoyment, affective social identity, self-esteem, and life satisfaction) based on the mean of each respective app. This approach was adopted to eliminate the potential influence of systematic differences in effect sizes across different apps or app contexts (Wolf et al., 2021). Moreover, since we are examining the influence of gamified interactions in three distinct conditions (prosocial goal, neutral goal, and proself goal), we introduced a new variable based on individuals' perceptions of the app's prosocialness. We categorized all samples into three groups based on the following criterion: respondents with a reported score greater than 4 were classified into the prosocial group, those with a score less than 4 were classified into the proself group, and the remaining respondents were placed in the neutral group.

For the primary analysis, multiple linear regressions were employed to examine the impact of competition, cooperation, and their interaction on various criterion variables within different contexts, specifically prosocial-goal driven, neutral-goal driven, and proself-goal driven scenarios.

To validate the integrity of our model, we performed various diagnostic tests to evaluate the fulfillment of the underlying assumptions. Specifically, we examined the Pearson correlation coefficients, which ranged from -.05 to .13. These coefficients indicate low to moderate levels of correlation. All correlations remained below the widely accepted threshold of .70 (Hair et al., 2014), thus indicating that multicollinearity is not a significant issue in our regression analysis.

4.2.4 Model

In order to examine the impact of goal orientation in three distinct settings, we conducted seven regression models using the same set of predictor variables (perceived competition, perceived cooperation, and interaction) and control variables (age and gender), but with different criterion variables. The seven regression models were as follows:

(1) $ENG_i = \beta_{10} + \beta_{11}PCOM_i + \beta_{12}PCOO_i + \beta_{13}AGE_i + \beta_{14}GEN_i + \beta_{15}PCOM_i \times PCOO_i + \varepsilon_{1i}$

(2) $CEI_i = \beta_{20} + \beta_{21}PCOM_i + \beta_{22}PCOO_i + \beta_{23}AGE_i + \beta_{24}GEN_i + \beta_{25}PCOM_i \times PCOO_i + \varepsilon_{2i}$

(3) $PER_i = \beta_{30} + \beta_{31}PCOM_i + \beta_{32}PCOO_i + \beta_{33}AGE_i + \beta_{34}GEN_i + \beta_{35}PCOM_i \times PCOO_i + \varepsilon_{3i}$

(4) $ENJ_i = \beta_{40} + \beta_{41}PCOM_i + \beta_{42}PCOO_i + \beta_{43}AGE_i + \beta_{44}GEN_i + \beta_{45}PCOM_i \times PCOO_i + \varepsilon_{4i}$

(5) $ASI_i = \beta_{50} + \beta_{51}PCOM_i + \beta_{52}PCOO_i + \beta_{53}AGE_i + \beta_{54}GEN_i + \beta_{55}PCOM_i \times PCOO_i + \varepsilon_{5i}$

(6) $EST_i = \beta_{60} + \beta_{61}PCOM_i + \beta_{62}PCOO_i + \beta_{63}AGE_i + \beta_{64}GEN_i + \beta_{65}PCOM_i \times PCOO_i + \varepsilon_{6i}$

(7) $LSF_i = \beta_{70} + \beta_{71}PCOM_i + \beta_{72}PCOO_i + \beta_{73}AGE_i + \beta_{74}GEN_i + \beta_{75}PCOM_i \times PCOO_i + \varepsilon_{7i}$

Where: *PCOM* is user's perceived competition toward the mobile app.

PCOO is user's perceived cooperation toward the mobile app.

ENG is user's behavioral engagement in the mobile app.

CEI is user's continued engagement intention in the mobile app.

PER is user's performance in the mobile app.

ENJ is user's enjoyment in the mobile app.

ASI is user's affective social identity in the mobile app community.

EST is user's overall self-esteem.

LSF is user's overall life satisfaction.

AGE is user's age.

GEN is user's gender.

ε is the error term.

4.3 Results

4.3.1 Apps Mapping

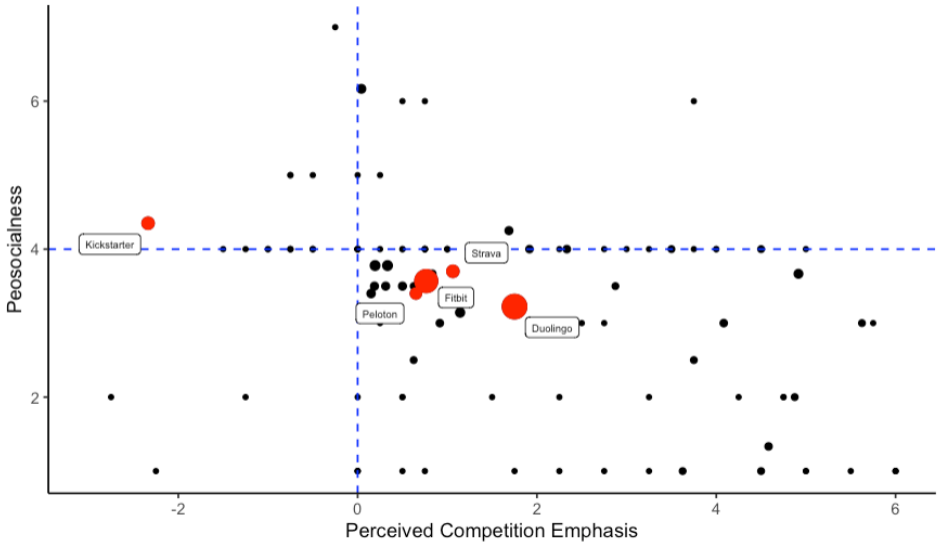
As part of Study 1's objective to gain a comprehensive understanding of the 116 collected apps, we performed a descriptive analysis to examine their distribution across two dimensions: the competitive-cooperative spectrum and the proself-prosocial spectrum. To create a unified continuum for the competitive-cooperative spectrum, we adopted the approach of Wolf et al. (2021) and generated a new variable called "Perceived Competition Emphasis" by subtracting perceived cooperation from perceived competition. This calculation was based on the concept of competitive psychological climate (Brown et al., 1998).

Based on Figure 1, the analysis revealed that among the 116 apps collected, the top five most frequently mentioned apps were Duolingo (N = 139), Fitbit (N = 118), Kickstarter (N = 20), Strava (N = 20), and Peloton (N = 15), which are highlighted in red. The majority of apps are situated in the fourth quadrant, representing high perceived competition emphasis and low

prosocialness (see Appendix B for details). Among the 116 apps collected from the survey, a significant portion of 83 apps (71.55%) demonstrated a high perceived competition emphasis, with 20 apps (17.24%) showing a low emphasis and 13 apps (11.21%) falling into the neutral category. In terms of prosocialness, 57 apps (49.14%) were classified as low, 47 apps (40.52%) were categorized as neutral, and the remaining 12 apps (10.34%) exhibited a high level of prosocialness.

From the sample perspective, out of the 499 valid samples collected, a majority of 299 respondents (59.52%) indicated a high perceived competition emphasis for the app, followed by 121 respondents (24.25%) indicating a low emphasis, and 68 respondents (13.63%) indicating a neutral emphasis. In terms of prosocialness, 278 respondents (55.71%) reported a neutral level, 171 samples (34.27%) indicated a low level, and 50 samples (10.02%) indicated a high level. The subsequent main analysis was conducted separately for the high, low, and neutral prosocialness groups, with their respective sample sizes. Table 2 provides a summary of the regression results for the prosocial setting. The detailed regression results for the proself and neutral groups can be found in Appendix C.

Figure 1. Apps Distribution by Perceived Competition Emphasis and Prosocialness



4.3.2 Behavioral Engagement

According to the findings presented in Table 2, in the context of prosocial goal setting (N = 50), perceived cooperation showed a marginal negative association with behavioral engagement, b = -.505, se[b] = .297, t = -1.699, p = .096. This suggests that as customers perceive more cooperation in the app, their engagement with activities and tasks tends to decrease. On the other hand, perceived competition did not have a significant (but a positive directional effect) on behavioral engagement, b = .403, se[b] = .287, t = 1.405, p = .167. Additionally, the interaction between perceived cooperation and perceived competition was not significant, b = .157, se[b] = .228, t = .690, p = .494. The findings did not provide support for either H_{1a} or H_{1b}.

In the proself setting (N = 171), the regression results revealed significant associations between behavioral engagement and both perceived competition and perceived cooperation (see Appendix C). Perceived competition emerged as a significant and positive predictor (b = .229, se[b] = .088, t = 2.591, p = .010), while perceived cooperation showed a significant and negative relationship (b = -.138, se[b] = .062, t = -2.227, p = .027). Additionally, a significant interaction effect was observed between perceived competition and cooperation, b = .119, se[b] = .042, t = 2.799, p = .006. Further examination through simple slope analyses demonstrated that the effect of perceived competition was significant at 1 standard deviation above the mean of perceived cooperation (b = .37, se[b] = .13, t = 2.94, p < .001), at the mean of perceived cooperation (b = .19, se[b] = .08, t = 2.34, p = .02), but not at 1 standard deviation below the mean (b = .00, se[b] = .07, t = .06, p = .95). The effect was stronger for higher levels of perceived cooperation.

In the neutral setting (N = 278), no significant main effects of either predictor variables or interaction effects were found (see Appendix C).

4.3.3 Continued Engagement Intention

As Table 2 indicated, in the prosocial setting (N = 50), higher perceived competition was significantly associated with increased continued engagement intention, b = .451, se[b] = .139, t = 3.245, p = .002. No significant main effect of perceived cooperation (b = .044, se[b] = .144, t = .307, p = .760) or interaction effect (b = .099, se[b] = .110, t = .899, p = .374) was found. The findings provided support for H_{2a}.

In the proself setting (N = 171), continued engagement intention was significantly predicted by both perceived competition (b = .364, se[b] = .068, t = 5.338, p < .001) and perceived cooperation (b = -.105, se[b] = .048, t = -2.205, p = .029). Moreover, there was a significant interaction effect between perceived competition and cooperation, b = .073, se[b] = .033, t = 2.223, p = .028. Simple slope analyses revealed that the effect of perceived competition was significant at 1 standard deviation above the mean of perceived cooperation (b = .45, se[b] = .10, t = 4.64, p < .001), at the mean of perceived cooperation (b = .34, se[b] = .06, t = 5.48, p < .001), and at 1 standard deviation below the mean (b = .23, se[b] = .06, t = 3.95, p < .001). A stronger effect for higher levels of perceived cooperation was revealed.

In the neutral setting (N = 278), both perceived competition (b = .189, se[b] = .043, t = 4.360, p < .001) and perceived cooperation (b = .095, se[b] = .037, t = 2.585, p = .010) significantly predicted continued engagement intention. However, no significant interaction effect was found between these predictors, b = .005, se[b] = .021, t = .249, p = .803.

4.3.4 Performance

In the prosocial setting (N = 50), higher perceived competition was significantly associated with increased performance, b = .636, se[b] = .179, t = 3.561, p = .001. There were no significant

main effects of perceived cooperation (b = .297, se[b] = .185, t = 1.606, p = .115) or an interaction effect (b = -.231, se[b] = .142, t = -1.626, p = .111). The findings provided support for H_{3a}.

For the proself setting (N = 171), performance was significantly predicted by perceived competition (b = .286, se[b] = .070, t = 4.072, p < .001), but not by perceived cooperation (b = -.047, se[b] = .049, t = -.944, p = .346). Furthermore, a significant interaction effect was observed between perceived competition and cooperation, b = .075, se[b] = .034, t = 2.218, p = .028. Simple slope analyses revealed that the effect of perceived competition was significant at 1 standard deviation above the mean of perceived cooperation (b = .38, se[b] = .10, t = 3.75, p < .001), at the mean of perceived cooperation (b = .26, se[b] = .06, t = 4.08, p < .001), and at 1 standard deviation below the mean (b = .14, se[b] = .06, t = 2.45, p = .02). The effect was stronger for higher levels of perceived cooperation.

In the neutral setting (N = 278), both perceived competition (b = .217, se[b] = .049, t = 4.405, p < .001) and perceived cooperation (b = .166, se[b] = .042, t = 3.961, p < .001) significantly predicted performance. However, there was no significant interaction effect between these predictors, b = -.016, se[b] = .024, t = -.667, p = .505.

4.3.5 Enjoyment

In the prosocial setting (N = 50), no significant main effects of perceived competition (b = .278, se[b] = .175, t = 1.589, p = .119), perceived cooperation (b = -.021, se[b] = .181, t = -.116, p = .908), or an interaction effect (b = .143, se[b] = .139, t = 1.027, p = .310) were found. The findings did not provide support for either H_{4a} or H_{4b}.

In the proself setting (N = 171), performance was significantly predicted by perceived competition (b = .222, se[b] = .058, t = 3.850, p < .001) and perceived cooperation (b = -.070, se[b]

= .040, t = -1.728, p = .086). However, there was no significant interaction effect between perceived competition and perceived cooperation, b = .039, se[b] = .028, t = 1.407, p = .161.

In the neutral setting (N = 278), both perceived competition (b = .189, se[b] = .041, t = 4.557, p < .001) and perceived cooperation (b = .092, se[b] = .035, t = 2.615, p = .009) significantly predicted performance. However, there was no significant interaction effect between these predictors, b = .024, se[b] = .020, t = 1.200, p = .231.

4.3.6 Affective Social Identity

In the prosocial setting (N = 50), the regression analysis revealed a significant main effect of perceived competition, b = .604, se[b] = .168, t = 3.587, p = .001, indicating that higher perceived competition was associated with higher affective social identity. Perceived cooperation was not a significant predictor of affective social identity, b = .221, se[b] = .174, t = 1.269, p = .211. Also, there was no significant interaction between perceived competition and perceived cooperation, b = .102, se[b] = .134, t = .762, p = .450. The findings rejected H_5.

In the proself setting (N = 171), we found significant main effects of both perceived competition (b = .523, se[b] = .098, t = 5.345, p < .001) and cooperation (b = .327, se[b] = .068, t = 4.773, p < .001). However, we did not find a significant interaction between the two predictors, b = .054, se[b] = .047, t = 1.140, p = .256.

In the neutral setting (N = 278), both perceived competition (b = .284, se[b] = .059, t = 4.771, p < .001) and cooperation (b = .396, se[b] = .050, t = 7.863, p < .001) were significant positive predictors of affective social identity. However, we did not find a significant interaction between the two predictors, b = .012, se[b] = .029, t = .422, p = .674.

4.3.7 Self-Esteem

Based on the results presented in Table 2, in the context of prosocial goal setting (N = 50), perceived competition was positively associated with users' self-esteem, b = .393, se[b] = .148, t = 2.650, p = .011. This suggests that as users perceive more competition in the app, their self-esteem tends to increase. Additionally, there was a significant interaction between perceived cooperation and perceived competition, b = .313, se[b] = .118, t = 2.653, p = .011. Further analysis showed that the effect of perceived competition was significant at 1 standard deviation above the mean of perceived cooperation (b = .86, se[b] = .20, t = 4.28, p < .001), at the mean of perceived cooperation (b = .52, se[b] = .14, t = 3.60, p < .001), but not at 1 standard deviation below the mean (b = .18, se[b] = .19, t = .95, p = .35). Perceived cooperation did not have a significant effect on self-esteem, b = -.011, se[b] = .154, t = -.074, p = .942. The findings rejected H_6.

In the proself setting (N = 171), perceived competition was a significant predictor of self-esteem (b = .260, se[b] = .100, t = 2.588, p = .011), while perceived cooperation was not significant (b = -.006, se[b] = .070, t = -.084, p = .933). The interaction effect between perceived competition and cooperation was also not significant, b = .078, se[b] = .048, t = 1.610, p = .109.

In the neutral setting (N = 278), both perceived competition (b = .175, se[b] = .062, t = 2.821, p = .005) and perceived cooperation (b = .161, se[b] = .053, t = 3.059, p = .002) had significant main effects on self-esteem. However, the interaction between these two predictors was not significant, b = .029, se[b] = .030, t = .967, p = .334.

4.3.8 Life Satisfaction

According to the findings presented in Table 2, in the context of a prosocial goal setting with a sample size of 50 participants, perceived competition demonstrated a significant positive

association with users' life satisfaction, b = .411, se[b] = .163, t = 2.524, p = .015. This implies that as users perceive more competition within the app, their life satisfaction tends to increase. Furthermore, the main effect of perceived cooperation on life satisfaction was also found to be marginally significant, b = .295, se[b] = .169, t = 1.749, p = .087. However, the interaction effect between perceived competition and cooperation did not reach significance, b = .086, se[b] = .129, t = .668, p = .508. The findings rejected H_7.

In the proself setting with a sample size of 171 participants, the regression analysis revealed that perceived competition significantly predicted life satisfaction (b = .254, se[b] = .107, t = 2.374, p = .019), while the effect of perceived cooperation was not significant (b = -.026, se[b] = .075, t = -.353, p = .725). Additionally, the interaction effect between perceived competition and cooperation was also not statistically significant, b = .033, se[b] = .051, t = .634, p = .527.

For the neutral setting, which consisted of 278 participants, both perceived competition (b = .164, se[b] = .069, t = 2.375, p = .018) and perceived cooperation (b = .174, se[b] = .059, t = 2.970, p = .003) demonstrated significant main effects on life satisfaction. However, the interaction did not reach statistical significance, b = .038, se[b] = .034, t = 1.129, p = .260.

Table 2. Results of Regression Models in Prosocial Goal Setting for Study 1

	Prosocial Goal Setting						
Models	**ENG (1)**	**CEI (2)**	**PER (3)**	**ENJ (4)**	**ASI (5)**	**EST (6)**	**LSF (7)**
	β (SE)	**β (SE)**	**β (SE)**	**β (SE)**	**β (SE)**	**β (SE)**	**β (SE)**
Intercept	-.085	**-1.128***	-.154	-.785	-.089	**-1.194***	.026
	(1.102)	**(.533)**	(.685)	(.672)	(.646)	**(.569)**	(.625)
Predictors							
PCOM	.403	**.451****	**.636*****	.278	**.604*****	**.393***	**.411***
	(.287)	**(.139)**	**(.179)**	(.175)	**(.168)**	**(.148)**	**(.163)**
PCOO	**-.505.**	.044	.297	-.021	.221	-.011	**.295.**
	(.297)	(.144)	(.185)	(.181)	(.174)	(.154)	**(.169)**
PCOM ×	.157	.099	-.231	.143	.102	**.313***	.086
PCOO	(.228)	(.110)	(.142)	(.139)	(.134)	**(.118)**	(.129)

Controls							
Age	-.014	.009	-.012	.008	-.010	.018	-.016
	(.022)	(.011)	(.014)	(.013)	(.013)	(.011)	(.012)
Gender	.421	.212	.244	.049	**.467.**	.242	.384
	(.419)	(.203)	(.260)	(.255)	**(.246)**	(.216)	(.238)

Note. N = 50. PCOM = Perceived Competition; PCOO = Perceived Cooperation; ENG = Behavioral Engagement; CEI = Continued Engagement Intention; PER = Performance; ENJ = Enjoyment; ASI = Affective Social Identity; EST = Self-Esteem; LSF = Life Satisfaction.
. $p \leq .1$.
* $p \leq .05$.
** $p \leq .01$.
*** $p \leq .001$.

4.4 Discussion

Overall, the findings from Study 1, which involved 499 users from 116 apps across different domains, indicate that competition generally has a positive impact on most of the dependent variables examined across all three conditions: prosocial goal setting, neutral goal setting, and proself goal setting. In contrast, the effect of cooperation is more varied, with positive impacts observed on some dependent variables and negative impacts on others. It is worth noting that competition, in general, has a stronger main effect compared to cooperation. While there were some interaction effects observed in certain aspects, they were not present across all dependent variables examined in this study.

In our primary analysis of prosocial goal setting, we found that competition had a positive and significant impact on almost all the seven dependent variables (and a directionally consistent effect for behavior engagement and enjoyment). Although competition did not significantly predict behavioral engagement, it was shown that cooperation had a negative impact on it. Considering competition and cooperation as a continuum, we can alternatively interpret this as competition being positively associated with behavioral engagement. Overall, the results consistently demonstrated the same pattern of competition across all dependent variables examined.

Behavioral engagement, continued engagement intention, and performance share a conceptual alignment, leading us to hypothesize that the same mechanism underlies the relationship with competition for these three variables. The results confirmed our hypotheses, indicating that competition drove intrinsic motivation, and thereby influenced behavioral engagement, continued engagement intention, and performance in the context of prosocial goal setting. This aligns with the findings of Cao et al. (2022), Morschheuser et al. (2019), and Kistruck et al. (2016) which suggest that competition increases user engagement.

Concerning enjoyment, despite the lack of a significant main effect of perceived competition in the current analysis based on our limited sample size of 50, it is noteworthy that the *p*-value ($p = .119$) is approaching marginal significance. This suggests that with a larger sample size, we expect to observe a significant and positive association between perceived competition and enjoyment in prosocial goal setting.

In terms of well-being aspects, we initially believed that competition would contradict the cooperative mindset of prosocial goal pursuit. However, the results revealed that competition actually increased affective social identity, self-esteem, and life satisfaction, rather than diminishing them. This highlights the positive role of competition in prosocial goal pursuit.

In our secondary analysis of neutral and proself goal setting, we found that competition and cooperation, as social interdependence structures, had different effects. For neutral goal setting, both competition and cooperation had a positive and significant relationship with the dependent variables, with competition showing a stronger effect compared to cooperation. For proself goal setting, competition was significantly and positively associated with all dependent variables, while cooperation was negatively associated with behavioral engagement, continued engagement intention, and enjoyment. However, cooperation was positively associated with affective social

identity. Significant interactions were observed for engagement, continued engagement intention, and performance. Overall, these results align with our predictions and most of the existing literature, indicating that both competition and cooperation were significant positive predictors. In scenarios where an application brings equal advantages to both others and oneself, or exclusively benefits oneself, competition becomes a natural and important indicator due to its alignment with the competitive and self-interested mindset prevalent in such contexts.

STUDY 2

5.1 Study Goal

Study 2 aimed to replicate the findings of Study 1 and examined the impact of social interactions, specifically competitive dynamics and cooperative dynamics, on consumer behaviors and well-being within real-life scenarios.

In contrast to Study 1, which solely focused on customers' perceptions of social interactions, Study 2 encompassed a broader perspective by capturing both "perceived competition and perceived cooperation" as well as "actual competitive behaviors and actual cooperative behaviors" as distinct measures of social interactions. By integrating various dimensions, the study aimed to enhance the understanding of how social interactions influence users' experiences in a mobile app program, particularly in the context of prosocial goal setting.

5.2 Method

5.2.1 Data Collection and Sample

In accordance with the methodology of Study 1, an online survey was devised to collect data from real users of mobile applications. However, there was a notable difference in Study 2 compared to the previous study. Specifically, Study 2 exclusively focused on gathering data from individuals who were actively using Alipay Ant Forest, rather than including users from a range of different mobile apps as in Study 1.

There are three primary reasons behind our decision to choose Alipay Ant Forest as the focus of our study. Firstly, Ant Forest stands out as a highly successful public-welfare program that is widely recognized for its strong prosocial elements (Cao et al., 2022). Operating as a mini program within the Alipay mobile app, which is the largest payment application developed by Ant

Group in China, Ant Forest encourages users to adopt environmentally friendly practices in their daily lives, such as walking and biking. In return for their participation, users are rewarded with "green energy" points. These points can be used to redeem virtual trees within the program, and ultimately, Ant Forest will plant real trees in China once these virtual trees reach their full growth.

Additionally, Ant Forest incorporates gamified elements that encompass both competitive and cooperative features (see Figure 2). In terms of competition, it offers a Forest Leaderboard that provides daily, weekly, and overall rankings for all Ant Forest users within your friends group. Moreover, it enables a direct comparison between your green energy accumulation and that of another user. On the cooperative front, Ant Forest introduces a feature called "Co-planting," allowing you and fellow users in your friends group to collectively plant a tree. Furthermore, there exists the "Ant Forest Public Forest," where various brands have established their own forests. Users who wish to support a particular brand can contribute energy points to that brand's forest. These well-designed competitive and cooperative game mechanics create an ideal environment for studying social interactions within Ant Forest.

Figure 2. Gamified Competition and Cooperation Features of Ant Forest

Lastly, Ant Forest has garnered immense popularity, attracting millions of users who actively engage in sustainable practices. As stated by Shen (2021), since its inception in 2016, Ant Forest has facilitated the planting of over 326 million trees by more than 600 million users. Consequently, Ant Forest offers us a substantial user base and valuable data for in-depth analysis.

We recruited Ant Forest users from a Chinese online crowdsourcing platform called Credamo. The survey was distributed in the Chinese language to ensure easy comprehension for the respondents. To motivate participants, we offered a reward of $0.42, which is equivalent to ¥3, for each completed response. A total of 500 samples were collected initially. After excluding 50 invalid cases and 10 extreme cases, we obtained a valid sample of 440 respondents (65.5% female, M_{age} = 31). It is important to note that upon identifying many incorrect responses for the question regarding users' performance, we carefully reviewed the answers again and eliminated the invalid cases from the analysis of that particular variable. This resulted in a final sample size of 296 respondents for the analysis of users' performance.

5.2.2 Survey Design and Measures

The survey was structured as follows:

To ensure that respondents were familiar with both the cooperative and competitive features of Ant Forest, our target group consisted of users who had used Ant Forest for at least 4 weeks within the past 12 months. Initially, to validate their eligibility, we requested respondents to provide a screenshot of the home screen of their Ant Forest account as a requirement to participate in the survey. By incorporating this screening question at the outset, we were able to ensure the quality of the sample and ensure that participants had the necessary familiarity with Ant Forest.

Participants were subsequently requested to provide details about their actual engagement

with the competitive and cooperative features in Ant Forest. To assess their competitive behaviors, participants were asked if they checked the Forest Leaderboard for daily, weekly, and/or total rankings, and if so, the frequency of their ranking checks. To evaluate their cooperative behaviors, participants were asked if they had previously participated in "Co-planting" and, if yes, the number of trees they had planted collectively with others. Additionally, participants were questioned about their involvement in the Ant Forest Public Forest, including the frequency of their contributions to brands within the Ant Forest Public Forest.

In the subsequent section, we utilized the same items from Study 1 to gauge users' perception of competitiveness and cooperativeness in the app's tasks.

The following section focused on measuring various criterion variables, including behavioral engagement, continued engagement intention, performance, enjoyment, affective social identity, self-esteem, and life satisfaction. While most variables utilized the same measures as in Study 1, the performance measure differed. To obtain more precise performance data, respondents were provided specific instructions and asked to report their accumulated green energy points earned in Ant Forest.

Finally, an attention check question was included to ensure participants' attentiveness. This was followed by a request for demographic information, such as age and gender.

The measurement model in this study demonstrates reliable and valid results (see Appendix D). Constructs exhibit acceptable reliability (Cronbach's alphas > .70) and strong relationships with their indicators (loadings > .70). Convergent validity is satisfactory (AVE > .50) and construct reliability is high (CR > .70). Discriminant validity is also confirmed (correlation values < square root of AVEs).

5.2.3 Data Analysis

The data analysis was conducted using R version 4.1.0. To facilitate a fair comparison between variables with different measurement scales and mitigate potential multicollinearity issues, we standardized the predictor variables: actual competitive behaviors, actual cooperative behaviors, perceived competition, and perceived cooperation. To normalize the data and stabilize the variance of the performance measure (i.e., green energy points), which has a large-scale unit, we applied a log transformation to this variable. Additionally, due to the presence of two distinct cooperative features in Ant Forest, which involve two dimensions in users' actual cooperative behaviors, we employed Principal Component Analysis (PCA) after standardizing all predictor variables. PCA identified linear combinations of the original variables that accounted for the most variance in the data, enabling us to merge the two dimensions into a single variable that best represented users' actual cooperative behaviors.

For the main analysis, multiple linear regressions were utilized to investigate the influence of gamified competition, gamified cooperation, and their interaction on different criterion variables. As we aimed to evaluate both perception and actual behaviors regarding social interactions, we performed two separate sets of multiple linear regressions. The first set examined the impact of perceived competition and perceived cooperation, while the second set focused on the effect of actual competitive and cooperative behaviors. Both sets analyzed these effects on the same set of criterion variables with same set of controls.

Additionally, we performed diagnostic tests to validate the reliability of our multiple linear regression model and assess the fulfillment of underlying assumptions. By examining the Pearson correlation coefficients, which ranged from -.13 to .40, we found no significant multicollinearity concerns in our regression analysis.

5.2.4 Model

Given that we assessed both perception and actual behaviors in terms of social interactions, we employed two distinct sets of regression models. Specifically, we utilized a total of 14 regression models, which can be summarized as follows:

(1) $ENG_i = \beta_{10} + \beta_{11}PCOM_i + \beta_{12}PCOO_i + \beta_{13}AGE_i + \beta_{14}GEN_i + \beta_{15}PCOM_i \times PCOO_i + \varepsilon_{1i}$

(2) $CEI_i = \beta_{20} + \beta_{21}PCOM_i + \beta_{22}PCOO_i + \beta_{23}AGE_i + \beta_{24}GEN_i + \beta_{25}PCOM_i \times PCOO_i + \varepsilon_{2i}$

(3) $log(PER_i) = \beta_{30} + \beta_{31}PCOM_i + \beta_{32}PCOO_i + \beta_{33}AGE_i + \beta_{34}GEN_i + \beta_{35}PCOM_i \times PCOO_i + \varepsilon_{3i}$

(4) $ENJ_i = \beta_{40} + \beta_{41}PCOM_i + \beta_{42}PCOO_i + \beta_{43}AGE_i + \beta_{44}GEN_i + \beta_{45}PCOM_i \times PCOO_i + \varepsilon_{4i}$

(5) $ASI_i = \beta_{50} + \beta_{51}PCOM_i + \beta_{52}PCOO_i + \beta_{53}AGE_i + \beta_{54}GEN_i + \beta_{55}PCOM_i \times PCOO_i + \varepsilon_{5i}$

(6) $EST_i = \beta_{60} + \beta_{61}PCOM_i + \beta_{62}PCOO_i + \beta_{63}AGE_i + \beta_{64}GEN_i + \beta_{65}PCOM_i \times PCOO_i + \varepsilon_{6i}$

(7) $LSF_i = \beta_{70} + \beta_{71}PCOM_i + \beta_{72}PCOO_i + \beta_{73}AGE_i + \beta_{74}GEN_i + \beta_{75}PCOM_i \times PCOO_i + \varepsilon_{7i}$

(8) $ENG_i = \beta_{80} + \beta_{81}ACOM_i + \beta_{82}ACOO_i + \beta_{83}AGE_i + \beta_{84}GEN_i + \beta_{85}ACOM_i \times ACOO_i + \varepsilon_{8i}$

(9) $CEI_i = \beta_{90} + \beta_{91}ACOM_i + \beta_{92}ACOO_i + \beta_{93}AGE_i + \beta_{94}GEN_i + \beta_{95}ACOM_i \times ACOO_i + \varepsilon_{9i}$

(10) $log(PER_i) = \beta_{100} + \beta_{101}ACOM_i + \beta_{102}ACOO_i + \beta_{103}AGE_i + \beta_{104}GEN_i + \beta_{105}ACOM_i \times ACOO_i + \varepsilon_{10i}$

(11) $ENJ_i = \beta_{110} + \beta_{111}ACOM_i + \beta_{112}ACOO_i + \beta_{113}AGE_i + \beta_{114}GEN_i + \beta_{115}ACOM_i \times ACOO_i + \varepsilon_{11i}$

(12) $ASI_i = \beta_{120} + \beta_{121}ACOM_i + \beta_{122}ACOO_i + \beta_{123}AGE_i + \beta_{124}GEN_i + \beta_{125}ACOM_i \times ACOO_i + \varepsilon_{12i}$

(13) $EST_i = \beta_{130} + \beta_{131}ACOM_i + \beta_{132}ACOO_i + \beta_{133}AGE_i + \beta_{134}GEN_i + \beta_{135}ACOM_i \times ACOO_i + \varepsilon_{13i}$

(14) $LSF_i = \beta_{140} + \beta_{141}ACOM_i + \beta_{142}ACOO_i + \beta_{143}AGE_i + \beta_{144}GEN_i + \beta_{145}ACOM_i \times ACOO_i + \varepsilon_{14i}$

Where: *PCOM* is user's perceived competition toward the mobile app.

PCOO is user's perceived cooperation toward the mobile app.

ACOM is user's actual competitive behaviors in the mobile app.

ACOO is user's actual cooperative behaviors in the mobile app.

ENG is user's behavioral engagement in the mobile app.

CEI is user's continued engagement intention in the mobile app.

PER is user's performance (green energy points accumulated) in the mobile app.

ENJ is user's enjoyment in the mobile app.

ASI is user's affective social identity in the mobile app community.

EST is user's overall self-esteem.

LSF is user's overall life satisfaction.

AGE is user's age.

GEN is user's gender.

ε is the error term.

5.3 Results

5.3.1 Descriptive Analysis of Ant Forest

Perception-wise, the findings revealed that, on average, users perceive Ant Forest as a more cooperative platform (M_{com} = 4.70, SD = 1.67) rather than a competitive platform (M_{coo} = 5.57, SD = 1.12). Examining the actual behaviors, it was observed that 10.7% of users reported not checking the Ant Forest Leaderboard, suggesting that a majority of individuals actively participate in the competitive activities within Ant Forest. Moreover, a substantial proportion of users, specifically 71.6%, indicated engaging in "Co-planting" activities, while an overwhelming 89.3% of users reported collaborative contributions to the Public Forest brand community.

5.3.2 Behavioral Engagement

According to the results presented in Table 3, perceived competition was found to be a significant positive factor driving behavioral engagement in Ant Forest, b = .153, se[b] = .066, t = 2.296, p = .022. This implies that as users perceive higher levels of competition within the platform, their behavioral engagement also tends to increase. However, perceived cooperation (b = .033, se[b] = .069, t = .471, p = .638) and the interaction between perceived competition and cooperation (b = -.052, se[b] = .057, t = -.925, p = .356) did not reach statistical significance.

In terms of actual behaviors, both competitive behaviors (b = .582, se[b] = .055, t = 10.493, p < .001) and cooperative behaviors (b = .275, se[b] = .056, t = 4.925, p < .001) were significant and positive predictors of behavioral engagement. This suggests that the more users engage in competitive or cooperative activities, the more likely they are to actively participate in the tasks offered by the platform. However, the interaction effect between actual competitive and cooperative behaviors was not significant, b = -.032, se[b] = .056, t = -.569, p = .570. Overall, the findings provided support for H_{1a}.

5.3.3 Continued Engagement Intention

The results of the regression analysis showed significant main effects for both perceived competition (b = .187, se[b] = .039, t = 4.785, p < .001) and perceived cooperation (b = .315, se[b] = .041, t = 7.750, p < .001) on users' continued engagement intention. Increased perceived competition or cooperation was associated with higher levels of intention to continue engaging with Ant Forest. However, no significant interaction effect was found between these two predictors, b = .020, se[b] = .033, t = .600, p = .549.

Furthermore, actual competitive behaviors emerged as a significant positive predictor of

continued engagement intention, b = .275, se[b] = .043, t = 6.475, p < .001. This suggests that greater engagement in competitive activities within Ant Forest predicts higher intention to continue engaging with the app community. However, no significant main effect of actual cooperative behaviors (b = .046, se[b] = .043, t = 1.072, p = .284) or interaction effect (b = -.020, se[b] = .043, t = -.468, p = .640) was found in the regression analysis. Overall, the findings provided support for H_{2a}.

5.3.4 Performance

The sample size used for analyzing the performance measure was 296, after removing invalid responses. To address the slight right-skewness in the distribution of the performance measure, we applied a log transformation to normalize the data and stabilize variance.

The regression analysis results indicated no significant main effects of perceived competition (b = -.015, se[b] = .086, t = -.171, p = .864) and perceived cooperation (b = -.050, se[b] = .086, t = -.576, p = .565), as well as no significant interaction between the two (b = .002, se[b] = .079, t = .028, p = .978). However, when including network size as an additional control, which was measured by the number of friends a user has in Ant Forest, a marginally significant main effect of perceived cooperation emerged, b = -.137, se[b] = .079, t = -1.738, p = .083.

Furthermore, actual competitive behaviors were found to be a significant positive predictor of performance, b = .268, se[b] = .086, t = 3.122, p = .002, indicating that higher engagement in competitive activities within Ant Forest predicts better performance. However, no significant main effect of actual cooperative behaviors (b = .077, se[b] = .090, t = .856, p = .392) or interaction effect (b = .047, se[b] = .085, t = .552, p = .582) was observed in the regression analysis. Overall, the findings provided support for H_{3a}.

5.3.5 Enjoyment

Both perceived competition (b = .138, se[b] = .040, t = 3.474, p = .001) and perceived cooperation (b = .388, se[b] = .041, t = 9.437, p < .001) emerged as significant positive predictors of enjoyment. This indicates that as individuals perceived the platform as more competitive or cooperative, they were more likely to enjoy being part of the community and completing community tasks. Furthermore, the interaction between these two predictors was significant, b = .097, se[b] = .034, t = 2.873, p = .004. Further examination through simple slope analyses demonstrated that the effect of perceived competition was significant at 1 standard deviation above the mean of perceived cooperation (b = .23, se[b] = .05, t = 4.89, p < .001) and at the mean of perceived cooperation (b = .14, se[b] = .04, t = 3.47, p < .001), but not at 1 standard deviation below the mean (b = .04, se[b] = .06, t = .73, p = .47). These findings indicate that the effect of perceived competition is stronger for higher levels of perceived cooperation.

Actual competitive behaviors were also found to be a significant positive predictor of enjoyment, suggesting that higher engagement in competitive activities within Ant Forest predicts greater enjoyment, b = .255, se[b] = .044, t = 5.786, p < .001. However, no significant main effect of actual cooperative behaviors (b = .065, se[b] = .044, t = 1.474, p = .141) or interaction effect (b = .027, se[b] = .044, t = .608, p = .544) was observed in the regression analysis. Overall, the findings provided support for H_{4a}.

5.3.6 Affective Social Identity

Both perceived competition (b = .549, se[b] = .058, t = 9.533, p < .001) and perceived cooperation (b = .474, se[b] = .060, t = 7.912, p < .001) emerged as significant positive predictors of affective social identity. This indicates that as individuals perceived the platform as more

competitive or cooperative, their affective social identity tends to strengthen. Furthermore, the interaction between these two predictors was significant, $b = .202$, se[b] = .049, $t = 4.122$, $p < .001$. Further examination through simple slope analyses demonstrated that the effect of perceived competition was significant at 1 standard deviation above the mean of perceived cooperation ($b = .75$, se[b] = .07, $t = 10.76$, $p < .001$), at the mean of perceived cooperation ($b = .55$, se[b] = .06, $t = 9.53$, $p < .001$), and at 1 standard deviation below the mean ($b = .35$, se[b] = .08, $t = 4.27$, $p < .001$). These findings indicate that the effect of perceived competition is stronger for higher levels of perceived cooperation.

Both actual competitive behaviors ($b = .447$, se[b] = .068, $t = 6.580$, $p < .001$) and actual cooperative behaviors ($b = .175$, se[b] = .068, $t = 2.562$, $p = .011$) were found to be significant positive predictors of affective social identity. This indicates that higher engagement in competitive or cooperative activities within Ant Forest predicts a greater emotional attachment to the community. However, no interaction effect was observed in the regression analysis, $b = .029$, se[b] = .068, $t = .430$, $p = .667$. Overall, the findings rejected H_5.

5.3.7 Self-Esteem

Perceived competition ($b = .116$, se[b] = .039, $t = 3.010$, $p = .003$) and perceived cooperation ($b = .386$, se[b] = .040, $t = 9.630$, $p < .001$) emerged as significant positive predictors of self-esteem. This suggests that as individuals perceive the platform as more competitive or cooperative, their self-esteem tends to strengthen. Moreover, the interaction between these two predictors was found to be significant, $b = .114$, se[b] = .033, $t = 3.464$, $p = .001$. Further examination through simple slope analyses revealed that the effect of perceived competition was significant at 1 standard deviation above the mean of perceived cooperation ($b = .23$, se[b] = .05, $t = 4.92$, $p <$

.001) and at the mean of perceived cooperation (b = .12, se[b] = .04, t = 3.01, p < .001), but not at 1 standard deviation below the mean (b = .00, se[b] = .05, t = .04, p = .97). These findings suggest that the impact of perceived competition is stronger when perceived cooperation is higher.

Actual competitive behaviors were also found to be significant positive predictors of self-esteem, indicating that higher engagement in competitive activities predicts higher self-esteem, b = .248, se[b] = .043, t = 5.719, p < .001. However, no significant main effect of actual cooperative behaviors (b = -.007, se[b] = .044, t = -.151, p = .880) or significant interaction effect was observed (b = .066, se[b] = .044, t = 1.502, p = .134). Overall, the findings rejected H_6.

5.3.8 Life Satisfaction

Perceived competition (b = .159, se[b] = .054, t = 2.961, p = .003) and perceived cooperation (b = .507, se[b] = .056, t = 9.056, p < .001) were found to be significant positive predictors of life satisfaction. This suggests that as individuals perceive the platform as more competitive or cooperative, their life satisfaction tends to increase. Additionally, the interaction between these two predictors was significant, b = .204, se[b] = .046, t = 4.439, p < .001. Further examination through simple slope analyses revealed that the effect of perceived competition was significant at 1 standard deviation above the mean of perceived cooperation (b = .36, se[b] = .07, t = 5.56, p < .001) and at the mean of perceived cooperation (b = .16, se[b] = .05, t = 2.96, p < .001), but not at 1 standard deviation below the mean (b = -.04, se[b] = .08, t = -.58, p = .56).

Actual competitive behaviors were also found to be significant positive predictors of life satisfaction, b = .320, se[b] = .060, t = 5.342, p < .001. This indicates that higher engagement in competitive activities predicts higher life satisfaction. Furthermore, the interaction between actual competitive behaviors and actual cooperative behaviors was significant, b = .160, se[b] = .060, t =

2.653, p = .008. Further examination through simple slope analyses revealed that the effect of actual competitive behaviors was significant at 1 standard deviation above the mean of actual cooperative behaviors (b = .48, se[b] = .09, t = 5.13, p < .001), at the mean of actual cooperative behaviors (b = .32, se[b] = .06, t = 5.34, p < .001), and at 1 standard deviation below the mean of actual cooperative behaviors (b = .16, se[b] = .08, t = 2.12, p = .03). However, no significant main effect of actual cooperative behaviors was observed in the regression analysis, b = .016, se[b] = .060, t = .260, p = .795. Overall, the findings rejected H_7.

Table 3. Results of Regression Models in Prosocial Goal Setting for Study 2

	Prosocial Goal Setting						
Models	**ENG (1)**	**CEI (2)**	**PER (3)[a]**	**ENJ (4)**	**ASI (5)**	**EST (6)**	**LSF (7)**
	β (SE)	**β (SE)**	**β (SE)**	**β (SE)**	**β (SE)**	**β (SE)**	**β (SE)**
Intercept	**5.253*** (.327)**	**6.043*** (.192)**	**11.550*** (.429)**	**5.839*** (.195)**	**4.122*** (.284)**	**5.692*** (.190)**	**4.569*** (.265)**
Predictors							
PCOM	**.153* (.066)**	**.187*** (.039)**	-.015 (.086)	**.138*** (.040)**	**.549*** (.058)**	**.116** (.039)**	**.159** (.054)**
PCOO	.033 (.069)	**.315*** (.041)**	-.050 (.086)	**.388*** (.041)**	**.474*** (.060)**	**.386*** (.040)**	**.507*** (.056)**
PCOM × PCOO	-.052 (.356)	.020 (.033)	.002 (.079)	**.097** (.034)**	**.202*** (.049)**	**.114*** (.033)**	**.204*** (.046)**
Controls							
Age	-.011 (.008)	-.002 (.005)	**.021* (.011)**	.003 (.005)	**.029*** (.007)**	.001 (.005)	**.016* (.006)**
Gender	-.159 (.126)	.092 (.074)	-.258 (.165)	-.003 (.075)	-.121 (.110)	.042 (.073)	.082 (.102)
Models	**ENG (8)**	**CEI (9)**	**PER (10)[b]**	**ENJ (11)**	**ASI (12)**	**EST (13)**	**LSF (14)**
	β (SE)	**β (SE)**	**β (SE)**	**β (SE)**	**β (SE)**	**β (SE)**	**β (SE)**
Intercept	**4.967*** (.271)**	**5.678*** (.208)**	**11.411*** (.420)**	**5.450*** (.215)**	**3.366*** (.332)**	**5.278*** (.212)**	**4.004*** (.293)**
Predictors							
ACOM	**.582*** (.055)**	**.275*** (.043)**	**.268** (.086)**	**.255*** (.044)**	**.447*** (.068)**	**.248*** (.043)**	**.320*** (.060)**
ACOO	**.275*** (.056)**	.046 (.043)	.077 (.090)	.065 (.044)	**.175* (.068)**	-.007 (.044)	.016 (.060)

ACOM × ACOO	-.032 (.056)	-.020 (.043)	.047 (.085)	.027 (.044)	.029 (.068)	.066 (.044)	**.160** (.060)**
Controls							
Age	**-.011. (.006)**	.008 (.005)	**.019. (.010)**	**.014** (.005)**	**.050*** (.008)**	**.013* (.005)**	**.031*** (.007)**
Gender	.004 (.105)	**.142. (.080)**	-.155 (.160)	.049 (.083)	-.020 (.128)	.085 (.082)	.140 (.113)

Note. $N = 440$. PCOM = Perceived Competition; PCOO = Perceived Cooperation; ACOM = Actual Competitive Behaviors; ACOO = Actual Cooperative Behaviors; ENG = Behavioral Engagement; CEI = Continued Engagement Intention; PER = Performance; ENJ = Enjoyment; ASI = Affective Social Identity; EST = Self-Esteem; LSF = Life Satisfaction.
[ab] The sample size is 296 and the dependent variable has been log transformed.
. $p \leq .1$.
* $p \leq .05$.
** $p \leq .01$.
*** $p \leq .001$.

5.4 Discussion

In Study 2, involving 440 Ant Forest users, the findings indicate that competition, whether it is perceived or demonstrated through actual behaviors, has a consistently positive and significant impact on all dependent variables examined, except for performance, in the prosocial goal setting. Cooperation, on the other hand, showed main effects in certain aspects such as affective social identity, but not across all variables. Although there were some interaction effects observed in specific areas, they were not consistently present across all dependent variables examined in this study. When comparing the effects of competition and cooperation, perceived cooperation generally exhibited a stronger main effect than perceived competition, while actual competitive behaviors generally had a stronger main effect compared to actual cooperative behaviors.

Regarding the perception analysis, the results revealed that perceived competition significantly and positively predicted all dependent variables, except for performance. This pattern aligns with the findings of Study 1, suggesting that perceived competition plays a beneficial role

in the prosocial setting. It indicates that users are motivated and stimulated by the positive effects of competition, and any negative effects are not strong enough to undermine their cooperative mindset and intrinsic motivation towards prosocial goals. The results further demonstrated that perceived cooperation significantly and positively predicted all dependent variables, except for performance and behavioral engagement. This contrasts with the findings of Study 1, where cooperation negatively influenced engagement but positively affected life satisfaction. The divergent results between the two studies can be attributed to the first study's reliance on various apps and a small sample size, while Study 2 provides more reliable and accurate results. Significant interactions were observed for enjoyment and all well-being aspects. Once again, in general, perceived competition was only significant at 1 standard deviation above the mean of perceived cooperation and at the mean of perceived cooperation, but not at 1 standard deviation below the mean. This suggests that in the prosocial goal setting, an increase in perceived competition can drive better outcomes only when individuals have a more cooperative perception. In other words, when people prioritize the overall well-being and altruism, they are not distracted by negative extrinsic factors associated with competition, such as negative emotions and a strong drive to outperform others instead of focusing on collective goods.

In analyzing actual behaviors, it was observed that actual competitive behaviors consistently played a positive role in all dependent variables examined. On the other hand, actual cooperative behaviors had a positive impact specifically on engagement and affective social identity. Moreover, it was discovered that overall, actual competitive behaviors exhibited a stronger main effect compared to actual cooperative behaviors.

It is intriguing to observe that both in the analysis of perception and actual behaviors, consistent patterns emerge regarding the significant and positive role of competition across almost

all aspects examined in this study. In this regard, there was a similarity in the effects of perceived competition and actual competitive behaviors, indicating that individuals' perception of competition aligns with their actual engagement in competitive behaviors. While perceived cooperation and actual cooperative behaviors did not yield identical results across the examined dependent variables, they generally played a positive role. However, the comparison between the effects of competition and cooperation differed in these two analyses. Specifically, perceived cooperation generally exhibited a stronger effect than perceived competition, while actual competitive behaviors tended to have a stronger effect than actual cooperative behaviors. This suggests that perception and actual behaviors are distinct concepts that should be measured separately. In the prosocial setting, increasing the perception of competition does not bring about significant gains compared to cooperation. This is because, in this prosocial context, individuals primarily focus on collective goods and possess a cooperative mindset. Thus, increasing their perceived cooperation aligns more with their default cooperative orientation. Interestingly, when users engage more in competitive behaviors, it leads to greater outcomes compared to engaging in cooperative behaviors. This indicates that actual behaviors have the ability to influence the default cooperative mindset in a counterintuitive manner. Marketers may not always have access to users' perceptions, but they can employ gamification strategies to increase user engagement in competitive activities. By incorporating more competitive elements such as leaderboards, marketers can enhance users' behavioral engagement, their intention to continue participating, overall performance, enjoyment, and other aspects of well-being.

5 GENERAL DISCUSSION

Despite some minor variations in the results between Study 1 and Study 2, the overall trend remains consistent. Thus, based on the findings, it can be concluded that:

Table 4. Summary of Hypotheses

Criterion Variables	Hypothesis	Result
ENG	H_{1a}: Competition augments ENG in prosocial goal setting.	Support
	H_{1b}: Competition diminishes ENG in prosocial goal setting.	Reject
CEI	H_{2a}: Competition increases CEI in prosocial goal setting.	Support
	H_{2b}: Competition decreases CEI in prosocial goal setting.	Reject
PER	H_{3a}: Competition improves PER in prosocial goal setting.	Support
	H_{3b}: Competition impairs PER in prosocial goal setting.	Reject
ENJ	H_{4a}: Competition enhances ENJ in prosocial goal setting.	Support
	H_{4b}: Competition diminishes ENJ in prosocial goal setting.	Reject
ASI	H_5: Competition weakens ASI in prosocial goal setting.	Reject
EST	H_6: Competition undermines EST in prosocial goal setting.	Reject
LSF	H_7: Competition diminishes LSF in prosocial goal setting.	Reject

Note. ENG = Behavioral Engagement; CEI = Continued Engagement Intention; PER = Performance; ENJ = Enjoyment; ASI = Affective Social Identity; EST = Self-Esteem; LSF = Life Satisfaction.

6.1 Perceived Competition and Perceived Cooperation

In both studies investigating the impact of perceived competition and perceived cooperation, we generally observed similar patterns of results, although not identical. Perceived competition emerged to be the primary positive predictor for almost all dependent variables examined in this paper. The consistent findings have confirmed the unexpected positive role of perceived competition. Rather than diminishing the outcomes, perceived competition appears to drive them upwards, despite being seemingly contradictory to the inherent nature of prosocial goal settings.

Our findings align with Morschheuser et al.'s (2019) study, which concluded that competition engages users more than cooperation in a crowdsourcing context. However, our findings contradict Cao et al.'s (2022) study on Ant Forest, where they found that gamified cooperation was more effective in encouraging low-carbon actions. Additionally, our findings differ from Morschheuser et al.'s (2019) finding of no significant difference in perceived enjoyment between competition and cooperation. In our study, we observed that competition generally resulted in higher levels of enjoyment within a prosocial goal setting. These distinct findings can be attributed to the broader context and a more accurate understanding of the prosocial goal setting in our study.

Overall, our finding suggests that in prosocial goal settings, despite the introduction of competition and the perception of a competitive environment, individuals who actively engage with these platforms maintain a strong inherent cooperative mindset that remains unchanged. In other words, competition does not distract them from their intrinsic motivation to contribute to collective goods by enticing them with extrinsic incentives such as winning over others. As a result, the negative effects of competition do not outweigh its positive effects in these contexts.

Specifically, the reasons why perceived competition drives up behavioral engagement, continued engagement intention, performance, and enjoyment can be summarized as follows. Firstly, in the context of prosocial goals, competition provides individuals with an opportunity to showcase their abilities and contributions, aligning with the principles of self-determination theory. This enhances their sense of autonomy, competence, and relatedness, thereby increasing intrinsic motivation (Banfield & Wilkerson, 2014; Burguillo, 2010; Suh et al., 2018). Secondly, competition fosters a sense of recognition and social comparison, but within appropriate bounds, in prosocial goal settings (Davis et al., 2017; Garcia et al., 2013). When individuals compete against others, their achievements and progress become more visible and comparable. Positive

feedback, praise, and recognition received within a competitive context can further fuel individuals' motivation to persist in pursuing prosocial goals.

For the well-being aspects, contrary to our prediction, competition in the prosocial goal setting also drives up those results. As previously indicated, it appears that individuals in this context are predominantly driven by a cooperative and altruistic mindset. In this light, healthy competition seems to yield more positive effects than negative ones, thereby enhancing affective social identity, self-esteem, and life satisfaction. Another significant factor that we believe largely explains these results and deserves attention is the "warm-glow effect" – a psychological phenomenon where individuals experience positive emotional responses or feelings of satisfaction after engaging in prosocial or altruistic behaviors (Andreoni, 1990; Giebelhausen et al., 2016). Competition makes their prosocial contributions more salient, triggering the warm-glow effect and providing participants with a deeper sense of internal satisfaction.

In this paper, we also examined the interaction effects in our models. We found significant interactions for enjoyment, affective social identity, self-esteem, and life satisfaction. Specifically, we observed that an increase in perceived competition leads to a boost in these aspects only when perceived cooperation is high. This finding further supports our earlier rationale that individuals who are more cooperative-oriented are less likely to be swayed by the negative effects of competition, such as a sole focus on outperforming others. Consequently, elevating perceived competition corresponds to amplifying the positive effects associated with competition.

6.2 Actual Competitive and Cooperative Behaviors

To ensure a comprehensive assessment of various dimensions of competition, we incorporated measurements of actual competitive behaviors, actual cooperative behaviors, and

their interaction as predictors in Study 2.

The findings from the analysis of perception and actual behaviors reveal consistent patterns, highlighting the significant and positive impact of competition on nearly all aspects examined in this study. Interestingly, there is a convergence between individuals' perception of competition and their actual engagement in competitive behaviors. Also, perceived cooperation and actual cooperative behaviors, although not producing identical results, generally exhibited a positive influence on the dependent variables examined.

However, the comparison between the effects of competition and cooperation differed in these two analyses. Perceived cooperation generally had a stronger impact than perceived competition, while actual competitive behaviors tended to have a stronger effect than actual cooperative behaviors. This highlights the distinct nature of perception and actual behaviors, emphasizing the importance of measuring them separately. In a prosocial setting, increasing the perception of competition does not yield significant advantages compared to cooperation. This is due to individuals naturally possessing a cooperative mindset in this context. As a result, enhancing their perceived cooperation has a larger impact as it aligns with their default cooperative orientation. Interestingly, in terms of actual behaviors, the results revealed that when users engage more in competitive behaviors, it leads to greater outcomes compared to engaging in cooperative behaviors. This indicates that actual behaviors hold greater significance and possess the potential to impact the default cooperative mindset in an unexpected manner.

6.3 Theoretical and Practical Implications

This study focuses on the roles of gamified competition and cooperation in individuals' pursuit of prosocial goals. With the cooperative nature of prosocial goals and the established link

between cooperation and altruistic behavior in previous research (DeMarree et al., 2014; Hinde et al., 1991; Niven et al., 2019), our aim is to explore whether competition enhances or hinders individuals' goal pursuit, enjoyment, and overall well-being within the prosocial setting.

The current paper makes several theoretical contributions. Firstly, it offers comprehensive insights that expand the existing debate on competition and cooperation, surpassing the scope of previous research. Secondly, it breaks new ground by thoroughly investigating the role of social interaction in prosocial goal pursuit, overcoming the limitations of prior studies that mainly focused on proself goal settings (e.g., Chen & Pu, 2014; Dindar et al., 2021; Peng & Hsieh, 2012; Tauer & Harackiewicz, 2004; Wolf et al. 2021). Additionally, this study deepens our understanding of the motivations underlying prosocial goals by examining various factors, including engagement, performance, enjoyment, and customer well-being.

The practical implications of this study are significant for various industries. As businesses increasingly incorporate gamified interactions and prosocial elements to incentivize customers (e.g., Strava, Forest), the findings offer valuable insights for effective implementation of these strategies. In light of our findings, it is important to note that perceived cooperation often has a greater influence than perceived competition. However, when it comes to actual behaviors, competitive actions tend to have a stronger impact than cooperative ones. Therefore, we propose that marketers should consider implementing competitive strategies to enhance users' actual competitive behaviors. While marketers may not always have direct access to users' perceptions, they can utilize gamification techniques to foster user actual engagement in competitive activities and promote actual competitive behaviors. By introducing elements such as leaderboards, marketers can enhance users' behavioral engagement, their inclination to continue participating, overall performance, enjoyment, and overall well-being.

6.4 Limitations and Future Study

This research is constrained by several limitations. Firstly, the samples were drawn from users of different apps in the mobile context, restricting the generalizability of the findings to a broader business context and the general consumer base. The behavioral patterns observed may not apply universally beyond app users. Secondly, the two studies conducted in this paper primarily relied on survey-based correlational methods. Despite incorporating effective controls, establishing causality solely through correlational studies remains challenging. Such studies are limited in their capacity to unveil detailed and precise relationships between variables.

In conclusion, this study serves as a pioneering effort in bridging the gap in the research field of social interactions and goal pursuit by inductively exploring the impact of gamified competition and cooperation on prosocial goal pursuit. Despite certain limitations, the findings of this research offer significant contributions and valuable insights for both scholars and practitioners. Future research is recommended to extend the scope beyond app usage and to conduct more experimental studies. Additionally, investigating the combined effects of various gamified goal structures (competitive vs. cooperative) and incentive types (self-benefiting vs. other-benefiting) on consumers' behavioral engagement, continued engagement intention, performance, enjoyment, and well-being would also be worthwhile avenues for future exploration.

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7 APPENDICES

Appendix A. Constructs and Measures for Study 1

Construct	Measures	α	Loadings
Perceived Social Interactions			
Perceived Competition (PCOM)	When using and performing tasks of [App], …	.919	
(Gerpott et al., 2018)	… I compete with other users for goal achievement.		.867
	… I compete with others to be better placed on leaderboards.		.894
	… I feel a sense of competition to achieve my desired results.		.876
	… I want to stand out among other users.		.808
Perceived Cooperation (PCOO)	When using and performing tasks of [App], …	.953	
(Gerpott et al., 2018)	… I cooperate with other users for goal achievement.		.913
	… Other users and I work together towards the common goal.		.892
	… Achieving my goal requires the joint effort from me and other users.		.922
	… Other users and I share the responsibility to achieve the common goal.		.927
Goal Orientation	I think the goal of [App] benefits me / equally benefits me and others / benefits others (seven-point scale).		
Behavioral Engagement (ENG)	How frequently do you use [App]?		
Continued Engagement Intention (CEI)	My willingness to continue to use [App] and solve the tasks in [App] in the future is:	.890	.896
	The probability that I would continue to put forth a great deal of effort in performing the [App] tasks in the future is:		.896
Performance (PER)	In the last four weeks …	.917	
(Greguras & Diefendorff, 2010)	… I made considerable progress with the [App]'s tasks.		.839
	… I did very well on [App]'s tasks.		.912
	… I met the requirements for [App]'s tasks very well.		.900
	… I mastered everything I was assigned in [App]'s tasks very well.		.786
Enjoyment (ENJ)	I find using [App] interesting.	.887	.893
(Morschheuser et al., 2019)	I find using [App] enjoyable.		.893
Affective Social Identity (ASI)	I have a strong connection with users in [App].	.951	.952
(Bagozzi & Dholakia, 2006)	I feel very attached to others of [App].		.952

Self-Esteem (EST) (Rosenberg, 1979)	On the whole, I am satisfied with myself. I feel that I have a number of good qualities. I take a positive attitude toward myself.	.922	.946 .821 .921
Life Satisfaction (LSF) (Diener et al., 1985)	In most ways, my life is close to my ideal. The conditions of my life are excellent. I am satisfied with my life.	.955	.946 .943 .920
Age (AGE)	What is your age?		
Gender (GEN)	What is the gender you identify with?		

Appendix B. Apps Distribution Table by Perceived Competition Emphasis and Prosocialness in Study 1

		Perceived Competition Emphasis			
		High (> 0)	Neutral (= 0)	Low (< 0)	Total
Prosocialness	High (> 4)	23 samples (4.61%) 6 apps (5.17%)	9 samples (1.80%) 1 app (.86%)	18 samples (3.61%) 5 apps (4.31%)	50 samples (10.02%) 12 apps (10.34%)
	Neutral (= 4)	161 samples (32.26%) 27 apps (23.28%)	40 samples (8.02%) 8 apps (6.90%)	77 samples (15.43%) 12 apps (10.34%)	278 samples (55.71%) 47 apps (40.52%)
	Low (< 4)	126 samples (25.25%) 50 apps (43.10%)	19 samples (3.81%) 4 apps (3.45%)	26 samples (5.21%) 3 apps (2.59%)	171 samples (34.27%) 57 apps (49.14%)
	Total	299 samples (59.52%) 83 apps (71.55%)	68 samples (13.63%) 13 apps (11.21%)	121 samples (24.25%) 20 apps (17.24%)	499 samples 116 apps

Appendix C. Results of Regression Models in Neutral and Proself Goal Settings in Study 1

Models	ENG (1)	CEI (2)	PER (3)	ENJ (4)	ASI (5)	EST (6)	LSF (7)
	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)
Neutral Goal Setting							
Intercept	-.393 (.392)	-.280 (.288)	-.410 (.328)	-.449 (.276)	-.620 (.395)	**-.775 (.412).**	-.607 (.459)
Predictors							
PCOM	.028 (.059)	**.189 (.043)*** **	**.217 (.049)*** **	**.189 (.041)*** **	**.284 (.059)*** **	**.175 (.062)** **	**.164 (.069)***
PCOO	.073 (.050)	**.095 (.037)***	**.166 (.042)*** **	**.092 (.035)** **	**.396 (.050)*** **	**.161 (.053)** **	**.174 (.059)** **
PCOM × PCOO	.018 (.029)	.005 (.021)	-.016 (.024)	.024 (.020)	.012 (.029)	.029 (.030)	.038 (.034)
Controls							
Age	.012 (.008)	**.014 (.006)***	.009 (.007)	**.013 (.006)***	.004 (.008)	**.030 (.008)*** **	**.024 (.009)***
Gender	-.053 (.141)	**-.180 (.104).**	.003 (.118)	-.066(.099)	**.282 (.143)***	-.234 (.149)	-0.202 (.166)
Proself Goal Setting							
Intercept	-.124 (.488)	.238 (.377)	.427 (.389)	.426 (.319)	-.300 (.540)	0.067 (.555)	0.201 (.591)
Predictors							
PCOM	**.229 (.088)***	**.364 (.068)*** **	**.286 (.070)*** **	**.222 (.058)*** **	**.523 (.098)*** **	**.260 (.100)***	**.254 (.107)***
PCOO	**-.138 (.062)***	**-.105 (.048)***	-.047 (.049)	**-.070 (.040).**	**.327 (.068)*** **	-.006 (.070)	-.026 (.075)
PCOM × PCOO	**.119 (.042)** **	**.073 (.033)***	**.075 (.034)***	.039 (.028)	.054 (.047)	.078 (.048)	.033 (.051)
Controls							
Age	.000 (.010)	-.003 (.008)	-.007 (.008)	-.003 (.007)	-.001 (.011)	-.008 (.011)	-.011 (.012)
Gender	.025 (.181)	-.061 (.140)	-.064 (.144)	-.126 (.119)	.177 (.201)	.102 (.206)	.077 (.220)

Note. N = 499. PCOM = Perceived Competition; PCOO = Perceived Cooperation; ENG = Behavioral Engagement; CEI = Continued Engagement Intention; PER = Performance; ENJ = Enjoyment; ASI = Affective Social Identity; EST = Self-Esteem; LSF = Life Satisfaction.

. $p \leq .1$.

* $p \leq .05$.

** $p \leq .01$.

*** $p \leq .001$.

Appendix D. Constructs and Measures for Study 2

Construct	Measures	α	Loadings
Actual Social Interactions			
Actual Competitive Behaviors (ACOM)	Do you check the daily, weekly, and/or total ranking on the Forest Leaderboard while using Ant Forest?		
	If "Yes", how frequently have you checked the daily, weekly, and/or total ranking on the Forest Leaderboard?		
Actual Cooperative Behaviors (ACOO)	Do you participate in "Co-planting" while using Ant Forest?		
	If "Yes", how many trees have you planted together with other users?		
	Do you participate in "Public Forest" while using Ant Forest?		
	If "Yes", how frequently have you contributed to the "Public Forest"?		
Perceived Social Interactions			
Perceived Competition (PCOM)	When using and performing tasks of Ant Forest, …	.948	
(Gerpott et al., 2018)	… I compete with other users for goal achievement.		.902
	… I compete with others to be better placed on leaderboards.		.912
	… I feel a sense of competition to achieve my desired results.		.926
	… I want to stand out among other users.		.892
Perceived Cooperation (PCOO)	When using and performing tasks of Ant Forest, …	.903	
(Gerpott et al., 2018)	… I cooperate with other users for goal achievement.		.840
	… Other users and I work together towards the common goal.		.773
	… Achieving my goal requires the joint effort from me and other users.		.867
	… Other users and I share the responsibility to achieve the common goal.		.867
Behavioral Engagement (ENG)	How frequently do you use Ant Forest?		
Continued Engagement Intention (CEI)	My willingness to continue to use Ant Forest and solve the tasks in Ant Forest in the future is:	.812	.827
	The probability that I would continue to put forth a great deal of effort in performing the Ant Forest tasks in the future is:		.827
Performance (PER)	How many green energy points have you accumulated in total?		
Enjoyment (ENJ)	I find using Ant Forest interesting.	.837	.849
(Morschheuser et al., 2019)	I find using Ant Forest enjoyable.		.849

Affective Social Identity (ASI) (Bagozzi & Dholakia, 2006)	I have a strong connection with users in Ant Forest. I feel very attached to others of Ant Forest.	.863	.877 .877
Self-Esteem (EST) (Rosenberg, 1979)	On the whole, I am satisfied with myself. I feel that I have a number of good qualities. I take a positive attitude toward myself.	.838	.792 .777 .820
Life Satisfaction (LSF) (Diener et al., 1985)	In most ways, my life is close to my ideal. The conditions of my life are excellent. I am satisfied with my life.	.917	.892 .875 .892
Age (AGE)	What is your age?		
Gender (GEN)	What is the gender you identify with?		

Note. All survey items were translated into Chinese when distributed on Credamo.