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An Economic Evaluation of Subjective Well-Being Derived from Sport Participation

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***Abstract*—**This study links up the theories of social psychology, economics and sport management to assess the impact of sport participation on subjective well-being (SWB) and use a simple statistic method to estimate the relative monetary value that sport participation derives SWB for Taiwan's college students. By constructing proper measurements on sport participation and SWB respectively, a structural equation model (SEM) is developed to perform a confirmatory factory analysis, and the causal relationship between sport participation and SWB as well as the effect of the demographic variables on these two concepts are also discussed.

***Keywords*—**Demographics, Economic value, Sport participation, Structural equation modeling (SEM), Subjective well-being.

I. Introduction

INDIVIDUAL well-being in physical, psychological,and social areas has long been a research focus in social psychology. With the changes in work patterns, family structure and the diversity of modern social values, and the standard level of material life rising beyond the basic living conditions, people would focus on life quality much more than economic prosperity [11]. Recently, a number of measures of subjective well-being (SWB) have been broadly adopted and considered as a critical indicator for studying the civil life quality and developing public policy by psychologists, economists and medical community [3], [17], [22], [26], [34], [35]. Meanwhile, the development of sport science has gradually shifted its focus on the balanced physical and mental health and stressed how to have a healthy body and enjoy the high quality of life through sport participation [1]. Some empirical research has verified when a sport participant consciously perceives to have the incredible ability and sense of control, and his/her body seems to be the peak performance of voluntary exercise that will bring a high degree of individual well-being [6]. [32] indicated that participation in organized sport may strengthen community bonds by helping people meet fellow citizens that would otherwise not easily meet. [27] also addressed continued participation can promote the physical health and increase the psychological well-being. Some extended empirical studies have verified that senior citizens can get higher well-being from the higher exercise intensity and frequency [28]. Many advanced countries in Europe have been starting to use econometric model to reveal the relationship between sport participation and SWB [5], [13], [15], [37]. Therefore, the option to participate in a variety of sport may enhance the quality of life in a community even for people who choose not to exercise the option. In the aspect of economic analysis, unemployment and income level are two major factors that have been considered into the relationship with SWB [30]. [8] conducted an econometric empirical analysis on the demand and supply of participation in outdoor recreational activities for household. [18] also developed an econometric model to explore the demand for sport participation. Recently, the Department of Culture, Media and Sport (DCMS) in UK has established a large-scale database to monitor the situation of sport participation, but these have only been restricted in a descriptive and theoretical way as a benchmark for public policy [14].

Some empirical researches have used country data to depict the national happiness against gross domestic product (GDP) [16], [29], [36]). These results show some weakly positive relationship between income and happiness. Especially, higher income is associated with higher happiness for relative poor countries but less strong for rich ones. Even though the nation has become wealthier, the happiness survey scores within the nation do not increase significant [3].

By reviewing the previous literature related to the topic of SWB, there is still little information about the economic evaluation associated with the degree of participation in sports such as exercise frequency, exercise duration and intensity. In last decades, despite the persist in higher education revolution, the proportion of Taiwan's college students who need to seek assistance in professional psychological counseling is rising rather than dropped, college students become increasingly severe depression in their future career. Thus, it is the current pressing issues whether through sport participation can relieve the life pressure, and further enhance college students' SWB. Therefore, identifying the essence of SWB and further evaluating the relative value to expenditure contributed by sport participation is an important task for the policy makers of physical education and public health. Based on this, this study is further to raise the following questions: (1) What is the status of students participating in sports? (2) How to measure the level and profile of sport participation and SWB, and further to transform into a specific monetary value? (3) Regarding sport participation as a positive life event, how do it affect on the three types of SWB? (4) What kinds of demographic variables play important roles on sport participation and SWB?

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II. Methodology

A. Research Design

Based on the theoretical framework of social psychology, the proposed model will undertake two tasks. First, we examine the goodness of fit for the conceptualized structure model and the accuracy of the measures of SWB (i.e. emotional, psychological and social well-being) ([12], [23], [24]) by confirmatory factor analysis, and explore the effects of sport participation and other influences such as demographic variables (i.e. gender, weekly expenditure and grade) on the relationship of sport participation and SWB. Second, using the statistical method originated by [10], we further calculate the monetary value of sport participation by estimating the relative coefficients of weekly expenditure and the degree of sport participation from the structure equations in which the three types of SWB are regarded as dependent variables. The weekly expenditure for each respondent is calculated by a logarithm value and the degree of sport participation is formulated by three components including frequency of exercise per week, average intensity of exercise, and duration time of exercise.

Referring to the Clark and Oswald's concept, the measure of economic evaluation is based on the generalized mentality that the student prefers more money, so the relative amount of expenditure can be thought of as a value of participation in sport. In other words, we assume that a lower level of sport participant with compensation would have the same SWB as a higher level of sport participant. Therefore, the value of compensation would be consistent with the *shadow price* which is a measure of SWB of participation in sports.

B. Instrument

In contrast with prior studies, which just focus on detecting the relationship between life events and single dimensional SWB, this study performs a cross-section analysis via Structure Equation Modeling (SEM) that constructs a comprehensive path to link demographics and expenditure with each type of SWB. The causal processes are represented by a series of structural equations that can be modeled graphically to facilitate the conceptualization of a theoretical framework [7]. Using SEM allows us to evaluate simultaneously the factor loadings and error variance of the measurements and to test the significance of the relationships between the latent variables of interest. According to Hayduk's [20] suggestion, the SEM should be simplified as much as possible in order to reduce the under-identification and improve the goodness of fit of a structural model.

The questionnaire is divided into three parts. The first part involves three types of well-being, and each well-being is regarded as a latent variable measured by 3-5 observed variables and totally constructed 12 items of questionnaires. The second part involves three measures of sport participation defined by [4]. Each item in these two parts adopts seven-point Likert-type scales to measure the psychological agreement of respondents. Categories for the scale ranged from strongly disagree (0) to strongly agree (6). The list of the measures with the reworded items is shown in TABLE I. The third part is demographics of the respondents, including gender, grade, and weekly expenditure. The self-report questionnaire designed by this paper is utilized to collect the subjective information from college students. However, it might be likely to lead the common method variance (CMV). To detect whether the survey data has been affected by CMV, the *post hoc* remedy, Harman's one-factor test, is adopted to examine the value of CMV by incorporating all observed variables to conduct an un-rotated factor analysis [31]. In the designated questionnaire, there are three factors with eigenvalue greater than 1 extracted from 12 items of observed variables in which the percentage of cumulative explained variance is 66.70% and the explained variance of the first principle component is only 29.47%. It implies that the CMV has little effect on the survey data.

TABLE I
The Internal Quality of Measures for Latent Variables

Latent variables	Items	Standard factor loading	SMC	Composite reliability
Emotional well-being	1. I am always in a good mood.	0.68*	0.46	0.86
	2. Overall I am satisfied with my life	0.78*	0.61	
	3. I am a happy college student	0.94*	0.90	
	4. I think the colorful life of college students	0.68*	0.47	
Psychological well-being	1. I believe I am valuable.	0.67*	0.44	0.84
	2. I can well adapt to the surrounding environment.	0.60*	0.37	
	3. I think my life is meaningful.	0.72*	0.51	
	4. I have a clear goal in student life.	0.74*	0.55	
	5. I believe that the thing which I want to do will be realized	0.85*	0.72	
Social well-being	1. I feel close to other people in my community.	0.67*	0.45	0.80
	2. I feel I am an important part of my community.	0.81*	0.65	
	3. I believe that people are kind.	0.79*	0.62	
Sport participation	Frequency	0.78*	0.61	0.84
	Duration	0.87*	0.75	
	Intensity	0.76*	0.57	

*$|t| > 1.96$

For the both considerations of reliability and measured goodness-of-fit, the final measurement scales for each latent variable are determined by the following criterion: (a) eliminate items with communalities (item-total) lower than .3 [38]; (b) eliminate items with square multiple correlation (SMC) lower

than .3; (c) eliminate items with standardized factor loadings higher than .95; (d) suggest the modification index (MI) provided by LISREL8.71 package [21]. Additionally, there are two steps to test the reliability and validity of measures: First, we have executed a pre-test by using 257 convenience samples collected from the selected university to test the internal consistent reliability shown as the Cronbach's α values calculated by SPSS12.0 for Windows. Second, we conduct a confirmatory factor analysis (CFA) to evaluate the construct and convergent validities of measurement. Excepting the two saturated models (i.e. sport participation and social well-being), the results of CFA show that all the factor loadings of observed variables on latent variables are significant (see TABLE I) and show a good model-fit where the indices of measures of emotional well-being are $\chi^2_{(2)} = .68,\ p = .713,$ GFI=1.0, CFI=1.0, NNFI=1.0, RMSEA=.00, SRMR=.007 and the indices of measures of psychological well-being are $\chi^2_{(5)} = 2.77,\ p = .736,$ GFI=1.00, CFI=1.00, NNFI=1.00, RMSEA=.00, SRMR=.014. The corresponding composite reliability (ρ_c) for each latent variable is also calculated by the indicator of $\rho_c = (\sum \lambda_i)^2/[(\sum \lambda_i)^2 + \sum \theta_i]$, where λ_i denotes the standardized factor loadings on latent variables, and θ_i denotes the measurement errors of observed variables. The value of ρ_c that is higher than 0.6 may be represented as good construct reliability [2]. The final measure items and the reliabilities of each item (i.e. the value of SMC) and composite concept (i.e. latent variables) are summarized in TABLE I. To sum up, the constructed models have a good internal quality because of the acceptable reliability and validity on the measurement.

C. Data

In the formal survey work, based on the suggestion of [19], the recommended sample size should be ten times that of the measurement items or upwards. [33] also suggested a proper sample size ranged between 200 and 500 for using structural equation modeling (SEM). For the purpose of this study, the formal survey is conducted to nation-wide college students that can be treated as sampling population. In order to ensure the representative of sample achieving 95% confidence level and sampling error under 3%, two-stage stratified sampling method is used to obtain the adequate sample size according to the statistic data of Ministry of Education in 2010. In first stage, we extract the school samples from nation-wide colleges by using probability proportional to size. Similarly, in second stage, we can sample the final student samples according to the proportion of 5 grade students from the prior school samples. On the other hand, considering the privacy concerns and willingness of respondents, the further screening interview is adopted to ask the students who have the willingness to complete the questionnaires. After totally investigating 1110 voluntary college students from four different locations in Taiwan during Sep. 15 to Nov. 30, 2010 and deducting the invalid and incomplete questionnaires, 1075 valid respondents have been collected, so the valid response rate reaches 96.8%.

D. Model

Based on previous literature, a structural equation model is proposed and analyzed with the LISREL 8.70 statistics package. The hypothetical model consisting of a measurement model and structure model is developed to explore how the demographics and the three types of well-being are related. The measurement equation is only for Y_i, shown as follows.

$$Y_i = \lambda_{Yij}\eta_j + \varepsilon_i, \tag{1}$$

where λ_{Yij} denotes the regression coefficient of $\eta_{i,j}$ on Y_i; ε_i denotes the measurement errors of endogenous latent variables. The structure equation is

$$\eta_i = \alpha + \beta_{ij}\eta_j + \gamma_{ij}\underline{X}_j + \varsigma_i, i, j = 1, 2, 3, ..., \tag{2}$$

where η_i denotes endogenous latent variables, i.e. including, emotional well-being, psychological well-being, and social well-being, η_j is also an endogenous latent variable denoted as sport participation, $\underline{X}_j$ is the vector of other exogenous influences such as weekly expenditure, gender and grade, γ_{ij} denotes the regression coefficient of $\underline{X}_j$ on η_i, β_{ij} denotes the regression coefficient of η_j on η_i; and ς_i denotes the error variance of structure equation. The hypothesized structure model is depicted as Fig 1.

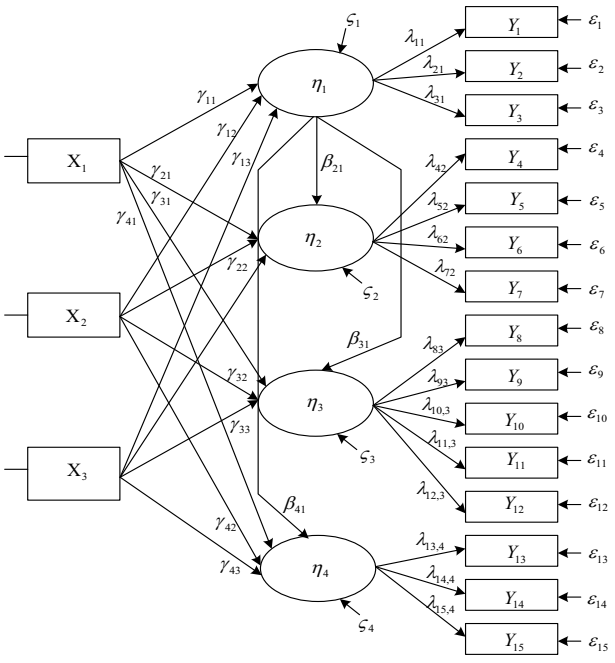

Fig. 1 The hypothesized structure model

By using maximum likelihood estimation, the fitness indices of the structure models are assessed by goodness of fit index (GFI), comparative fit index (CFI), and non-normed fit index (NNFI), where the values greater than .90 are regarded as acceptable. A situation in which the value of the root mean square error of approximation (RMSEA) is .05 or lower implies

that it is a close fit. Additionally, values up to .08 are recognized as a reasonable error of approximation [7]. In addition, according to the principle of parsimony, parsimony normed fit index (PNFI) should be higher than .5, and normed chi-square (χ^2/df) should be lower than 3.

As to the determination of relative monetary valuation to sport participation, we can employee the structure equation to estimate and test the related parameters in which the dependent variables are the three types of well-being. At the time, the structure equation can also be regarded as one kind of utility function. The estimated coefficients from structure equation (2) can be used to calculate the values of sport participation. Think of a college student change his/her degree of sport participation. The compensating differential for the transition is the amount of extra money to the average level of weekly expenditure that keeps the student at the same level of SWB. In other words, for a given value of η_i from (2), the value of increment in sport participation per week for a college student starting with average weekly expenditure can be thought of *shadow price* as the following (3).

$$SP = \beta_{ij}/\gamma_{ij} \quad (3)$$

III. Results

TABLE II summarizes the descriptive statistics for various measurements and the respondents' personal information. The sample is composed of 529 males (49.2%) and 546 females (50.8%), with 22.4% freshman, 22.2% sophomore, 24.0% junior, 22.8% senior, and 8.6% graduate. The average weekly expenditure for college students is about US$67.67. From the mean value of sport participation indicators, college students participate in sport less than three times per week, and duration time is about 90 minutes with middle intensity. The absolute values of skewness and kurtosis for all observed items are lower than 3 and 10, respectively. It means that all of these measurements could be regarded as approximate normal distribution [25] and the Maximum Likelihood method is suitable to be used to estimate the parameters in the proposed model.

Fig. 2 presents the hypothesized model for predicting the SWB. All goodness-of-it indices (i.e. $\chi^2_{(116)} = 262.50$, $p < .00$; GFI=.90, CFI=.96, NNFI=.95, RMSEA=.069; PNFI=.73 > .5) indicate the model has a good model fit on data except for the χ^2 value. However, when we use the normed chi-square index ($\chi^2/df = 2.21 < 3$), this model can be still regarded as an acceptable model. From the estimation value of path coefficients, gender and grade appear to play a significant role in explaining the difference of sport participation but there are no significant differences on three types of well-being. The results indicate that male students appear to have a stronger degree of sport participation than that of females, and the lower grade of students has greater sport participation than higher grade ones. The distinction might be resulted from the different frequency of physical education course. Contrasting with the weekly expenditure of students, there is no significant effect on the participation in sport but it does hold a positively relationship with emotional well-being and psychological well-being. Additionally, sport participation can also positively influence emotional well-being and psychological well-being. Unfortunately, there is no significant evidence that sport participation can raise social well-being for college students.

Using the standardized estimated coefficients from Fig. 2, and employing equation (3) to calculate the monetary values of well-being derived from sport participation, the results indicate that on average, a college student is willing to pay US$150.38 per week to participate in sport in order to keep the same level of emotional well-being. Similarly, on average, a college student is willing to pay US$171.43 per week to participation with keeping the same level of psychological well-being. Obviously, college students may acquire higher psychological and emotional well-beings through aggressive participation in sport, and the economic values of well-being derived from sport participation are about twice average monthly expenditure. The results seem to be similar and consistent with the arguments of prior studies (cf. [3], [16], [29], [36]).

TABLE II
Descriptive Statistics for Items on the Questionnaire

Items	Mean	SD	Skewness	Kurtosis	Percentage
Sport participation					
Frequency	2.83	1.01	-0.47	-0.04	
Duration	3.12	1.37	-0.12	-1.23	
Intensity	2.19	0.69	-0.28	-0.90	
Emotional well-being					
Em1	3.90	1.26	-0.09	-0.56	
Em2	3.85	1.23	-0.20	-0.11	
Em3	3.84	1.25	-0.34	-0.11	
Em4	3.82	1.32	-0.15	-0.60	
Psychological well-being					
Ps1	3.93	1.23	-0.22	0.29	
Ps2	3.92	1.13	-0.23	-0.14	
Ps3	4.27	1.40	-0.46	-0.40	
Ps4	3.70	1.49	-0.31	-0.25	
Ps5	3.50	1.26	-0.02	0.01	
Social well-being					
So1	3.93	1.12	-0.29	0.50	
So2	3.88	1.16	-0.23	0.53	
So3	3.31	1.41	-0.33	-0.19	
Average weekly expenditure (US$)	67.67	30.36	1.06	2.48	
Gender					
Male					49.2%
Female					50.8%
Grade					
Freshman					22.4%
Sophomore					22.2%
Junior					24.0%
Senior					22.8%
Graduate					8.6%
Sample size	*n*=1075				

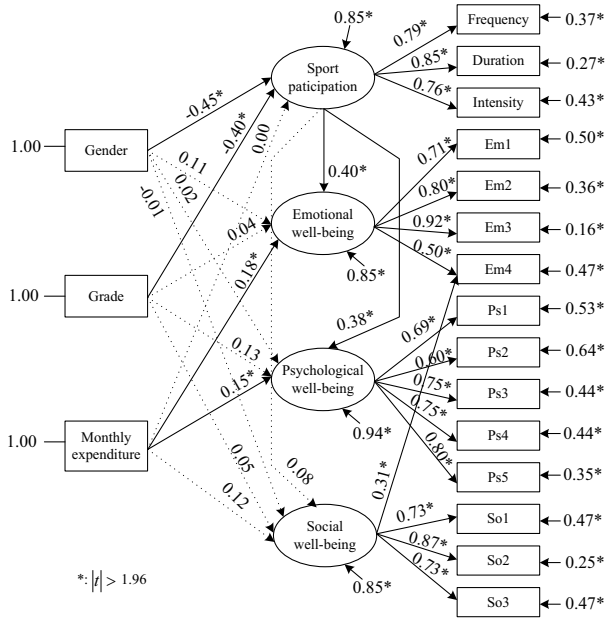

Fig. 2 The effects of demographics and sport participation on SWB

IV. Conclusion

Welfare economic research has traditionally well-developed in a framework of SWB and ignored the specific group such as college students who are the backbone of a country's human resource. By using a nation-wide college survey conducted in 2010, this paper examines the relationship between self-reported SWB and sport participation for college students in Taiwan. The results suggest the existence of two distinct spheres of SWB: emotional well-being and psychological well-being that can be noticeably derived from sport participation, but, surprisingly, does not seem to be so with social well-being. As emotional and psychological well-being are affected in a similar way by sport participation and individual expenditure level, but rather differently by demographics such as gender and grade, the distinction is specially relevant from economic perspective. From a socio-economic perspective, the results do not only indicate that the positive life-event method of analysis can be applied to provide an implied economic value of sport participation, but also are expected to help the college students keep their vision of sport participation in pursuit of well-being in their student life. The main findings can be offered the education authority to enhance the understanding of the formation of SWB derived from sport participation and the economic value of participation in sports, and therefore develop a better policy about health and sport management.

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