Demonstration or Substitution: A Cross-Country Comparison of the Relationship between Sport Spectatorship and Physical Activity Participation

Luke Lunhua Mao, University of New Mexico

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Physical activity participation (PAP), including sports participation, can deliver physical and mental benefits for individuals (Inoue, Berg, & Chelladurai, 2015). Collectively, a country can derive significant economic benefits from an active society (Colditz, 1999; Humphreys, 2011). How to promote PAP among the grassroots population has been one major element in sport policies developed by national governing bodies of sport (NGBS, Green, 2007; Hogan, 2000; Nicholson, Hoye, & Houlihan, 2010). Many of these sports policies depend on the assumption of a symbiotic link between elite sports and PAP, known as demonstration effect.

Demonstration effect, also called “trickle down” effect, refers to how a nation’s excellence in sports performance lead to increased mass interest in sports, and hence increased PAP (Hogan, 2000). It has been primarily examined with regarding to success in sports performance and hosting mega events, such as summer Olympic Games (Bauman, Bellew, & Craig, 2015; Boardley, 2013), winter Olympic Games (Potwarka & Leatherdale, 2016), Rugby World Cup (Frawley & Cush, 2011), Commonwealth Games. Subsequently, the concept of health legacy or physical activity legacy of mega events has been proposed and becomes one major rationale for bidding sporting events (Frawley & Cush, 2011; McCartney Gerry et al., 2010; Veal, Toohey, & Frawley, 2012; Weed et al., 2009; Weed et al., 2012). Besides mega events, spectator sports or professional sports may also deliver demonstration effects through inspiration (Ramehan Dani, Kokolakakis, & Coleman, 2014), enhanced sport involvement (Mutter & Pawlowski, 2014b), role modelling (Mutter & Pawlowski, 2014c), or proactive leveraging (Misener, Taks, Chalip, & Green, 2015; Weed et al., 2012).

Regardless of a solid theoretical underpinning of the symbiotic relationship between spectatorship and PAP, the demonstration effect has received limited empirical support (Bauman et al., 2015; Boardley, 2013; Hogan, 2000; Mutter & Pawlowski, 2014b). The findings in the literature has been mixed: some studies found a significant demonstration effect whereas others didn’t. The inconsistencies in the literature can be explained by a confounded substitution effect. In this study, substitution effect is broadly defined as the replacement of PAP with sport spectatorship under circumstances of external or internal constraints, such as leisure time or income. For instance, time, as a scare source, puts significant constraints on people’s choices (Becker, 1965), including sports participation and spectatorship choices (Humphreys, 2011; Taks et al., 1994). The relationship between spectatorship and PAP can constitute substitution.

The main purpose of current study is to examine the relationship between spectatorship and PAP across different countries. If the demonstration effect hold, we will reasonably expect that on average people who attend more events as spectator will also do more physical activity, i.e., a positive relationship between spectatorship and PAP; if the substitution effect hold, we will reasonably expect that on average people who attend more events as spectator will do less physical activity, i.e., a negative relationship between spectatorship and PAP. If there are significant differences in direction and strength of the relationship between spectatorship and PAP across the compared countries, a subsequent research question will be what factors will impact the demonstration or substitution effect (hereafter, DOSE).

To accomplish these goals, the 2007 Leisure Time and Sport survey data of the International Social Survey Program (ISSP) was used. Thirty-six member countries conducted the survey but data from Denmark and Netherlands were not included for public access. Therefore, data from the rest 34 countries/regions with a total of 49,730 observations were included for current study. The survey provided rich information on leisure time activities, sports spectatorship, physical activity and sports participation, enjoyment of various leisure activities, constraints of physical activity participation, attitude towards sports policies, and socio-demographic variables such as age, gender, marital status,
Using Kendall's $\tau B$ rank-order correlation coefficient between spectatorship and PAP as a measure of DOSE, we found a demonstration effect across 34 compared countries using the complete sample. This demonstration effect from the complete sample was likely spurious, as the sign and magnitude of $\tau B$ changed significantly after we partial out the observations who had never attended any sport event as spectator or never done any physical activity. The $\tau B$ coefficients based on the subsample suggested that there was a demonstration effect in some countries, a null effect is some countries, and a substitution effect in other countries. The effects were rather weak as the $\tau B$ coefficients ranged from .045 to .197 for the demonstration effect, and that -.049 to -.393 for the substitution effect. Somewhat consistent to previous studies, we found demonstration effect in most western countries, such as Australia, Norway, and Great Britain. Germany had a positive sign but was not statistically significant. East European countries and Asian countries tend to have a negative sign.

In exploring the determinants of DOSE, the following regression model was estimated:

$$\text{DOSE} = \beta_0 + \beta_1 \text{SIR} + \beta_2 \text{GDPPC} + \beta_3 \text{GDPPCSQ} + \beta_4 \log(\text{OLYMPICS}) + \beta_5 \log(\text{POPDENS}) + \beta_6 \text{WRKHRS} + u$$

where SIR is an indicator of a country's mass sport involvement. OLYMPICS is the total Olympic medals a country won in 2004, 2006, 2008 and 2010 Olympic Games. GDPPC is Gross Domestic Product Per Capita of the given country for 2007 in 10,000 2009 Purchasing Power Parity USD; GDPPC is an indicator of a country's economic development and essentially a measure of time value. GDPPCSQ is the squared term of GDPPC. WRKHRS is the reported average working hours of a given country. POPDENS is population density in persons per km².

We found sports related variables, SIR and OLYMPICS, were positively related to DOSE. As DOSE and SIR were mutually influencing each other, SIR were endogenous in the model. We used the conventional instrument variable approach to overcome the endogeneity issue, and our results suggested our approach was appropriate. The positive sign of OLYMPICS suggested that elite sports performance had positive impact on DOSE. Consistent with theory of time allocation (Becker, 1965), WRKHRS negatively impacted DOSE. The effect was relative small, which might be attributable to shared variance among WRKHRS, GDPPC and GDPPCSQ (i.e., GDPPC might have explained some variances in WRKHRS). POPDENS was also positively associated with DOSE, which is consistent with the prediction of contagious diffusion theory (Anthamatten & Hazen, 2012). This also resonates with “festival effect” idea proposed by Weed et al. (2012). As expected, the GDPPC’s impact on DOSE was nonlinear. With the GDPPC increases, the cost of time will also increase. When this opportunity cost effect is greater than income effect, we will observe a decrease in DOSE. Only when the GDPPC increase to a sufficient high level of $41,7000, so that the income effect will outweigh opportunity cost effect, hence a positive effect on DOSE.

The substitution effect found in this study has significant policy implications, particularly to the transitional countries and Asian countries, which will be discussed during presentation.