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## Exploring the relationship between cycling motivation, leisure benefits and well-being

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**Abstract:** Bicycles have been useful transportation tools for many years, and have recently become more popular in terms of leisure and health. Increasingly, people choose regular cycling activities as a means of becoming healthier and happier. However, the relationships between why people choose to cycle, what benefits they get from bicycle-based leisure activities, and how their well-being is improved have not been fully explored. In this article, the relationship between cycling motivation, leisure benefits, and well-being is examined. Specifically, internal and external factors are considered in the motivation to cycle. Leisure benefits comprise physiological, psychological, and social benefits, while well-being consists of life satisfaction, self-confidence, and self-affirmation. A questionnaire survey is developed, and field data collected in China. A descriptive analysis, correlation analysis, and regression analysis are conducted. The results show that leisure benefits are positively affected by cycling motivation and both cycling motivation and leisure benefits have a positive impact on well-being. The practical implications of the results of the study are also discussed.

### 1. INTRODUCTION

The role of the bicycle has recently changed in many countries. Initially a primary transportation tool for many people, its use began to decline and it was to some extent marginalized after motorized vehicles became available to the public ([Aldred, 2015](#)). This phenomenon became apparent globally from the mid-twentieth century. As [Aldred, \(2015\)](#) indicated, in the U.K. the use of the bicycle for transportation has declined, but cycling as a leisure activity has gradually increased ([Aldred, 2015](#); [Lamont, 2009](#)).

The broad influence of cycling as recreation has been the focus of numerous studies. Cycling tourism has been considered effective in promoting local economic development, improving the construction of social infrastructure, and reducing environmental damage ([Pratte, 2006](#)). Due to changes in individual economic status and attitudes toward consumption, and as the concept of environmental protection and sustainable development has gained popularity, cycling has become newly fashionable. Cycling is a way of exercising, and thus can improve the life

and the health of an individual ([Anon, 2010](#); [Cohen, Boniface, et al., 2014](#); [A. Lusk and Li, 2012](#)). Cycling also can help obese people lose weight ([A. C. Lusk, Wen, et al., 2014](#)), reduce the incidence of many diseases such as cancer or cardiovascular disease, and positively influence mental health ([Hansen and Nielsen, 2014](#); [Pucher, Buehler, et al., 2010](#); [Rissel, Petrunoff, et al., 2014](#)). Thus, cycling represents a type of healthy lifestyle or even an identity ([Hu, 2006](#)), and so the use of the bicycles has gradually developed to incorporate its new functions of leisure, recreation, and health ([Lamont, 2009](#); [Rowland, Flintham, et al., 2009](#)).

Cycling has undergone such changes in China. Forty years ago, China was considered to be a “country on a bicycle”. Now the car has replaced the bicycle as the main transportation tool. However, in areas such as tourist destinations it has been observed that the bicycle has gradually returned and cycling as a leisure activity has become more extensive ([Mou, 2013](#)). Cycling infrastructure has also been built in many cities. In Guangzhou, Chengdu, Zhuhai, Shenzhen, and other Chinese cities greenways have been constructed, and are intended to meet the needs of cyclists when enjoying their leisure activities ([Yu and Tian, 2013](#)). For example, in the Pearl River Delta area, a 7350-kilometer greenway network has been built, connecting 320 tourist attractions and 166 service stations, covering 3,600 square kilometers, and serving a population over 8 million ([Su and He, 2014](#)).

Studies of cycle tourism have increased with its popularity. These studies focus on the motivations ([De Vos, Schwanen, et al., 2013](#); [Green, Jones, et al., 2014](#)), experiences ([Fox, Humberstone, et al., 2014](#)), and benefits ([Yu and Tian, 2013](#)) of cycling, and its effect on wellbeing ([Gatrell, 2013](#)). In terms of the factors contributing to well-being, [Yu and Tian, \(2013\)](#) found that cycling can bring leisure benefits and therefore can have an impact on an individuals’ sense of happiness and subjective well-being. [Liu, \(2016\)](#) also pointed out that the motivation for leisure activities may have an effect on leisure benefits and well-being. However, no studies have been conducted to examine the potential links among these constructs.

Thus, the aim of this study is to explore how the motivation of cyclists, the leisure benefits of cycling, and the effects on well-being are linked. Empirical research was carried out through data collection and analysis. The study helps to further the understanding of cyclists’ experiences and the benefits of cycling. The practical implications are also discussed.

## **2. LITERATURE REVIEW**

### **2.1 Motivation, benefits and well-being from cycling**

Motivation has been widely studied in psychology since the 1930s ([J. J. Liu, 2004](#)), and can be considered as a need, reason, or satisfaction that stimulates involvement in an activity ([M. Chen and Pang, 2012](#); [Crandall, 1980](#)). Motivation also refers to an internal psychological process, and is used as a variable when measuring psychological perception ([Z. G. Li and Lu, 2004](#)). Cycling tourists were classified by the [South Australian Tourism Commission, \(2005\)](#) as being dedicated, interested, or incidental/opportunistic, which suggested that they may have different motivations toward cycling activities ([Ritchie, Tkaczynski, et al., 2010](#)). Thus, cycling motivation has been explored by many researchers ([Gonzalez, Hanumara, et al., 2006](#); [Ritchie, 1998](#); [Ritchie, Tkaczynski, et al., 2010](#); [Simonsen, Jørgensen, et al., 1998](#)).

Numerous tourism studies suggest that push and pull factors influence travel behavior ([Dolnicar, 2008](#); [Park and Yoon, 2009](#)), with push motivations derived from intrinsic motivations and pull motivations referring to destination attributes ([Ritchie, Tkaczynski, et al., 2010](#)). With reference to tourism motivation theory, [Ritchie et al., \(2010\)](#) found that push motivation items were also effective for cycling, comprising adventure experiences, competence mastery, personal challenge, relaxation/escape, and social encounters. [L. Liu, \(2016\)](#) further proposed internal and external motivation as types of push motivation, with internal motivation derived from participants themselves, such as self-achievement and exercise, and external motivation derived from what can be gained from others, such as making friends. Drawing on studies of cycling motivation, which almost exclusively focus on push motivation ([Mou, 2013](#); [Wan and Meng, 2008](#)), the motivation measuring method developed by [L. Liu, \(2016\)](#) is used in this study.

The meaning of leisure benefits is very broad and can be understood from physiological, psychological, and social perspectives ([L. Liu, 2016](#); [Yu and Tian, 2013](#)). [Ajzen, \(1991\)](#) discussed and evaluated leisure benefits using social psychology theory, and found that participants could benefit from leisure activities, which suggests that leisure benefits also measure psychological perception. The study also revealed that a higher assessment of the possible benefits of leisure activities from the participants led to a more obvious participation attitude, and to more active participating behavior. [Bright, \(2000\)](#) suggested that leisure benefits can be examined from many perspectives, such as those of physiology, psychology, social interaction, economy, and the environment.

At the micro level, the studies of [McAvoy, \(2001\)](#) and [Parry and Shaw, \(1999\)](#) reveal that leisure can benefit individuals in many aspects, including changing their self-concepts, enriching their lives, the promotion of leisure skills, and the improvement of interpersonal relationships, self-efficacy, and physical and psychological comfort. In terms of personal benefits, new social relationships can be established and previous social bonds can be strengthened by walking or cycling together ([Gatrell, 2013](#)). For example, cycling activities can promote interactions between parents and children in families ([McIlvenny, 2015](#)). [Esbjörnsson, Juhlin, and Östergen, \(2003\)](#) found that cycling tourists always give a quick nod or wave when encountering others on the road, and such brief encounters were enjoyable to them. However, there is a lack of quantitative measurements of leisure benefits in the context of cycling. Further empirical studies are required to identify the benefits brought by cycling activities.

The definition and characteristics of the concept of well-being have been widely discussed. [Kearns and Andrews, \(2010\)](#) understood it as simply including “being well” and “feeling well”, that is, physical and emotional satisfaction. Well-being can be objective or subjective ([Western and Tomaszewski, 2016](#)). Subjective well-being is a concept widely used in research, and is defined as the degree to which an individual positively evaluates the overall quality of their lives ([Bergstad, Gamble, et al., 2011](#); [Diener, Emmons, et al., 1985](#)). Many studies examine the subjective well-being of local residents and tourists, including diverse factors in different specific settings such as economic status, social relations, community consciousness, social environment, and tourism perception ([Chi, Cai, et al., 2017](#)). The well-being of cyclists involves the subjective perception of individuals, and particularly their psychological status, according to [Yu and Tian, \(2013\)](#). To measure the well-being of cyclists more comprehensively,

the three factors of life satisfaction, self-affirmation, and self-confidence ([Jin, 2011](#); [L. Liu, 2016](#)) are used in this study. Life satisfaction is the judgment of satisfaction with life as a whole, and is the cognitive component of subjective well-being ([Diener, Emmons, et al., 1985](#)). Self-affirmation and self-confidence both refer to the level of satisfaction with oneself, which is also a psychological category ([Guan, Dai, et al., 2017](#)). Self-confidence is the trust of a subject in his or her social and moral value, while self-affirmation is the identification of one's own valuable achievements ([Briñol, Petty, et al., 2007](#); [Guan, Dai, et al., 2017](#)). Self-affirmation and self-confidence are in psychological terms types of positive self-evaluation in a subject ([Guan, Dai, et al., 2017](#)).

## 2.2 Hypotheses development

### 2.2.1 Cycling motivation and well-being

Leisure motivation refers to the internal psychological process that induces, guides, and integrates personal leisure activities, and leads the leisure activity to a certain goal, and is thus the subjective cause of leisure activities ([Z. G. Li and Lu, 2004](#)). Cycling motivation is a specific type of leisure motivation. The literature suggests that leisure motivation has a significant impact on the well-being of individuals ([Y. H. Chen, 2010](#); [Jin, 2011](#)). [Jin, \(2011\)](#) found that leisure motivation and subjective well-being had a significant predictive effect. [Padhy et al., \(2015\)](#) found that leisure motivation had significantly different effects on the well-being of adolescents and young adults, and could explain a significant proportion of variance in well-being. [L. Liu, \(2016\)](#) empirically tested the motivation and well-being of marathon participants, and found that the motivation of the participants had a positive impact on their well-being. Many studies have suggested that cycling motivation has important effects on cyclists' well-being [Simonsen et al., \(1998\)](#), but the relationship between cycling motivation and well-being has not been examined. Accordingly, we propose the following hypothesis, H1.

*H1: Cycling motivation has a significant positive impact on the well-being of cyclists.*

### 2.2.2 Cycling motivation and leisure benefits

Leisure benefits are defined by ([Ajzen, 1991](#)) as the achievement of a goal and the benefits obtained by the target achievement. ([L. Liu, 2016](#)) found leisure benefits to be affected by leisure motivation in the context of marathons. Both internal and external motivations for participating in marathons were found to influence leisure benefits, and internal motivation was of more relevance to leisure benefits. ([M.-J. Li, 2016](#)) also indicated that leisure motivation could effectively explain nearly half of the variance in leisure benefits.

In cycling studies, many theoretical suggestions have been put forward for the correlation between cycling motivation and leisure benefits ([M.-J. Li, 2016](#); [Šťastná, Vaishar, et al., 2018](#); [Wu, 2016](#)). Urban cycling contributes significantly to inhabitants' health and the city environment ([Šťastná, Vaishar, et al., 2018](#)), and these benefits may influence the decisions to use bicycles for transportation. [Wu, \(2016\)](#) indicated that the participation motivation of amateur cyclists increased in terms of leisure benefits as their

engagement deepened. [Yu and Tian, \(2013\)](#) also suggested that leisure benefits could be affected by the degree of motivation in the context of cycling. There may be a correlation between cycling motivation and leisure benefits, but further evidence is required. Thus, the following hypothesis is developed.

*H2: Cycling motivation has a significant positive impact on leisure benefits.*

### 2.2.3 Cycling motivation, leisure benefits and well-being

Many studies have suggested that leisure motivation can affect the well-being of individuals through an intermediary variable ([Y. H. Chen, 2010](#); [Jin, 2011](#); [L. Liu, 2016](#)). [Yu and Tian, \(2013\)](#) found leisure involvement had a positive impact on the sense of happiness, as it acted as a presentation of motivation and interest. A significant correlation has been identified between leisure benefits and well-being, and leisure benefits can effectively predict happiness according to [Lu and Argyle, \(1994\)](#). The study of [Huang, \(2007\)](#) showed that leisure benefits and well-being were closely related, and had a significant dependency relation. Cycling as a leisure activity is considered to improve mental and physical health ([A. C. Lusk, Wen, et al., 2014](#); [Rissel, Petrunoff, et al., 2014](#)), and cycling motivation has been considered a crucial factor in the well-being of cycling tourists. Thus, leisure benefits may act as the mediator variable between cycling motivation and well-being. However, this mediating effect has received little attention. Thus, the third hypothesis is proposed.

*H3: Cycling motivation has an indirect significant positive impact on the well-being of cyclists through the mediator variable leisure benefits.*

## 3. METHODOLOGY

### 3.1 Model and Measurement

The model used in this study is illustrated in the following Figure 1. An empirical survey study was conducted to test the hypotheses.

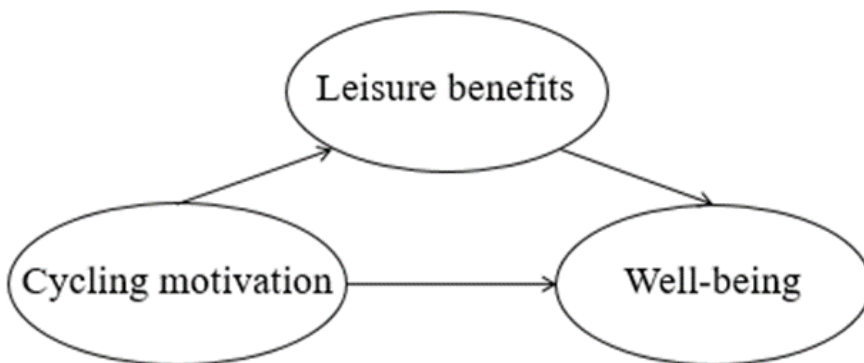


Figure 1. The research model of the paper

Cycling motivation, leisure benefits, and well-being are the three latent variables in the scale.

Cycling motivation was measured by the scale developed by [L. Liu, \(2016\)](#). The reliability and validity of the scale was tested by [L. Liu, \(2016\)](#), and its Cronbach's  $\alpha$  is 0.867 in the empirical study, with its criterion validity of this scale being supported by its positive relationship with well-being.

Many scholars' research results were combined in the design of the leisure benefit scale, from the three aspects of physiology, psychology and society ([L. Liu, 2016](#); [Yu and Tian, 2013](#)), giving a total of 15 items. The criterion validity of this scale was also supported by their studies.

Well-being was measured by life satisfaction, self-affirmation, and self-confidence. The life satisfaction scale developed by [Diener et al., \(1985\)](#) was originally aimed at assessing individual satisfaction with life as a whole, and has been widely used in many studies. Self-affirmation and self-confidence were measured using the scale developed by [L. Liu, \(2016\)](#).

To better estimate the effects of cycling motivation on well-being, the following control variables were incorporated into the model: gender, age, whether the participant had a bicycle (1 = Yes; 2 = No), and cycling experience (1 = 1 year and below; 2 = 2-3 years; 3 = 4-5 years; 4 = 6-9 years; 5 = 10 years and above).

The questionnaire was divided into two parts, with the three scales in the first part. The second part consisted of questions on gender, occupation, age, and other basic information about the respondents. Forty-five items were included before the formal research. The Likert 5-score scale was used for measurement, with 5 = strongly agree, and 1 = strongly disagree.

### 3.2 Data collection and analysis

Before the formal questionnaire survey, a pre survey was carried out and the questionnaire items were tested in advance. Data were collected in a university for convenient sampling, and respondents were asked to give their opinions on the understandability and readability of the questionnaire items. For clarity, vague or repetitive items were modified or deleted after the pre-survey. The validity of the questionnaire was examined with a small sample ( $N = 50$ ), and the reliability of the questionnaire scale was confirmed. The final questionnaire included 38 items. Formal research was conducted at the end of February to early March in 2018. The survey was conducted both online ( $N = 179/326$ ) and by face-to-face questionnaire collection ( $N = 147/326$ ). A total of 326 questionnaires were distributed with 312 valid questionnaires recovered, so the effective rate was 95.7%. The sample population characteristics are given in

#### *Table 1.*

For further analysis, descriptive statistics and correlations among cycling motivation, leisure benefits and well-being were first used to obtain the basic information, then the mediation model was tested. According to the analytic procedure proposed by [Preacher and Hayes, \(2008\)](#) and [Guan et al., \(2017\)](#), the following three steps were taken to test the mediation effects:

first, the independent variable (cycling motivation) should significantly predict the mediator (leisure benefits); second, the mediator (leisure benefits) should be significantly related to the dependent variable (well-being) after the effect of the independent variable (cycling motivation) is controlled; and third, in the bootstrapping test, the indirect effects through mediators must be significant. Hierarchical regression analyses were conducted to examine the first two criteria, while process regression was conducted for the bootstrapping test. Based on the work of [Aiken, West, and Reno, \(1991\)](#) and [Guan et al., \(2017\)](#), all of the latent variables were measured by centering effective observed variables before the regression analysis.

Before the data analysis, the reliability and validity of the scale were tested to ensure the accuracy of the measurement. The Cronbach's alpha of the three scales was 0.938, which shows the good reliability of all scales. The Cronbach's alpha of the sub-scales of cycling motivation, leisure benefits and well-being were 0.774, 0.890, and 0.909 respectively, which are all greater than the reference value (0.6) of the social science study, indicating a high level of reliability for each scale. The Kaiser-Meyer-Olkin value was 0.927, which is close to 1, indicating that the sample size is sufficient, and Bartlett's test of sphericity was 4448.45 ( $df = 378$ ,  $p = 0.00 < 0.05$ ), indicating that it is very suitable for factor analysis. The samples were randomly divided into two parts.

The independent sample T test of each item of the three scales showed that the two groups of random samples had no significant differences, indicating that the sampling was representative. Thus, the reliability and validity of each scale were sufficient. Based on the work of [Guan et al., \(2017\)](#), the calculation method used for each scale is the additive average method. Each indicator conforms to the principle of comparability in terms of the standard of measurement, the meaning of value, and the calculation method and therefore the absolute values of the indicators are comparable ([L. Liu, 2016](#)).

## 4. RESULTS

### 4.1 Demographic

The profiles of the participants are displayed in

*Table 1.* Males accounted for 52.9% of the effective sample. Most of the respondents were between 18 to 40 years old, while 5.8% were older. As the chart shows, the respondents generally had a high degree of education, with 76.6% undergraduates or above. Most respondents had a monthly income of over 3000 yuan and were employed or self-employed, with students and others accounting for only a small proportion.

In terms of basic cycling information, 80.4% of the respondents owned a bicycle and the majority had been cycling for more than one year, with some having more than ten years cycling experience. Only 24% of the respondents said they had little or no cycling experience, while more said they had



extensive experience. In terms of their frequency of cycling, 82.4% of the respondents participated in cycling activities at least once a month, 58% once a week, and 11.9% once a day. Thus, cycling appeared to be a very common activity among the different groups of Chinese people (in terms of age, education and occupation), and particularly for the young and middle-aged.

*Table 1.* Demographic characteristics of the respondents

Items	Sample size	Proportion (%)	Items	Sample size	Proportion (%)
	Gender		Occupation		
Male	165	52.9	Government/institution	11	3.5
Female	147	47.1	State-owned enterprise	44	14.1
	Age		Private enterprise	147	47.1
18 and under	1	0.3	Self-employed person	14	4.5
18-25	101	32.4	Student	65	20.8
26-30	64	20.5	Retired	7	2.2
31-40	96	30.8	Other	24	7.6
41-50	32	10.3	Whether have a private bicycle		
51 and above	18	5.8	Yes	251	80.4
	Education		No	61	19.6
Junior middle and below	2	0.6	How long they have cycled		
High school/Training school	19	6.1	1 year and below	40	12.8
Junior college	52	16.7	2-3 years	94	30.1
Bachelor degree	213	68.3	4-5 years	78	25
Graduate degree and above	26	8.3	6-9 years	50	16
Monthly income			10 years and above	50	16
1000 yuan and below	20	6.4			
1001-3000 yuan	72	23.1			
3001-5000 yuan	91	29.2			
5001-10000 yuan	95	30.4			
10001 yuan and above	34	10.9			

## 4.2 Descriptive statistics and correlations

The descriptive statistics and correlations among cycling motivation, leisure benefits, and well-being are given in Table 2 and Table 3.

Table 2. Descriptive statistics of each item

Latent variable	Factors	Items	Mean value	Standard deviation
Cycling motivation	Internal factors	Physical exercise	4.07	0.887
		Relax the body and mind	3.79	0.993
		Self-achievement	3.68	0.983
	External factors	Make more friends	3.64	0.995
		Be noticed by others	3.06	1.035
		Enjoy the fun	4.25	0.83
		Physical benefits	Improve cardiopulmonary function and strengthen physical energy	4.23
Leisure benefit	Physical benefits	Eliminate fatigue and restore physical strength	3.53	0.992
		Slow down aging	3.83	0.897
		Improvement or control of disease	3.88	0.886
		Vent or stabilize the mood	3.89	0.89
	Psychological benefits	Relieve pressure	4.09	0.774
		Relaxed and clear mind	4.27	0.739
		Increase enjoyment of life	4.14	0.759
	Social benefits	Know more new people	3.87	0.879
		Promote friendship	3.91	0.839
		Get the support and trust of companions	3.85	0.878
		Obtain team spirit, mutual assistance and cooperation	3.97	0.859
Self affirmation	I'm in good health	3.95	0.851	
	I'm full of energy and can do anything	3.78	0.906	
	I'm satisfied with everything	3.7	0.874	
Well-being	Self confidence	I am full of confidence in the future	4.04	0.889
		I'm happy most of the time	3.67	0.927
	Life satisfaction	I can bring happiness to others	3.68	0.857
		I have a good influence on everything in life	3.51	0.956
		WB4. In general, I'm satisfied with my life	3.74	0.926
		WB1. So far, I've got the most important things in my life	3.76	0.975

Table 3. Inter-correlations among the variables

	M	SD	Internal factors	External factors	Physical benefits	Psychological benefits	Social benefits	Self-affirmation	Self-confidence	Life satisfaction
Internal factors	3.85	0.730	1							
External factors	3.65	0.713	0.641**	1						
Physical benefits	3.87	0.677	0.522**	0.436**	1					
Psychological benefits	4.10	0.621	0.559**	0.465**	0.620**	1				
Social benefits	3.90	0.706	0.536**	0.608**	0.484**	0.644**	1			
Self-affirmation	3.81	0.728	0.483**	0.465**	0.484**	0.470**	0.529**	1		
Self-confidence	3.80	0.720	0.432**	0.465**	0.495**	0.430**	0.532**	0.720**	1	
Life satisfaction	3.68	0.777	0.489**	0.489**	0.484**	0.420**	0.494**	0.756**	0.740**	1

(Note: \* represents  $P < 0.05$ , \*\* represents  $P < 0.01$ , \*\*\* represents  $P < 0.001$ , two-tailed test)

The results show that people participating in cycling activities are motivated both by internal and external motivations, but based on the mean value, external motivation appears less important. In addition, they perceive more psychological benefits than social benefit. Psychological experience is most valued by individuals, indicating that people are now pursuing emotional achievement. In terms of well-being, self-affirmation and self-confidence share similar mean values while life satisfaction has the lowest value.

According to the results of the correlation analysis, all of the correlation coefficients are higher than 0.4, indicating that all the variables are positively correlated. People who have different types of cycling motivation perceive leisure benefits differently. Those who cycle and consider internal factors have a closer relationship with psychological benefits, while those considering external factors have a closer relationship with social benefit. However, all of the correlation coefficients between well-being and the different factors of cycling motivation and leisure benefits have no significant difference. These results indicate that the perception of well-being is not decided by the types of cycling motivation or leisure benefits.

### 4.3 Testing the mediation model

To further explore the relationship between different variables, hierarchical regression analyses were conducted. Table 4 displays the results of the hierarchical regression. After controlling for the effects of gender and age, whether they had a bicycle, and their cycling experience, leisure benefits are predicted by cycling motivation ( $\beta = 0.626$ ,  $p < 0.001$ ), thus H2 is supported. After the effects of control variables and cycling motivation are controlled, the effect of leisure benefits is significant and it can explain the additional variance ( $R^2$  change = 7.8%,  $p < 0.001$ ) of well-being. The results provide evidence for the mediation effect of leisure benefits.

Table 4. Hierarchical regressions of cycling motivation, leisure benefits and well-being

Variable	Leisure benefits	Well-being	
		Model 1	Model 2
Gender	0.199**	0.410***	0.333***
Age	0.032	0.288***	0.275***
Whether have a bicycle	-0.190**	-0.174**	-0.101*
Cycling experience	-0.028	-0.010	0.001
Cycling motivation	0.626***	0.496***	0.252***
Leisure benefits			0.389***
R <sup>2</sup>	0.485	0.435	0.513
Adjusted R <sup>2</sup>	0.476	0.425	0.505
F	57.567***	47.068***	53.446***

(Note: \* represents P<0.05, \*\* represents P<0.01, \*\*\* represents P<0.001)

To test the mediating effects of each factor of leisure benefits separately, further analysis was conducted. Table 5 displays the details of each factor of leisure benefits, and the results show that they all have significant mediation effects between cycling motivation and well-being. Compared to the R2 of model 1, the R2 of model 2a (physical benefits), 2b (psychological benefits), and 2c (social benefits) are all larger, and the F values are all significant at the 0.001 level.

Table 5. Further Hierarchical Regressions of Cycling Motivation, Leisure Benefits and Well-Being

Variable	Physical benefits	Psychologic al benefits	Social benefits	Well-being			
				Model 1	Model 2a	Model 2b	Model 2c
Gender	0.167*	0.214**	0.134*	0.410***	0.365***	0.368***	0.364***
Age	0.135	0.004	-0.056	0.288***	0.252***	0.287***	0.307***
Whether they have a bicycle	-0.147*	-0.206**	-0.137*	-0.174**	-0.135*	-0.134*	-0.127*
Cycling experience	-0.008	-0.023	-0.041	-0.010	-0.008	-0.006	0.004
Cycling motivation	0.488***	0.505***	0.605***	0.496***	0.365***	0.396***	0.288***
Physical benefits					0.268***		
Psychological benefits						0.197***	
Social benefits							0.343***
R <sup>2</sup>	0.310	0.346	0.431	0.435	0.484	0.460	0.502
Adjusted R <sup>2</sup>	0.299	0.335	0.422	0.425	0.474	0.450	0.492
F	27.498***	32.315***	46.324**	47.068**	47.730**	43.334**	51.198**
			*	*	*	*	*

(Note: \* represents P<0.05, \*\* represents P<0.01, \*\*\* represents P<0.001)

To examine the significance of the indirect effect, bootstrapping analyses in the process regressions (Preacher and Hayes, 2008; Guan et al., 2017) were conducted. The indirect effect of cycling motivation (95% CI = [0.154, 0.440]) on well-being through leisure benefits is significant. In terms of each factor of leisure benefits, the indirect effects of cycling motivation on well-being through physical benefits (95% CI = [0.304, 0.568]), the psychological benefits (95% CI = [0.313, 0.616]), and the social benefits (95% CI= [0.218, 0.517]) are all significant. The results are given in Figure 2.

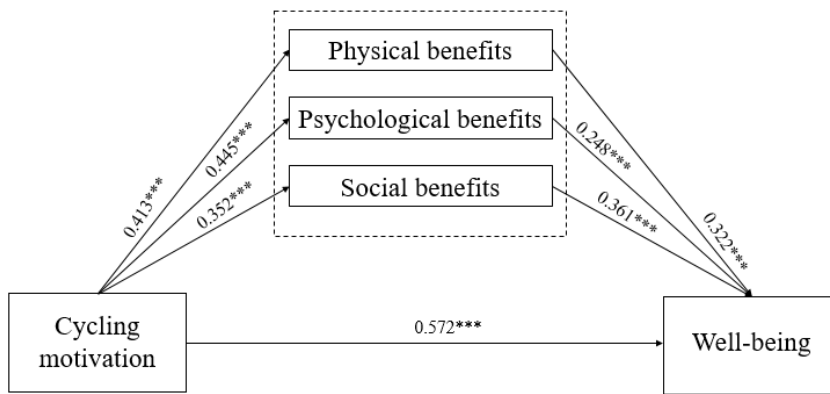


Figure 2. The Mediation Model

## 5. CONCLUSION AND DISCUSSION

This study extends previous research by examining the mediation through which cycling motivation influences well-being. Cycling motivation can both directly and indirectly influence the well-being of cyclists through the mediating role of leisure benefits. As a type of green mobility, cycling is beneficial to individuals. The characteristics of cycling may be why cycling motivation has an impact on well-being. Cycling is an embodied experience (Fox, Humberstone, et al., 2014), which enables cyclists to obtain multiple sensory experiences in a pleasant way. Friendship and emotional support from companions can also be obtained through leisure activities (Gatrell, 2013). Cycling has a positive impact on health (A. Lusk and Li, 2012), and the importance of cycling activities in terms of national fitness is also confirmed. The bicycle, with its green image, low carbon footprint and environmental benefits, is welcomed by local governments and by people of all ages.

This study has practical implications. First, Chinese people still participate in cycling activities, and the average levels of motivation, benefit and well-being for cyclists are high. This study indicates a high level of cycling demand in China. Therefore, infrastructure for cyclists is very much required. Although Chinese local governments have made great efforts to build greenways, many of these are outside the city centers and thus not easy to access. The maintenance of greenways is also problematic. Cycle lanes should also be formally integrated into the road system and priority should be given to them.

Second, motivation plays a key role in the ability of cyclists to improve their well-being. However, bicycles are typically used for daily commutes, and many people do not realize the benefits of cycling for their health. The mobility gained through cycling can affect the well-being of cyclists in many aspects, such as self-affirmation, self-confidence and life satisfaction. Therefore, educational campaigns are required.

This study has some limitations. For example, the research only used a questionnaire survey and did not acquire deeper knowledge from the respondents. In addition, the measurement items are limited. In future, more work can be done to integrate qualitative methods into the research and to explore other aspects that may influence the experiences and well-being of cyclists.

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