Long-term impact of the Tokyo 1964 Olympic Games on sport participation: A cohort analysis

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Abstract

The sport participation rate has been shown to decrease with age in many countries. In Japan, however, the elderly sport participation rate has increased over the last decade and is the highest among all Japanese. This study investigated whether the cohort effect generated by the shared experience of hosting the Tokyo 1964 Olympic Games during their youth can explain the increased sport participation of elderly Japanese. Data from the Japanese National Sport-Life Survey over 20 years were analyzed through regression analysis. The results show that, after controlling for demographics and other determinants of sport participation, individuals who experienced the Tokyo 1964 Olympic Games participated in sport more frequently than other generations.

Keywords

Olympic legacy, Cohort effect, Social ecological model, Determinants of sport participation

Long-Term Impact of the Tokyo 1964 Olympic Games on Sport Participation:

A Cohort Analysis

1. Introduction

Active sport participation can have substantial health benefits (Berg, Warner, & Das, 2015; Wilhite & Shank, 2009). Sport organizations and governments regard promoting sport activities as an important goal and have engaged in efforts to promote sport participation by implementing policies and guidelines. For example, the U.S. government implemented Healthy People, a national health objective, in 1990 to improve the health of Americans and has updated the objective every 10 years. Under Healthy People, the government provided policy makers and physical educators with guidelines on the types and levels of physical activities recommended to enhance health (U.S. Department of Health and Human Services, n.d.). Despite efforts such as this, the participation rate of sport and physical activity has been flat or has even decreased in many countries (World Health Organization, 2010). The weekly sport participation rate of Europeans has remained at 41% since 2009 (European Commission, 2014), while the weekly sport participation rates of American adults have decreased slightly over the past few years (Physical Activity Council, 2016).

A notable exception to this trend is Japan, where the twice-weekly sport participation rate of adults aged 20 and older increased from 41% in 2000 to 48% in 2014 (Sasakawa Sports Foundation, 2014). This increase is attributable to the elderly (aged 60 years and above), whose sport participation rate increased from 41% in 2000 to 58% in 2014, the highest among all Japanese (Sasakawa Sports Foundation, 2014). Previous literature shows that age has a negative effect on sport participation (Breuer & Wicker, 2008; Hovemann & Wicker, 2009; Physical Activity Council, 2016), which is contrary to the trend observed in Japan of high sport

participation rates among the elderly. Thus, the existing knowledge is insufficient to explain the Japanese sport participation trends.

To fill this knowledge gap, this study applies concepts of *cohort effect* and *trickle-down effect* to investigate determinants of sport participation among elderly Japanese. A cohort refers to a group of people "who experienced a particular event during a specified period of time" (Glenn, 2005, p.2). Breuer and Wicker (2009) found that sport participation patterns differ depending on the specific cohorts to which people belong, referring to these systematic differences as *cohort effects*. The increased sport participation among elderly Japanese may be understood as a cohort effect, wherein the elderly, as a cohort, show a unique pattern of high sport participation. The trickle-down effect refers to "a process by which people are inspired by the elite sport, sports people or sports events to participate themselves" (Weed, 2009, p.4). Combining these two concepts allows for the following explanation: given the trickle-down effect that inspires participation, a cohort effect may be created by the shared experience of hosting a mega sport event. As such, the purpose of this study is to examine whether the shared experience of the Tokyo 1964 Olympic Games—a mega sport event that had a profound effect on Japanese society (Wilson, 2012)—during youth would explain the subsequent increased sport participation among a specific cohort later in life.

2. Theoretical background and framework

2.1. Determinants of sport participation behavior

Defining the term *sport* is essential to an explication of this study, because how sport is distinguished from other related terms, such as physical activity and recreation, can vary with different perspectives. Adopting the United Nations' (2003) definition of sport, this study defines sport broadly as forms of physical activity, including both recreational and competitive.

Our theoretical framework as discussed in section 2.4. builds on the social ecological model to show the overall impact of the Olympic Games on sport participation. The social ecological model is "a general framework for understanding the nature of people's transaction with their physical and sociocultural surroundings" (Stokols, 1992, p.7). This model has been identified in the literature as a useful framework for studying physical activity (Rowe, Shilbury, Ferkins, & Hinckson, 2013; Sato, Du, & Inoue, 2016). The central tenet of this model is that multilevel interventions from internal variables, such as demographic and psychological variables, and external variables, such as political and social variables, can influence people's behavior (Sallis et al., 2006).

Studies about internal variables show the influence of sociodemographic and psychological factors. Men tend to participate in sport more than women, and age negatively influences sport participation (Hovemann & Wicker, 2009). Individual economic situations, occupations, marital status, and the presence of children also have an impact on people's decision regarding sport participation (Chung, Domino, Stearns, & Popkin, 2009; Hovemann & Wicker, 2009; Humphreys & Ruseski, 2015). In terms of psychological factors, experiencing certain emotional states through sport during youth, such as feelings of enjoyment or anxiety, influences attitudes toward sport in subsequent years (Crocker, Hoar, McDonough, Kowalski, & Niefer, 2004; Weiss, Kimmel, & Smith, 2001).

External variables, including policy (e.g., laws, regulations), behavioral (e.g., facilities, natural environment), and social (e.g., culture, interpersonal relationships) environments, also influence individuals' behavior (Sallis et al., 2006). For example, the accessibility of sport infrastructure, as indicated by the number of sport facilities in a neighborhood, constitutes behavioral environment that can promote sport participation (Wicker, Hallmann, & Breuer,

2013). Social environment, such as support from family and other immediate social groups (e.g., community members, leisure groups), is another important motivational factor for sport participation (Allender, Cowburn, & Foster, 2006).

2.2. Mega sport events as a determinant of sport participation behavior

Based on the social ecological model, mega sport events can be regarded as external variables that help to determine sport participation (Bauman et al., 2012; Vella, Cliff, & Okely, 2014). Conceptually, mega sport events are understood to have a trickle-down effect on sport participation (Potwarka & Leatherdale, 2016; Weed et al., 2015). This effect captures the potential ability of high-level sport to increase national pride, sporting interest, and mass sport participation (Hogan & Norton, 2000).

Research suggests that mega sport events have both direct and indirect effects on sport participation. The direct effects are generated through the role model effect of elite athletes (Frick & Wicker, 2016; Weimar, Wicker, & Prinz, 2015; Wicker & Frick, 2016), national success in international sport competition (Ruseski & Maresova, 2014), and direct event experience as a participant and spectator (Charlton, 2010; Downward, Dawson, & Mills, 2016). Particularly, the role model effect of elite athletes is found to be a critical determinant of sport participation (Mutter & Pawlowski, 2014a, 2014c). It can not only increase the enthusiasm of existing sport participants, but also motivate new participants to engage in sport (Mutter & Pawlowski, 2014b). Notably, empirical evidence of this role model effect is found primarily among young people (Frawley & Cush, 2011).

Indirect effects include the supplementary forms of the trickle-down effect that influence sport participation indirectly through such mechanisms as improvement of sport infrastructure and transportation (Veal, Toohey, & Frawley, 2012) and promotion from the local media

(Misener, Taks, Chalip, & Green, 2015). The creation of new sport venues serves as a catalyst in the trickle-down effect by not only providing local communities with more recreational spaces for active sport participation, but also facilitating the decision to host future sport events (Huang & Humphreys, 2012; Misener et al., 2015). In addition, the local media tends to provide substantial coverage of the latest progress for a sport event, which would greatly raise local residents' awareness of the event (Preuss, Seguin, & O'reilly, 2007). In particular, the closer people live to the host region, the more significant the influence of a sport event would be (Misener et al., 2015; Mutter & Pawlowski, 2014a).

Although scholars extensively discussed the aforementioned mechanisms underlying the direct and indirect trickle-down effect on sport participation, previous research has only examined the impacts up to five years after events. Considering that the International Olympic Committee (IOC) defines Olympic legacy as the positive effects of the Olympics Games for a longer duration (International Olympic Committee, 2015a), research on the event's long-term impact on sport participation behavior is important, but such impact is little studied.

Identifying the trickle-down effect for a long duration can involve methodological challenges. A key challenge is to determine the relevance of a specific sport event to increased sport participation by controlling for other influencing factors (Mutter & Pawlowski, 2014c). In the current study, to examine the impact of the Tokyo 1964 Olympic Games on sport participation for a long period, the influences of other mega sport events that were held during this study period (such as the Sapporo 1972 Winter Olympic Games) must be controlled. Social characteristics of a host country or region, such as its economic status, can also have a strong influence on sport participation (Ruseski & Maresova, 2014). For example, the sport participation rate is expected to be high in regions with high economic development because they

have sufficient resources for creating sport facilities in communities and providing people with ample opportunities to participate in sport and physical activities (Huang & Humphreys, 2012). Consequently, controlling for variables that represent social characteristics is critical in examining the trickle-down effect.

2.3. Cohort study

Cohort analysis is useful to examine the influence of age, understand social, cultural, and political change, and explain phenomena which cannot be understood by cross-sectional analysis (Chen, Kie, & Hong, 2001; Glenn, 2005). The challenge of cohort analysis is to isolate the cohort effect from the effects of age and period using statistical models (Mason, Mason, Winsborough, & Poole, 1973; Yang & Land, 2006). Both cohort and period can experience similar effects from historical events and social changes, such as economic depressions and social movements (Breuer, Hallmann, Wicker, & Feiler, 2010; Glenn, 2005). However, these effects are different in that the cohort effect is observed within a specific cohort only (Breuer et al., 2010), whereas the period effect is evident in an entire society (Glenn, 2005).

Literature has identified cohort as an important predictor of sport participation. Breuer and Wicker (2009) found that belonging to a specific cohort had a stronger effect on individual sport participation than age and period. Pilgaard (2013) created eight cohorts based on individual birth years and demonstrated that the younger cohorts (especially born after 1975) showed a different sport participation pattern from the older cohorts (especially born before 1935). This finding suggested that characteristics of each cohort generate unique sport-related needs and demands (Pilgaard, 2013). Collectively, the previous studies showed that analyzing sport participation by cohort provides a better understanding of sport participation than analyzing the effect of individual age. These studies, however, did not attempt to analyze what generates the

cohort effect. To understand a cohort effect on sport participation, we developed a theoretical framework that illustrates how the Olympic Games may produce a cohort effect.

2.4. Theoretical framework

Our theoretical framework was developed by integrating the trickle-down effect into the social ecological model (see Figure 1). This framework identifies the Olympic Games as an external variable influencing people's sport participation behavior. The framework consists of three periods: (a) the bidding process, (b) the preparation stage and event hosting, and (c) the post-event stage.

(Insert Figure 1 around here)

Public officials and politicians play an important role in bidding for mega sport events (Hautbois, Parent, & Séguin, 2012). These individuals often believe in the power of sport events to promote sport participation, and this belief determines the direction of sport policies (Weed et al., 2015). During the bidding process for mega sport events, they also lead the bidding project (Hautbois et al., 2012). Thus, political factors (i.e., the pre-event policy environment created by public officials and politicians) influence the extent to which cities and countries exert efforts to win the bidding of a mega sport event, such as the Olympic Games.

After a successful bid, preparation for the Olympic Games may influence the development of the policy environment, behavioral environment, and social environment. In the social ecological model, these three factors represent external variables that influence people's behavior. The effects of these external variables also constitute indirect trickle-down effects (Veal et al., 2012). First, the Olympic Games influence the policy environment, such as by creating a focus on sport and urban development policies. For Atlanta and Salt Lake City, the Olympic Games served as a justification for urban development, and public officials used the

events to gain subsidies for urban development projects (Burbank, Andranovich, & Heying, 2002). Second, the Olympic Games are catalysts to improve the behavioral environment. For past Olympic Games, not only public sport facilities but also privately-owned sport facilities and infrastructures were developed through hosting the Olympic Games (Burbank et al., 2002; Kaplanidou & Karadakis, 2010). Third, the Olympic Games influence the social environment. As part of legacies of the London 2012 Olympic Games, the British Olympic Association encouraged, guided, and trained thousands of young citizens (aged 14-19) to participate in sport, and created an active and healthy community environment through a program called *Get Set to Make a Change* (Get Set to Make a Change, n.d.).

Interactions among policy environment, behavioral environment, and social environment are also possible. For example, public transportation (an element of behavioral environment) may be improved based on urban development policy (an element of policy environment). Developing sport facilities (an element of behavioral environment) further increases sport programs and cultivates sports culture (an element of social environment).

As proposed in prior studies (Hogan & Norton, 2000; Weed, 2009), the Olympic Games may also directly influence the sport participation by inducing attitudinal changes toward sport. Specifically, this effect was found to be stronger for a younger generation (Weed et al., 2015; Wicker & Sotiriadou, 2013). This finding, along with the empirical evidence showing that cohort affects sport participation (Breuer & Wicker, 2009), suggests that membership in a specific cohort (especially in a younger generation) may mediate the effect of the Olympic Games on individuals' attitudes and behavior toward sport participation. We regard a group of individuals who experienced their country's hosting of the Olympic Games during their youth as an *Olympic cohort*. Individuals in this cohort would show the Olympic cohort effect.

Moreover, the interactions between external variables (i.e., policy, behavioral, and social environments) and the Olympic cohort may contribute to sport participation behavior. For instance, according to Veal et al. (2012), the Amateur Athletic Foundation (currently known as the LA84 Foundation), established in 1984 after Los Angeles 1984 Olympic Games, has provided sport programs for youth, benefiting many children. As an external variable, experiencing the development of youth programs and other organized support for youth would help this Olympic cohort develop positive attitudes toward sport.

Our theoretical framework describes the overall impacts of the Olympic Games on sport participation. The current study specifically applies this framework to the case of the Tokyo 1964 Olympic Games and examines their impacts on sport participation of the Olympic cohort.

2.5. The impacts of Tokyo 1964 Olympic Games

The Tokyo 1964 Olympic Games were a national project intended to facilitate the recovery and development of Japan after the Second World War (Wilson, 2012). Based on our framework, the impacts of the Tokyo 1964 Olympic Games can be broken down into those linked to policy environment, behavioral environment, and social environment. In terms of policy environment, the Japanese government implemented the Sports Promotion Act in 1961. This plan promoted sport participation by improving facilities and fostering sport leaders across the country (Japanese Ministry of Education, Culture, Sports, Science and Technology, 2010). In terms of behavioral environment, during the preparation stage, new roads, train systems, and highway networks were constructed in Tokyo and nearby areas. The city's water supply and waste management systems were also improved. As a result, the quality of life in Tokyo was ameliorated (Chalkley & Essex, 1999). Additionally, the bullet train system was opened before the Olympic Games, connecting the two largest cities, Tokyo and Osaka, and later linking these

cities to other parts of the country (Wilson, 2012). After the implementation of the Sport Promotion Act in 1961, a number of sport facilities were also constructed across the country (Sasakawa Sports Foundation, 2012). In terms of social environment, the Japan Junior Sport Clubs Association was established in 1962, and sport clubs for juniors were developed nationally (Japan Sport Association, n.d.). In sum, the Tokyo 1964 Olympic Games changed the lives of Japanese people and made sport more accessible.

Despite these positive impacts, the country's decision to host the Tokyo 1964 Olympic Games faced some criticism. For example, one criticism was that the Olympic Games led to the sacrifice of projects for rural areas (NHK Broadcasting Culture Research Institute, 1967). Although such criticism was widespread, the Japanese government justified that hosting the Olympic Games would facilitate the connection between rural areas and central cities (Wilson, 2012). Nationwide public opinion surveys showed public support for the Tokyo 1964 Olympic Games. For example, in a survey conducted in March 1964, 74% of the respondents believed that hosting the Olympic Games would have a positive impact on Japan, and 84% indicated that they would watch the Olympic Games (Cabinet Office, 2006c). In addition, in a survey conducted right after the Olympic Games, 64% of the respondents indicated that the event had a positive impact on the citizens of Japan (Cabinet Office, 2006e). These results suggest that, although the Olympic Games were held in Tokyo, their influence was nationwide.

Moreover, the success of Japanese athletes in the Tokyo 1964 Olympic Games might have affected people's attitudes toward the event and sport in general. As discussed in section 2.2, the role model effect of elite athletes constitutes a direct trickle-down effect (Mutter & Pawlowski, 2014a, 2014c). Japanese medalists at the Tokyo 1964 Olympic Games could be regarded as role models who significantly inspired sport participation. For example, when the

Japanese women's volleyball team won a gold medal, its final game garnered an audience rating of 67% on television (Aramaki, 2016). After the Olympic Games, athletes of the national volleyball team contributed to developing numerous recreational volleyball teams across the country, which increased the popularity of the sport (Aramaki, 2016).

Given the aforementioned discussion, we hypothesized that the Tokyo Olympic cohort would show a higher rate of sport participation than other generations. This phenomenon constitutes the Olympic cohort effect generated by the Tokyo 1964 Olympic Games. Based on the definition of adolescent from the United Nations (2013) , the Tokyo Olympic cohort was defined as individuals who were aged 10 to 19 years in 1964 (60 to 69 years in 2014).

3. Method

3.1. Data

Data were drawn from the Japanese National Sport-Life Survey collected by the Sasakawa Sports Foundation. This survey was conducted every two years since 1992 with a nationally representative sample of adults in Japan to understand trends in sport-related behaviors. The respondents, who were Japanese adults aged 20 and older, were selected using a quota sampling with approximately 2,000 samples for each year. In the first stage, investigation spots were divided into 210 areas based on the adult population size of each subgroup stratified by the geographical area and city size. In the second stage, respondents were selected based on the demographic composition of each investigation spot. The survey was a self-completed questionnaire using the placement method. In this study, data from three years, 1994, 2004 and 2014, were used to examine the cohort effect. The total number of respondents for these three years was 5,884. Of those respondents, 5,815 (98.8% of the original respondents) who provided complete information for the study variables constituted the final sample.

3.2. Measures

The annual frequency of sport participation (hereafter *annual frequency*) was assessed based on respondents' answers to the following question: How many times did you participate in sports in the previous year? The same question was used for all surveys in 1994, 2004, and 2014. Specifically, respondents indicated the total number of times they participated in a sport in the past year, with an option to provide the average frequency of participation per month or week as an alternative response. In 2004 and 2014, respondents could provide this information for a maximum of five different sports. In 1994, they could choose for a maximum of 15 different sports. In the current analysis, we calculated the total number of times respondents participated across all sports in the previous year and used this number as a measure of the annual frequency. Although respondents in 1994 were allowed to report more numbers of sports than those in the other two years, only 3% of the respondents in 1994 provided responses for more than five sports. Consequently, the use of a different response format for 1994 is assumed to have a minimal effect on the results of hypothesis testing.

To ensure the validity of sport participation data obtained from the National Sport-Life Survey, we compared the 2014 data from this survey to the results of another population survey, the Public Opinion Survey on the Physical Strength and Sports conducted by the Japanese Ministry of Education, Culture, Sports, Science and Technology in 2013. The two surveys provided similar estimates of the annual sport participation rate; therefore, the data from the Japanese National Sport-Life Survey was deemed to provide reliable and valid estimates of sport participation among Japanese adults.

To test the hypothesis, the dummy variable *the Tokyo Olympic cohort* (1 = those whose ages were between 10 and 19 years in 1964) was constructed as the independent variable of

interest. The age range of the Tokyo Olympic cohort in each survey year was as follows: 40 to 49 years in 1994, 50 to 59 years in 2004, and 60 to 69 years in 2014. All respondents who met this age requirement for a given survey year were regarded as the Tokyo Olympic cohort and had the value of 1 for this dummy variable.

While the focus of the current study was to understand the long-term impact of the Tokyo 1964 Olympic Games on sport participation, it is possible that other mega sport events would have a similar effect. To address this possibility, the following three additional cohorts were constructed based on mega sport events held in Japan after the Tokyo 1964 Olympic Games and were included as control variables: Sapporo 1972 Winter Olympic Games cohort (Sapporo Olympic cohort), 1991 World Championships in Athletics cohort (WCA cohort), and Nagano 1998 Winter Olympic Games cohort (Nagano Olympic cohort). These three events were selected because they meet the definition of a mega sport event as "ambulatory occasions of a fixed duration that (1) attract a large number of visitors, (2) have a large mediated reach, (3) come with large costs, and (4) have large impacts on the built environment and the population" (Müller, 2015, p. 634). These three cohorts were created in the same way as the Tokyo Olympic cohort. The age ranges of each cohort in each survey year are shown in Table 1.

(Insert Table 1 around here)

The analysis included other control variables to take into account their potential effects on sport participation. First, based on the literature on cohort analysis (Glenn, 2005; Keyes, Utz, Robinson, & Li, 2010), survey years (included as dummy variables) and age were included to control for the effects of period and age. Age-squared was also included to consider a nonlinear relationship between sport participation and age (Keyes et al., 2010; Pilgaard, 2013). Second, based on the findings of previous studies indicating the influence of internal variables on sport

participation (Breuer & Wicker, 2008; Chung et al., 2009; Humphreys & Ruseski, 2015), the following dummy variables were examined: gender (1 = male), unemployment (1 = unemployment), marital status (1 = living with spouse or partner), and having children (1 = living with children).

Moreover, four additional control variables were included as external variables that may influence people's sport participation. The unit of analysis for these four variables was a region, which consists of nearby prefectures that share similar economic and cultural characteristics (Kokolakakis, Lera-López, & Castellanos, 2014). Consistent with the most commonly used classifications, Japan was divided into eight regions. First, the number of community sport clubs in region was obtained for each survey year from a survey conducted by the Japanese Ministry of Education, Culture, Sports, Science and Technology.[1] Examining this variable allowed for controlling for the influence of environmental changes that are not directly tied to the Tokyo 1964 Olympic Games, as community sport clubs were established across the country after the Japanese government implemented a sport promotion program in 1995.

Second, regional gross domestic product (GDP) was included to examine the effect of economic conditions on sport participation (Ruseski & Maresova, 2014). Because the latest available data on regional GDP was from 2013 (Cabinet Office, n.d.), we used the 2013 data for a proxy of regional GDP in 2014. For 1994 and 2004, we used the regional GDP data for each year. Third, a dummy variable representing the host region of the Tokyo 1964 Olympic Games

[1] For 2014, the number of community sport clubs in each region was obtained from a survey conducted by the Japanese Ministry of Education, Culture, Sports, Science and Technology in 2014. Because information on the number of community sport clubs in each region was available only in 2014, we estimated this information for the other two years. For 2004, the number of community sport clubs in each region was calculated as one-third of the number reported in 2014 given that there was a total of 1,117 clubs across Japan in 2004, when compared to 3,512 clubs (i.e., approximately three times) in 2014. For 1994, we assumed that each region had no community sport club because the community sport club system was initiated in 1995 (Japanese Ministry of Education, Culture, Sports, Science and Technology, n.d.).

(1 = host region) was included because it is likely that the host city (i.e., Tokyo) and nearby areas had more opportunities to develop sport facilities and programs during the time of the event than the other parts of the country did (Hallmann, Wicker, Breuer, & Schüttoff, 2011; Mutter & Pawlowski, 2014a; Wicker et al., 2013).

Finally, as discussed in section 2.5, medalists of the Tokyo 1964 Olympic Games contributed to promoting sport by serving as role models. Specifically, because sporting success can unite the local community (Castellanos, García, & Sánchez, 2011), we assumed the success of local athletes (i.e., athletes from one's local region) at the Olympic Games served as a significant factor affecting sport participation. Hence, we calculated the total number of medalists from each region at the Tokyo 1964 Olympic Games based on data obtained by the Japanese Olympic Committee (n.d.) and used the data to take into account the effect of sporting success.

3.3. Statistical analysis

We used an ordinary least squares regression analysis to identify the hypothesized effect of the Tokyo 1964 Olympic Games. For this analysis, the Tokyo Olympic cohort was included as an independent variable, along with age, period, and three additional cohort variables as well as the other control variables explained above. The dependent variable was the annual frequency.

4. Results

4.1. Descriptive statistics

Table 2 presents the demographic characteristics of the sample and the descriptive statistics for the annual frequency. To show the representativeness of samples in terms of the general population, this table includes the descriptive statistics of Japanese adult aged 20 and over from the 2010 census data. The gender distribution of the study sample in each year is

almost the same as the gender distribution (52% female) reported in the 2010 census (Japanese Ministry of International Affairs and Communications, 2010). The mean and median ages of the current sample are also comparable to the values (M = 52 years, Mdn = 52 years) in the census. These results suggest that our sample is statistically representative of the Japanese population. As shown in Table 2, the average annual frequency has increased from the year 1994 (M = 68.30, SD = 128.84) to 2014 (M = 166.12, SD = 206.39).

(Insert Table 2 around here)

4.2. Hypothesis testing

Table 3 shows the results of the regression analysis examining the effect of the Tokyo Olympic cohort on the annual frequency. As for control variables, having children had a negative effect, whereas unemployment had a positive effect on the annual frequency. Other control variables (i.e., gender, marital status, the number of medals in region, host region, regional GDP, the number of community sport clubs in region) did not have significant effects on the annual frequency, indicating that the regional characteristics and policy implementation examined had no influence on sport participation.

Regarding the effect of age, period, and cohort, the WCA cohort had a significant negative effect, while both period variables had significant positive effects. Additionally, age and age-squared had nonsignificant effects on the annual frequency. In controlling for the effects of all other independent variables, the Tokyo Olympic Cohort had a significant positive effect on the annual frequency (B = 21.57, t = 3.33, p = .001). Consistent with our hypothesis, these results indicate that belonging to the Tokyo Olympic cohort positively predicted sport participation.

(Insert Table 3 around here)

5. Discussion

The current study examined whether the cohort effect generated by the Tokyo 1964 Olympic Games could explain the trend of sport participation in Japan—a unique research context that has seen increases in sport participation when other developed countries have suffered from decreased participation. We found that while age and age-squared did not have significant effects, cohorts significantly predicted the annual frequency. In particular, of the four cohorts examined, only the Tokyo Olympic cohort showed a significant positive effect. The results support our hypothesis by indicating that the shared experience of hosting the Tokyo 1964 Olympic Games influenced individuals in this cohort to participate in sport actively over their lifetime. The results further suggest that the impacts of mega sport events on sport participation behavior may vary across events.

A possible mechanism for explaining the impact of the Tokyo 1964 Olympic Games is that (1) the Tokyo 1964 Olympics Games had a positive influence on the Tokyo Olympic cohort's attitudes toward sport; (2) their positive attitudes, in turn, motivated them to participate in sport; and (3) because of their increased motivation, the Olympic cohort maintained or even increased their sport participation. Moreover, as shown in the theoretical framework (Figure 1), the indirect influences from the event contributed to the long-term impact of the Olympic Games through its effects on the policy, behavioral, and social environments. Consequently, not only experiencing the Olympic Games as residents of the host country but also the improved accessibility to sport would be essential to stimulating sport participation (Frawley & Cush, 2011; Macrae, 2017).

A key question would be why the effect of the Tokyo 1964 Olympic Games was observed even 50 years later. The phenomenon of the sleeper effect and the theory of allocation of time may provide a plausible explanation. The sleeper effect refers to an instance where

people who receive a persuasive message with a discounting cue (e.g., opinions from a less important source) would be more persuaded by the message as time goes by (Hovland & Weiss, 1951). The theory of allocation of time (Becker, 1965) posits that, in the prime of life, people give a higher priority to areas of education, work, and family than to nonworking activities (e.g., sport participation). As individuals get older, their priorities may shift from household responsibilities to nonworking activities. Building on these accounts, under the rapid economic growth and the bubble economy after the Tokyo 1964 Olympic Games to the early 1990s, increased working hours might have constrained Japanese people from participating in sport. In addition, family structures (e.g., having children) could negatively influence sport participation (Hovemann & Wicker, 2009). Thus, individuals in the Tokyo Olympic cohort might have allocated limited time to recreational sport participation during their working-age years. However, through the sleeper effect, promotional messages that people received from the Tokyo 1964 Olympic Games during youth remained in their minds, and could increase their participation in sport as they aged and obtained more time and resources for nonworking activities.

Another important question is why this long-term positive impact was observed only among the Tokyo Olympic cohort. As discussed in section 2.5, the Tokyo 1964 Olympic Games were the first mega sport event held in Japan and played a major role in redeveloping Japanese society after the Second World War. Because of the widespread social changes associated with this event, it had a stronger impact on sport participation than the other examined sport events. For example, the results of nationwide public opinion surveys conducted in 1962, 1971, and 1996 (Cabinet Office, 2006a; 2006b; 2006d) showed the Tokyo 1964 Olympic Games garnered significant interest among Japanese. Specifically, a substantially higher proportion of the

respondents (47%) for the 1962 survey indicated their intention to attend the Tokyo 1964 Olympic Games, when compared to the Sapporo 1972 Olympic Games (38% from the 1971 survey) and the Nagano 1998 Olympic Games (33% from the 1996 survey). Additionally, a new national curriculum for physical education was implemented in schools during the periods before and after the Tokyo 1964 Olympic Games, which boosted the Tokyo Olympic cohort's sport participation. Specifically, the curriculum implemented in 1958 (prior to the Olympics) focused on the promotion of Olympic sports and traditional Japanese sports. The curriculum shifted the focus after the Olympics to promoting fitness-oriented activities and lifelong sports (Nakai & Metzler, 2005). Given this targeted approach to promoting sport through the national curriculum, the Tokyo Olympic cohort may have received a stronger influence from this mega-event, when compared to the cohorts of other mega-events. Consequently, the finding that only the Tokyo 1964 Olympic Games had a positive long-term impact seems to indicate that the social significance of the event increased its influence on young people's attitudes toward sport and subsequently altered their sport participation behavior.

We found that the WCA cohort had a negative impact on the annual frequency. This negative effect may result from the fact that the event created limited local interest and few infrastructure improvements, and it was held under a social situation that was substantially different from the situation surrounding the Tokyo 1964 Olympic Games. The 1991 WCA specialized in athletic sports and was held in existing sport facilities. Japanese athletes also had limited success, with only two athletes winning medals. As discussed earlier, not only experiencing a mega sport event as residents, but also sporting success and social changes related to the event are the keys to encouraging people to participate in sport. Given this, the direct and indirect impacts from the 1991 WCA would be smaller and less likely to stimulate people's

attitudes toward sport participation. Additionally, individuals in the WCA cohort experienced a severe economic depression between 1991 and 2000 (Hayashi & Prescott, 2002), and this social situation might have had a negative impact on sport participation.

An alternative explanation for the positive effect of the Tokyo Olympic cohort is that our data might include a high proportion of the active elderly because of the mortality of inactive individuals. However, the impact of mortality on our finding should be minimal. According to the Global Health Observatory data for 2015, the life expectancy at birth was 84 years in Japan (World Health Organization, n.d.). In addition, people aged 60 years and above accounted for 33% of the Japanese population in 2014 (Japanese Ministry of International Affairs and Communications, 2014). In the current study, individuals who belonged to the Tokyo Olympic cohort were 60 to 69 years old in 2014. Given the high life expectancy and the large proportion of elderly people in Japan, it is unlikely that the mortality rate for this cohort would have been high enough to impact the survey results for the years under study.

Notably, our finding does not indicate the Tokyo Olympic cohort was the only determinant of sport participation. In the model, when various internal and external variables were controlled, the period (i.e., survey years) had a stronger positive effect on the annual frequency than the Tokyo Olympic cohort. This finding implies that sport participation is affected by recent social changes captured by the period effect. Moreover, although the adjusted R-squared value of the model (.06) was comparable to the values identified in previous studies (Breuer & Wicker, 2009), this value was relatively small. This result means that other internal and external variables that were not examined in this study would influence the annual frequency, thereby highlighting the need to further identify other determinants of sport participation, along with those found to be significant in this study.

6. Theoretical contributions and practical implications

Our study contributes to the sport management literature in several ways. First, we extend the research scope of the social ecological model to the study of sport events. By demonstrating multidimensional interventions, including external and internal interventions, of the Olympic Games on sport participation, our framework furthers the application and the usefulness of the social ecological model to understand the Olympic legacy. Second, we demonstrate a possible mechanism of the long-term trickle-down effect based on the sleeper effect and the theory of allocation of time. Therefore, our study contributes to the literature by not only providing the evidence of long-term trickle-down effect, but also presenting a comprehensive framework that (a) allows for further understanding mechanisms of trickle-down effect and (b) serves as a theoretical basis for future research. Third, our findings advance previous studies indicating the potential effect of cohort on sport participation (Breuer & Wicker, 2009; Pilgaard, 2013) by offering empirical evidence for the cohort effect and identifying a factor that can generate this unique sport participation trend.

For practical implications, as general strategies are shown to be ineffective to promote sport participation in a nation (Weed et al., 2015), specific efforts and objectives to promote sport participation need to be considered. Thus, by understanding the characteristics of a specific cohort and their unique motivation toward sport participation, policy makers can have a clearer and deeper understanding of factors influencing sport participation. More specifically, policy makers should be aware of the uniqueness of each cohort and develop specific actions targeting a cohort when planning new sport policies.

Second, our findings contribute to developing strategic planning for encouraging young people's engagement in mega sport events and increasing their active participation in sport in

later life. Jacques Rogge, former president of the IOC, highlighted the importance of inspiring youth with the Olympic values and raising their awareness of and motivation toward sport (International Olympic Committee, 2015b). Moreover, former Olympian Sebastian Coe shared his youth experience of how watching the Mexico City 1968 Olympic Games on television positively influenced his behavior toward sport later in his life (Veal et al., 2012). Based on the long-term legacy of a mega sport event found in this study, we encourage the IOC and other event organizers, such as National Olympic Committees (NOCs), to take proactive actions to raise young people's engagement in sport events. For example, events such as the Youth Olympic Games can continuously motivate young people's interests in sport and physical activities (Judge, Petersen, & Lydum, 2009; Parry, 2012; Wong, 2011). Therefore, similar associated events could be established for other mega sport events to positively influence young people's perceptions of sport.

Third, by identifying increased sport participation as one of the long-term legacies of the Tokyo 1964 Olympic Games, this study encourages both the IOC and NOCs to address the following key question: After the Olympic Games, what could be done to maintain and maximize the Olympic legacies? Chalip (2004, 2006) proposed the concept of social leverage, which is concerned with strategic ways to maximize the benefits of sport events from both short- and long-term perspectives using event venues and event-related activities. Our framework is consistent with his proposition. Thus, the key to developing the legacy of mega sport events is to engage in a planned effort to effectively leverage venues, atmosphere, and related programs created by the hosting of a mega sport event before, during, and after the event.

7. Limitations and future research

Some limitations of this study should be noted. First, although our theoretical framework shows how the Olympic Games influences sport participation, the relationships between the external variables (i.e., policy, behavioral, and social environment) and sport participation were not fully tested. Thus, this study is unable to conclude that sport participation behavior is determined only by the effect of the Olympic cohort. Rather, the current result only demonstrates a cohort effect indicating that the shared experience of the Olympic Games constitutes an important factor to promote sport participation. To further understand the function of the cohort effect in explaining sport participation, it would be necessary to consider the effects of other external and internal variables identified in the framework.

Second, the key assumption of this study is that the cohort effect generated from the shared experience of the Tokyo 1964 Olympic Games results in higher levels of sport participation during a particular period. However, some questions need to be answered to develop a concreate explanation for why this cohort effect is observed. For example, what encouraged the Tokyo Olympic cohort to participate in sport? How did they view the role of the Tokyo 1964 Olympic Games in their sport participation? An in-depth qualitative study should be designed to answer these questions and draw a complete picture for understanding how the Olympic Games plays a role in the relationship between the Olympic cohort and sport participation behavior.

Third, this study focused on a specific cohort among Japanese adults. Thus, the results cannot be directly applied to other countries that hosted the Olympic Games. Further research is needed to examine whether the same phenomenon can be observed in other host countries, and what internal and external variables would influence sport participation behavior in these countries. In addition, future research should also consider the impact of more recent mega sport

events on Japanese sport participation. For example, although excluded from this study because of data limitations, co-hosting of the 2002 FIFA World Cup and the victory of the 2011 FIFA Women's World Cup could impact sport participation. Future studies exploring the influence of these events could advance the understanding of what makes particular mega sport events more successful in promoting sport participation than others.

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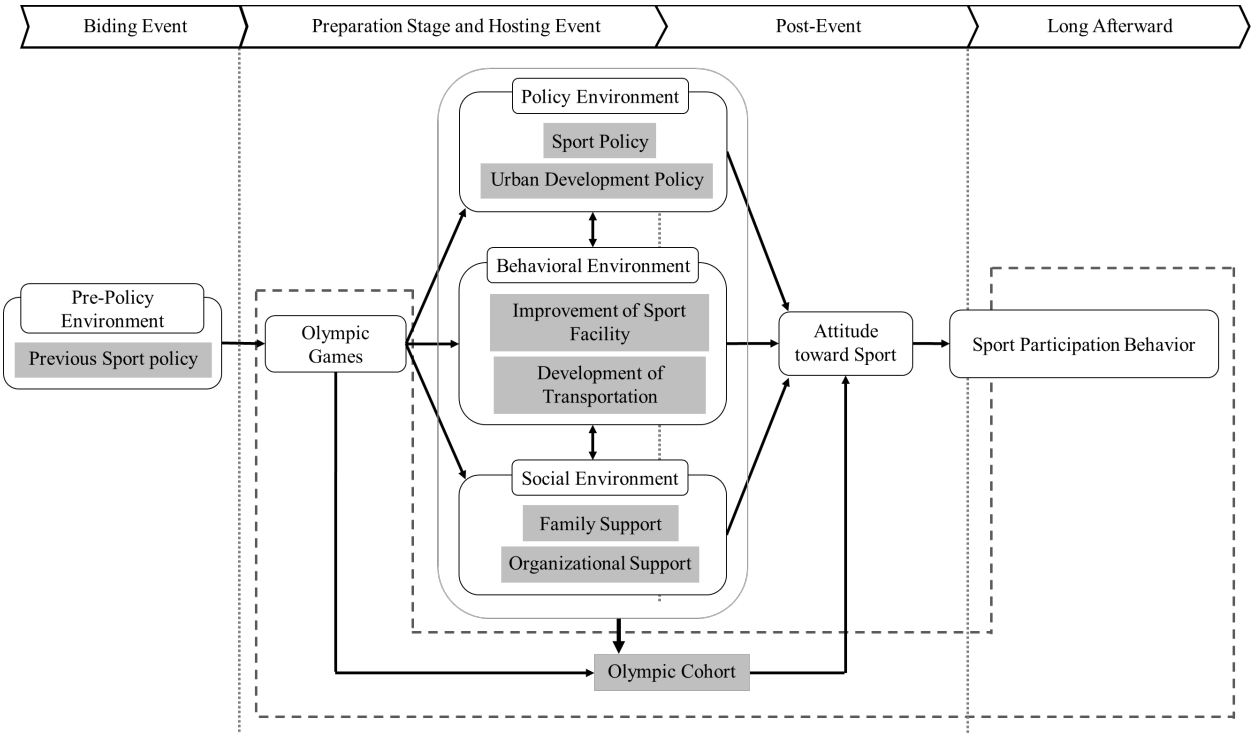

Figure 1. Theoretical framework. The dashed rectangle indicates the focused relationship that is analyzed in this study.

Table 1

Age Ranges of Each Cohort in Each Survey Year

	1994	2004	2014
Tokyo Olympic cohort	40-49	50-59	60-69
Sapporo Olympic cohort	32-41	42-51	52-61
WCA cohort	13-21[a]	23-31	33-42
Nagano Olympic cohort	6-15[a]	16-25[a]	26-35

[a]Because the current data consisted of responses from Japanese adults aged 20 years and above, individuals aged under 20 years were excluded from the analysis.

Table 2

Demographic Characteristics of the Sample

Year	*N*	Gender		Mean of Age	Median of Age	Mean of the annual frequency	SD of the annual frequency
		Male	Female				
1994	1,539	49.58%	50.42%	46.47	46.00	68.30	128.84
2004	2,284	49.21%	50.79%	49.61	50.00	149.60	194.90
2014	1,992	49.45%	50.55%	50.08	49.00	166.12	206.39
Census 2010[a]	N/A	48.02%	51.98%	52.06	52.00	N/A	N/A

[a]The descriptive statistics of census data is limited to Japanese adults aged 20 years and over.

Table 3

Results of Multiple Regression Predicting the Annual Frequency of Sport Participation

Variable	B	β	*t*-value	*p*-value
Gender	7.194	0.019	1.383	0.167
Spouse	6.196	0.014	0.947	0.344
Children	-18.964	-0.050	-3.450	0.001
Unemployment	38.365	0.096	6.259	0.000
Number of medals in region	-2.106	-0.032	-1.821	0.069
Host region	-6.760	-0.017	-0.435	0.664
Regional GDP	0.000	0.060	1.501	0.133
Number of community sport clubs in region	-0.010	-0.014	-0.540	0.589
Age	1.907	0.165	1.641	0.101
Age-squared	-0.017	-0.147	-1.487	0.137
Year 2004	83.971	0.218	12.224	0.000
Year 2014	106.316	0.268	8.904	0.000
Sapporo Olympic cohort	7.132	0.014	1.028	0.304
WCA cohort	-24.161	-0.044	-2.982	0.003
Nagano Olympic cohort	-4.644	-0.007	-0.451	0.652
Tokyo Olympic cohort	21.574	0.046	3.331	0.001
R^2		.26		
Adj. R^2		.06		
F value		25.96^{***}		

$^{***}p < .001$; B = unstandardized coefficient; β = standardized coefficient.