Gamification and smart exercise travel

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Seongsoo Jang (corresponding author)

Senior Lecturer, Cardiff Business School, Cardiff University

Aberconway Building, Colum Drive, Cardiff, CF10 3EU, United Kingdom

Tel : +44 78 5979 2745. Email: JangS@cardiff.ac.uk.

Jinwon Kim*

Assistant Professor, Department of Tourism, Hospitality & Event Management, University of Florida, 186A Florida Gym | PO Box 118208 Gainesville, FL 32611-8208 USA.

Tel: +1 352 294 1625. Email: jinwonkim@ufl.edu.

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Abstract

This research note aims to empirically explore what types of gamified experiences affect exercise visitors' behavioral engagement. After identifying four types of motivational patterns of using gamified features before and during visits—intellectual curiosity, information reciprocity, posting reciprocity, and challenge, this study employs spatial analytical methods to capture how the gamification-exercise travel behavior relationship varies across locations. The ordinary least squares regression model shows that exercise visitors with greater information reciprocity and challenging experiences burned more calories. In addition, the geographically weighted regression results demonstrate that gamified experiences before or during visits have differential (negative or positive) effects on exercise travel outcomes across locations. The results of spatially heterogeneous relationships provide destination managers with meaningful managerial implications in terms of place-based gamification and smart tourism design.

Gamification and smart exercise travel

Although COVID-19 has shaken the tourism industry, it is expected that wellness tourism—travel associated with the pursuit of enhancing personal wellbeing—will grow steadily and reach nearly $7.0 trillion in 2025 (Global Wellness Institute, 2021). Demand for health and wellbeing has driven an increase in mobile exercise apps, hitting 2.48 billion downloads in 2021 (App Annie, 2022). Exercise app users likely continue and track their physical activities during leisure time (Litman et al., 2015). As an extension of prior research on the interrelationship among tourism and leisure/recreation (Hall & Page, 1999), we define *smart exercise travel* as a visitor's activity with multiple purposes such as leisure/recreation and tourism empowered by smart technology (Fig. 1). While prior research has focused mainly on smart visitors in a non-travel context (e.g., smart city), this study attempts to extend our knowledge of smart exercise visitors' behavioral outcomes in a travel context.

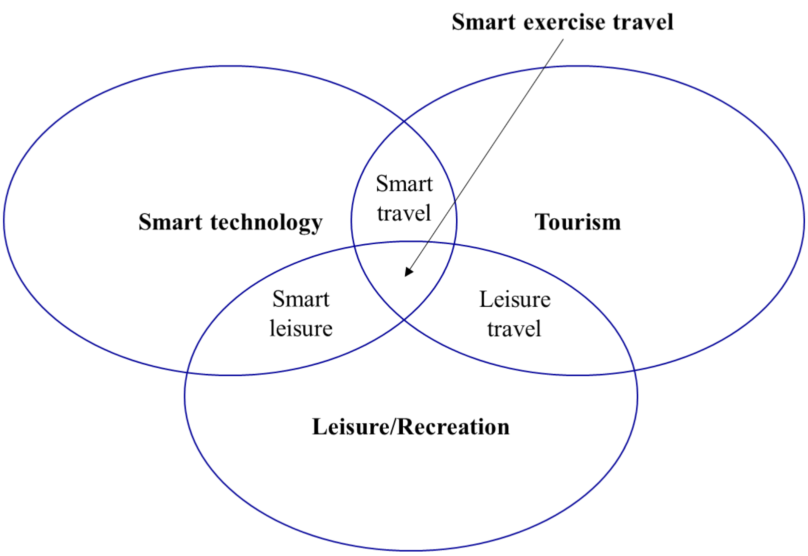

Fig. 1. Relationship between smart technology, leisure/recreation, and tourism

A successful smart tourism design can be facilitated by integrating visitors and their perspectives when designing the relevant motivational affordances (e.g., achievement, power, and affiliation) of gamified technologies (Aebli, 2019). Gamification refers to the process of enhancing a service with affordances to gamify experiences, which support users' overall value creation (Huotari & Hamari, 2017). Prior research on tourism gamification has focused on either the gamified characteristics of tourism products and services (Liang, Schuckert, Law, & Chen, 2017) or tourists' motives for engaging with gamified features (Aebli, 2019). Although gamification can affect visitors' psychological outcomes (Lee, 2021), how mobile app-based gamification influences exercise visitors' actual behaviors across locations has not been addressed.

This research aims to empirically explore what types of gamified experiences can affect visitors' behavioral engagement in the context of smart exercise travel. Furthermore, this study employs spatial analytical methods to capture how the gamification-exercise travel behavior relationship varies across locations. As exercise travel is considered to be a highly intrinsically motivated behavior, the behavioral outcomes of gamification may result from three types of motivational needs: competence (mastering a challenge), autonomy (choosing a challenge), and relatedness (experiencing recognition) (Deterding, 2014; Ryan & Deci, 2000). In the exercise travel context, gamified motivations can comprise of visitors' competence (increasing visitors' understanding of the destination), autonomy (choosing a challenging activity in the destination), and relatedness (interacting with other visitors). Hence, exercise gamification may trigger motivational affordances, and the gamified experiences in turn lead to behavioral outcomes (Huotari & Hamari, 2017).

For the empirical analysis, this study collected a unique dataset of exercise app (Tranggle) users' activities before and during visits to a famous tourist destination, Jeju Island, South Korea. Tranggle, the South Korea's largest exercise app, enables users to record the details of each physical activity and share their activity experiences with other Tranggle users, and some also upload and download specific trekking route information within the app. Randomly extracted data have a total of 3,546 exercise activities recorded by 764 users that occurred solely on Jeju Island in 2015. As a dependent variable of behavioral outcome, we measured the number of calories a visitor burned during each exercise activity. As independent variables, we operationalize competence as (1) *epistemic curiosity* by measuring number of trekking route downloads, autonomy as choosing a challenging destination by measuring (2) the maximum pace (*pace pressure*) and (3) the maximum altitude (*height pressure*) of an exercise travel activity, and relatedness as social reciprocity by measuring (4) cumulative amount of exercise route that a visitor has uploaded (*information reciprocity*), and (5) cumulative number of in-app user postings (*posting reciprocity*). Finally, age, app experience, and in-app purchase quantity and expenditures are controlled in the model.

The ordinary least squares (OLS) regression model (Table 1) shows that gamification related to autonomy (pace pressure and height pressure) and relatedness (information reciprocity) played a significant role in enhancing exercise visitors' behavioral outcome. That is, exercise visitors who walked faster (5.975) and climbed higher (1.098) and visitors who uploaded exercise route software (0.913) burned more calories. In addition, older and experienced travelers burned fewer calories than younger and less experienced travelers (-12.734 and -13.009). Finally, geographically weighted regression (GWR) is employed to produce a set of local regression coefficients to explore spatially varying relationships between variables.

Table 1

Results of OLS regression and GWR models.

Variable	OLS regression	GWR		
		Min	Mean	Max

Epistemic curiosity	-0.159	-91.672	-0.162	151.57
Pace pressure	5.975*	-17.612	7.103	49.895
Height pressure	1.098*	-0.21	1.316	10.596
Information reciprocity	0.913*	-17.791	0.039	12.137
Posting reciprocity	4.651	-479.253	8.997	683.855
Age	-12.734*	-20.801	-13.421	13.543
Experience	-13.009*	-198.47	-9.948	61.392
Purchase quantity	-92.651	-450.686	-87.218	688.532
Purchase expenditure	5.218	-105.767	4.314	48.591
Intercept	1022.459	-436.627	1089.77	4115.742
R^2	0.490	0.043	0.516	0.792

* $p < 0.05$

The GWR results demonstrate that the relationship between gamification and exercise travel outcome varies across activities. For example, although epistemic curiosity, on average, was negatively related with calorie burns (OLS: -0.159; GWR mean: -0.162), the GWR results indicate that depending on activity, the negative relationship was even larger (minimum: -91.672) and the relationship was positive (maximum: 151.570). Fig. 1 visualizes the spatial distributions of GWR-based local coefficients for five gamification elements. Visitors with higher information reciprocity increased their calorie burns in the center and southern (red-colored) areas but decreased their calorie burns in the center-right (blue-colored) areas (1-b). Interestingly, visitors with greater pace pressure increased calorie burns in the northern areas (1-d), whereas visitors with height pressure increased their engagement in the center areas (1-e). These results show that gamified experiences have differential (negative or positive) effects on exercise travel outcomes across locations. The spatial distribution of local R^2 (1-f) illustrates that the GWR model (0.516) outperformed the OLS model (0.490), and the model performance was spatially heterogeneous across activity locations (0.043 to 0.792).

Findings of the GWR model provide destination managers with a guidance of how destination managers benefit from the place-based segmentation or clustering of gamification-driven engagement management in a particular season. For example, Fig. 2 illustrates how and where exercise visitor engagement can be driven by one or multiple gamified experiences—epistemic curiosity (S1), pace pressure (S2), height pressure (S3), information reciprocity (S4), posting reciprocity (S5), and all experiences (S6). Further, managers can collaborate with exercise apps on promoting specific gamified experiences because visitors are likely to demonstrate high behavioral engagement. For instance, managers can organize a speed hiking competition in area S2 and online posting competition in area S5 on Jeju Island.

This study offers several conclusions and a new research agenda in the areas of gamification and smart tourism. First, this study introduces the concept of *smart exercise travel* and enhances our knowledge of smart tourism design by identifying quantified traveler behaviors while considering gamification and spatial data analytics. Second, this work contributes to the literature on tourism gamification by demonstrating that two types of intrinsic gamification—autonomy and relatedness—enhance exercise travel outcomes. However, future research can measure extrinsically motivated gamification to examine how the traveler gamification-behavioral outcome linkage varies among different constructs. Finally, the results of spatially heterogeneous relationships provide managers with advanced marketing implications in terms of managing place-based gamification and visitor engagement. However, the data used in this study was collected in 2015 before COVID-19. Future research can utilize the opportunity to examine why the spatial heterogeneity of exercise travel engagement occurs across the type of gamification amid the pandemic.

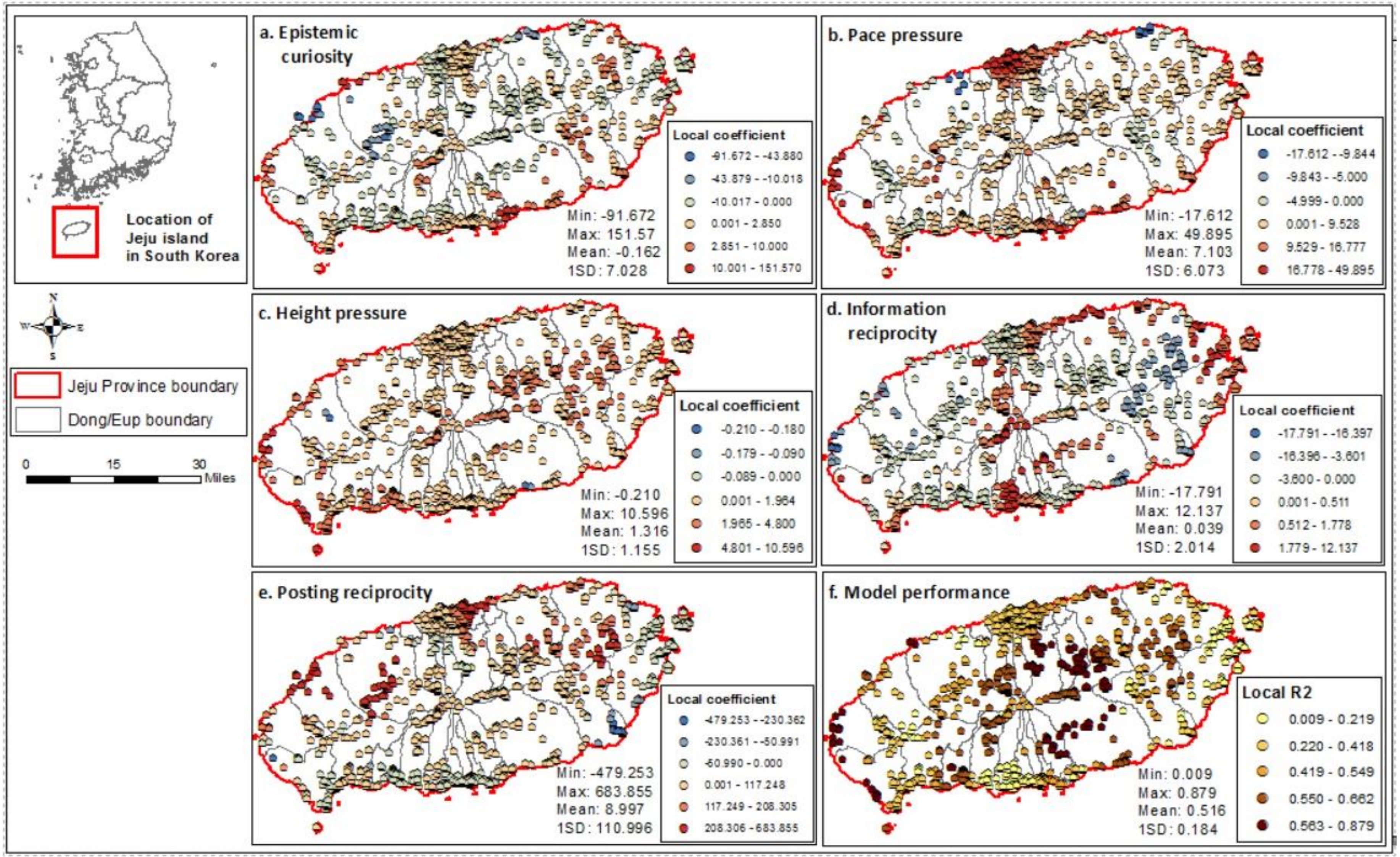

Fig. 1. Spatial distributions of local GWR coefficients for five gamification variables and local R^2.

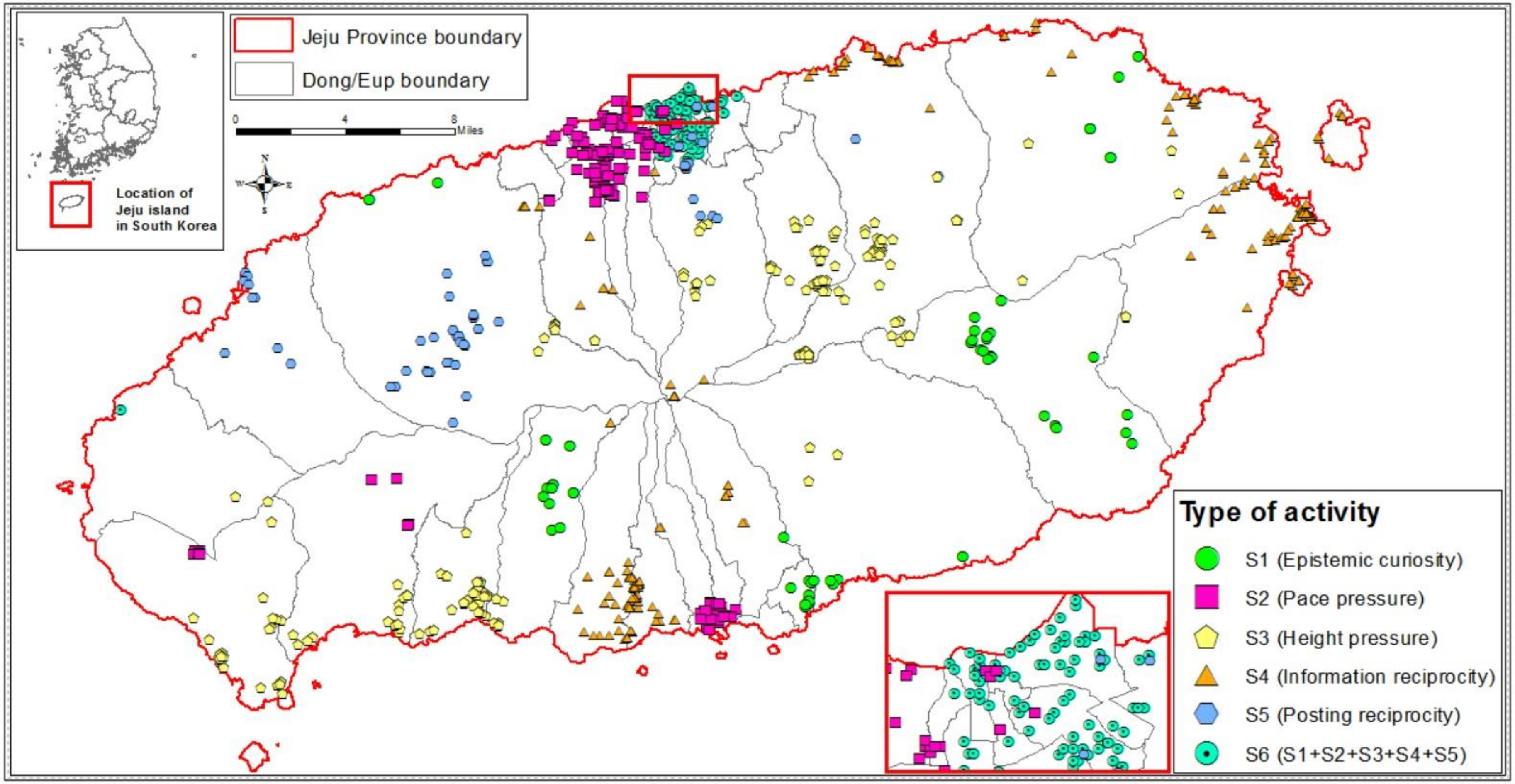

Fig. 2. Spatial segmentation of positive GWR coefficients for gamification variables.

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