Environmental factors, such as weather and air pollution, are important determinants of attendance for professional sports events (Borland & Macdonald, 2003; Watanabe, Yan, Soebbing, & Fu, 2019). Specifically, higher levels of air pollution are believed to negatively affect spectator sports (Carlisle & Sharp, 2001). However, limited attention has been paid to how such environmental conditions, like air pollution, may impact consumer behavior concerning sports (Watanabe et al., 2019). In addition, air pollution data in previous studies is limited for explaining the accurate relationship between air pollution and attendance because daily average weather data was analyzed instead of specific weather conditions during game hours. Against these limitations, this study investigates the impact of air pollution on attendance for professional sports by collecting hourly air pollution data.

The demand curve was derived by utilizing previous studies identifying five factors of sport demand (Borland & Mcdonald, 2003): consumer preferences (e.g., consumer habits or popularity among consumers), viewing quality (e.g., the quality of stadium or environmental conditions), economics (e.g., ticket prices), the sporting contest (e.g., success of competing, quality of a match), and supply capacity (e.g., stadium size). Based on these components, the sport demand model was used to examine how consumer interest in spectator sports may be influenced by place (Fort, 2004), weather (Bird, 1982; Schofield, 1983), household size (Taks, Renson, & Vanreusel, 1999), income (Borland & Mcdonald, 2003), team success (Kahane & Shmanske, 1997), uncertainty outcomes (Hunt & Lewis, 1976), and other pertinent factors.

This study collected the attendance numbers from Korean professional soccer league (K-League) games of the 2013 to 2017 seasons. The population and average income of the teams' home cities and the capacities of the home stadiums were collected. Data concerning the hourly weather (temperature and precipitation) and levels of air pollution were also collected from the Korea Meteorological Administration (KMA) and the Korea Environment Corporation (KECO), while considering spectators' travel time from their homes to the stadiums and vice versa. Scores of matches, accumulative winning percentages, rivalries, promotions, and split statuses were included in the analysis.

Following the precedence of traditional attendance functions in sports studies, this research regressed weather specific variables by controlling five demand factors for the attendance of each match. Pooled regression models, including time effects, were tested to estimate the impact of air pollution and other weather conditions on attendance. The results of these estimations have shown that precipitation ($\beta$=-.395, $p=.019$) and clouds ($\beta$=-1.274, $p=.004$) negatively impact attendance, while air pollution and temperature are not significantly related to attendance.

Therefore, this study shows that, even though there are disputes about the negative impact of air pollution on outdoor activities, sports fans still generally attend games, regardless of air pollution. In other words, sports fans are not seriously concerned about air pollution when they make consumption decisions, largely based on habitual patterns (Lee & Smith, 2008; Watanabe et al., 2019). However, as air pollution has become a more serious problem, it may be necessary for sports fans’ habitual patterns to change.