TEMPORAL RELATIONSHIP BETWEEN INTRINSIC MOTIVATIONS IN PHYSICAL EDUCATION AND IN A LEISURE-TIME CONTEXT

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ABSTRACT

This study examined the temporal relationships between intrinsic motivation in physical education and in leisure time context over two year period. The stability, stationary and cross-lagged effects of the relationship between these variables over the two-year period was tested. Participants, 94 students (37 boys and 57 girls) aged 14–16 years (M14.9±0.90) at the beginning of the study, completed measures of intrinsic motivation in both contexts. The model indicated to the existence of significant impact from intrinsic motivation in physical education on intrinsic motivation in a leisure-time context but not in vice verse. The results showed that the degree of stability in intrinsic motivation in physical education was higher than in leisure time context over two year period. Additionally, the existence of stationary of the relationship between these variables was followed on both time points. This study demonstrated that intrinsic motivation in physical education is not affected by the previous intrinsic motivation in leisure time context.

Key words: intrinsic motivation, physical education, leisure time, covariance structure analysis

INTRODUCTION

Throughout the past decades several models have been proposed to better understand the dynamic interplay among motivational constructs. For example, Vallerand [16] proposed a hierarchical model of self-determined motivation (i.e. regulation of behaviors by choice and pleasure) where motivation operates and interacts at various levels, including the global level [2], the life domains level [5] and the situational level [6]. Guay et al. [4] investigating the stability of global self-determined motivation and school-determined motivation with a 1-year interval found that global self-determined motivation was not more stable than self determined school motivation. Also the existence of significant small reciprocal effect between global self-determined motivation and school-determined motivation was followed. Losier & Vallerand [11] who investigated the temporal relationship between perceived competence and self – determined motivation over 5 months period found that perceived competence determined motivation rather than the reverse. Recently, the trans-contextual model, proposed by Hagger et al. [7] specified the processes by which motivation for physical activity in a physical education context is transferred into a leisure-time physical activity context. However, up to data the reciprocal relation between intrinsic motivation in school physical education and intrinsic motivation for exercise behavior in leisure time is not clear.

The purpose of the present study was to test whether the relation between self-determined motivation like intrinsic motivation in school physical education and intrinsic motivation in exercise behavior during leisure time is reciprocal or simply horizontal over the period of two years. It was initially hypothesized that the constructs of intrinsic motivation in school physical education and intrinsic motivation in exercise behavior during leisure time will achieve discriminant validity at both time points. It was also hypothesized that intrinsic motivation in school physical education and intrinsic motivation in exercise behavior during leisure time would exhibit a high degree of stability, and that the relationship between these two variables would be stationary at two time points.

METHODS AND PROCEDURES

Students completed questionnaires on two occasions over a two-year period. The first time the questionnaires were administered, the students were in 8th ($n = 42$), 9th ($n = 20$) and 10th ($n = 32$) grades aged 14–16 yrs ($M = 14.9$, SD = 0.90). The participants (37 boys and 57 girls) completed measures of the intrinsic motivation for school physical education and for exercise behavior in leisure time context on two occasions over a two-year period. On both occasions the one week interval between the measures of motivation was used to minimise the amount of error variance introduced into the data that could be attributed to the use of similar measures of intrinsic motivation in physical education and leisure-time contexts. A modified version of perceived locus of causality scale [15] was used to measure intrinsic motivation in physical education. Intrinsic motivation in a leisure-time context was measured by the scale from Behavioural Regulations in Exercise Questionnaire [12]. During the two-year period, students were taking physical education as a required course.

Data analysis

The data were analysed using the LISREL 8.58 structural equation modelling (SEM) programme. To test the causal nature of the relationships between intrinsic motivation in school physical education and intrinsic motivation in exercise behavior during leisure time, the hypothesized structural model was specified in which reciprocal cross-lagged effects between these variables across time were estimated.

In addition, to examine the stability of the intrinsic motivation in school physical education and intrinsic motivation in exercise behavior during leisure time over the two-year period, the model specified direct effects of both intrinsic motivation in school physical education and intrinsic motivation in exercise behavior during leisure time measured at Time 1 on themselves measured two years later (Time 2). Finally, to test the stationarity of the relationship between intrinsic motivation in school physical education and intrinsic motivation in exercise behavior during leisure time were set to correlate at both time points.

Goodness-of-fit of the model with the data was evaluated using multiple recommended indexes of good-fit: the Comparative Fit Index (CFI), the Non-Normed Fit Index (NNFI), and the Standardized Root

Mean Squared Residuals (SRMSR). Cut-off values of 0.95 or above for the CFI and NNFI indicated acceptable models. Values of 0.08 or less for the SRMSR was deemed satisfactory for well-fitting model [10].

RESULTS

Preliminary analyses

Distributional properties of the responses to the all items were examined. A skewness value greater than one indicated that not all variables were normally distributed. Therefore, for further analyses PRELIS 2.51 provided the polychromic correlations, and its asymptotic covariance matrix. To fit the confirmatory factor models maximum likelihood method based on asymptotic covariance matrix was used, because this is suitable for ordinal data and standard errors. Descriptive statistics for the observed variables are presented in Table 1. The reliability coefficients of intrinsic motivations for different context in Time I and Time II were on acceptable level [13].

Table 1. Descriptive statistics of the observed study variables.

	Time I			Time II		
	Mean	SD	α	Mean	SD	α
Intrinsic motivation in PE	3.00	0.70	0.88	2.37	0.91	0.91
Intrinsic motivation in LT	5.15	1,34	0.86	5.19	1.39	0.92

Note. PE – physical education context; LT – leisure-time context.
α = cronbach alpha

Prior to testing the main hypotheses, to support the fit of the measures used in this study, a measurement CFA models that assumed discriminant validity were conducted and compared with a congeneric CFA models that did not assume discriminant validity. Goodness of fit indices for the series of congeneric and discriminant validity models at both time points are given in Table 2. Each of the discriminant validity models were superior in fit to the congeneric models at both time points. These analyses support the discriminant validity of two differentiated measures of intrinsic motivation in school physical

education and intrinsic motivation in exercise behavior during leisure time as hypothesised.

Main analyses

The main idea of the structural equation model was to test the causal nature of the relationships between intrinsic motivation in school physical education and intrinsic motivation in exercise behavior during leisure. The longitudinal model is presented in Figure 1. The goodness of fit statistics are reported in Table 2 (see Cross-lag model). Focusing on Time 1, it can be seen that intrinsic motivation in physical education and intrinsic motivation in a leisure-time context have strong relationship whereas the relationship between these two variables at Time 2 is not so strong. Focusing on the overall time-lagged model, intrinsic motivation in physical education and intrinsic motivation in a leisure-time context demonstrate autoregression over time. This tests the extent to which the distribution of the variable at Time 1, for example intrinsic motivation in physical education, overlaps with the distribution of that variable measured at Time 2. The extent to which they do not overlap provides confirmation that change has occurred in the variable over time and the standardized coefficient reflects the extent of this change. The results of the model demonstrated high degree of stability in intrinsic motivation in physical education from Time 1 to Time 2 (path coefficient = 0.59, with 95 percent confidence intervals (CI_{95}) = 0.37 to 0.81, $p<0.05$). In respect of intrinsic motivation in a leisure-time context students did not demonstrate as high degree of stability over time (path coefficient = 0.28, CI_{95} = 0.02 to 0.53, $p<0.05$). Cross-lagged relationships indicated to the existence of significant path from intrinsic motivation in physical education to intrinsic motivation in a leisure-time context but not in vice verse. Consequently, intrinsic motivation in physical education is not affected by the previous intrinsic motivation in leisure time context.

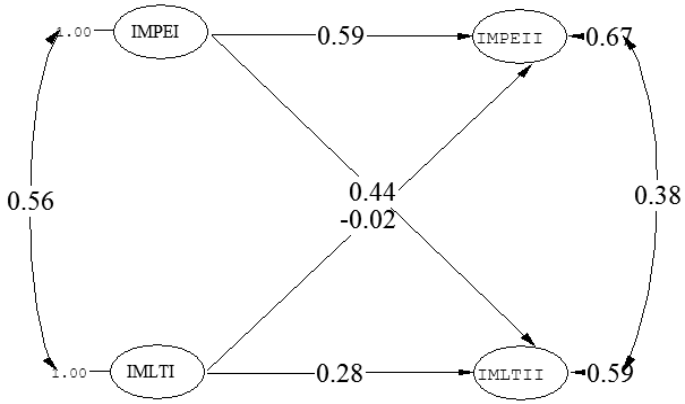

Figure 1. Cross-lagged model of intrinsic motivation in physical education and in leisure time context.

Notes: IMPEI – intrinsic motivation in PE at Time I; IMPLTI – intrinsic motivation in a leisure-time context at Time I; IMPEII – intrinsic motivation in PE at Time II; IMPLTII – intrinsic motivation in a leisure-time context at Time II
All paths, except the path from IMLTII to IMPEII are significant at P<0.01

Table 2. Goodess fit statistics for congeneric and discriminant validity confirmatory factor analytic models and cross-lag model.

	χ^2	d.f	Models	RMSEA	CI_{90}RMSEA	*NNFI*
Congeneric model. Time I	141.67	20	0.84	0.257	0.220–0.300	0.78
Discriminant model Time I	34.91	19	0.98	0.095	0.042–0.140	0.97
Congeneric model. Time II	123.69	20	0.91	0.237	0.220–0.280	0.88
Discriminant model Time II	12.63	19	1.00	0.001	0.051–0.061	1.00
Cross-lag model	104.13	98	1.00	0.026	0.000–0.062	0.96

DISCUSSION

The main purpose of the present study was to test the causal nature of the relationships between intrinsic motivation in physical education and intrinsic motivation in leisure time context. We assumed that there are reciprocal cross-lagged effects between intrinsic motivation in PE context and intrinsic motivation in leisure time context and that both constructs will demonstrate a high degree of stability and stationary relationships over the two-year period. The present findings have important implications for at least two key issues. First, they suggest how intrinsic motivation at different contexts may influence each other. Secondly, they inform us about the stability of intrinsic motivation over time. Usually, the shorter the time, the stronger the relationship. However, in this study the stability of intrinsic motivation for both contexts was comparatively high over two year period. This result is consistent with findings reported by Gottfried et al [3]. The authors investigated the stability of intrinsic motivation in a longitudinal study of students from the middle through high school years and found that with advancement in age stability of intrinsic motivation even increased.

The cross-lagged model only partly supported the hypothesis about reciprocal effect between intrinsic motivation in physical education and in leisure time context because an unidirectional effect was apparent. Specifically, the path coefficient from intrinsic motivation in physical education (IMPEI) to intrinsic motivation in a leisure-time context (IMPLTII) was significant but not in vice verse (see Figure 1). This result is in some extent consistent with several previous studies [7, 8, 9] where the one-way effect from self-determined motivation in physical education on self-determined motivation in leisure time context were highlighted. The previous studies have documented the existence of the reciprocal effects between motivation at global level and at the contextual level [4, 17] and also between motivation at the contextual level and motivation at the situational level [1] but not between the same contextual levels. In our study intrinsic motivation in physical education and in leisure time context were observed as two different contexts on the same contextual level. The results of this study showed that intrinsic motivation in physical education has effect on intrinsic motivation in leisure time context even over two year period, but not in vice verse. Further, the relationships between

intrinsic motivation in physical education and intrinsic motivation in leisure time context weakened with advancement in age.

In terms of practical recommendation based on current results, it is important that teachers in promotion the motivation for leisure time physical activity first of all turn attention on intrinsic motivation in physical education setting, which in long perspective, has also impact on motivation in leisure time context.

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