Suicides around Major Public Holidays in South Korea

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A dip and peak pattern of suicide around major public holidays has been found in developed countries and explained by the broken promise effect. Focusing on two major holidays in South Korea (New Year’s Day and Thanksgiving Day, both on the lunar calendar), replication of the dip and peak pattern was done by analyzing individual information on all suicides from 1997 to 2014. The replicated pattern revealed the most vulnerable group to be married men aged 50+ in nonmetropolitan areas in 2006–2014. Families, friends, and policy makers can use these findings to save the vulnerable.

South Korea has had the highest rate of suicide among the Organisation for Economic Co-operation and Development (OECD) countries in the period from 2003 until the latest comparable year, 2012; both men and women are highly suicidal. In 2012, the total suicide rate was 29.1 per 100,000 persons, while the male rate was 43.2 and the female rate was 17.8. The second highest rate for both sexes was much lower at 22.0 for Hungary (OECD, 2016). In 2014, suicide was the fourth leading cause of death among Korean men and sixth among Korean women. This is surprising in that Korea has been strikingly successful in improving material and nonmaterial indicators of living (Sohn, in press-a, in press-b). Naturally, many researchers have attempted to determine the causes and consequences of suicide in Korea (e.g., Chan et al., 2014; Chang, Gunnell, Sterne, Lu, & Cheng, 2009; Kim et al., 2006; Kwon, Chun, & Cho, 2009). Little attention, however, has been paid to the role of major public holidays on suicide in Korea, although a dip immediately before or during a holiday and a peak immediately after a holiday have been found in Denmark (Jessen & Jensen, 1999), Japan (Nishi, Miyake, Okamoto, Goto, & Sakai, 2000), Lithuania (Kalediene & Petrauskiene, 2004), and the United States (Phillips & Liu, 1980; Phillips & Wills, 1987; Stack, 1995). The goal of this study was to replicate these findings for Korea by analyzing individual information on all suicides that occurred from 1997 to 2014.

One major difference between this study and others is the focus on two specific holidays: New Year’s Day and Thanksgiving Day, both on the lunar calendar (January 1 and August 15, respectively). These holidays have not been discussed in the literature, but they are so important in Korea that the days before and after each holiday are designated, by law, to be nonworking days. If an extended nonworking day coincides with another nonworking day, such as a Saturday or Sunday, the law designates the next working day as a nonworking day. No other public holidays enjoy this legal status in Korea. In addition, unlike other public holidays, these holidays have been
celebrated since time unknown. One can easily see the importance of these holidays by observing the instant completion of train ticket bookings when booking services become available 1 month in advance. The severe congestion of highway traffic around the holidays provides another piece of evidence.

In this study, the dip and peak pattern for the holidays was replicated and the most vulnerable subgroup identified. The pattern and the subgroup is explained by the broken promise effect proposed by Gabennesch (1988). This pattern was then contrasted to that for Christmas Day and solar New Year’s Day, which have been typically analyzed for other countries.

DATA AND METHODS

All digitized records of individual deaths from 1997 to 2014 were analyzed. Because the holidays are most meaningful to Koreans, we considered only Korean citizens born in Korea. Although this information was available only for 2010–2014, this partial exclusion is inconsequential because the Korean population has long been ethnically homogenous. The cause of death was classified based on the International Classification of Disease-10, and the codes X600–X849 were used to define suicide. The data were based on the certificate of death, which is mandatory for all deaths and usually provided by doctors. For example, 98.7% of deaths in 2014 were examined by doctors. In 2002, Statistics Korea started to include information provided by the National Prosecution Office, which thoroughly investigates some death cases, including those that are suspected to be suicides (Kwon et al., 2009). All of these features of the data should minimize errors in determining the cause of death.

The date of death was separately reported from the date of report, so there should be no confusion between them. The date of death is not the same as the date of injury (the date when the suicidal act was begun), and the date of injury is more appropriate to understand the motivation for suicide. Like most other data on suicide, however, our data did not contain the date of injury. That said, the distinction should be inconsequential if an injury was immediately followed by death. Phillips and Sanzone (1988) provided supporting evidence with finding that 92.6% of all suicides in California from 1973 to 1985 occurred within 1 day of the injury date; the percentage varied little by sex, race, age, and marital status. Furthermore, analyses of the date of death produced almost the same results as those of the date of injury. Therefore, the date of death in used in this study is accurate enough to understand the motivation for suicide.

I first analyzed all suicides to present the big picture and then different subgroups to identify more vulnerable people by creating dichotomous subgroups by sex, age, marital status, education, region, and year. The population was divided at age 50 because in this Confucian country, older people expect much from the holidays, such as their offspring’s visits and their leading roles in the ancestor worship rites—Gabennesch (1988) argued that anticipation plays an important role in the dip and peak pattern. Other demographic subgroups were distinguished as being married from being nonmarried (single, divorced, and widowed) and having a junior high school education or below from a high school education or above. Korea has seven metropolitan areas (Seoul, Busan, Daegu, Incheon, Gwangju, Daejeon, and Ulsan), so all areas were divided into metropolitan cities and the rest. The entire period was cut in half to observe changes in the dip and peak pattern over time. A total of 3,580 suicides that contained missing values for any of these variables or that had addresses overseas were excluded, resulting in 199,971 suicides for analysis. The number of suicides for each subgroup are listed in Table 1.

To understand trends in suicide around the holidays, I focused on the
period spanning 7 days (i.e., one full week) before and after the holidays; that is, 15 days in total. To see the trends in a broader perspective, however, the period spanning 14 days before and after the holidays—29 days in total—were analyzed. I did not focus on days beyond the 15-day range surrounding the holidays because suicides on days outside the range were less likely to be related to holidays. Because the dip and peak pattern, regardless of the days, weeks, or months (on the solar calendar) of the holidays was of interest, an “expected” number of suicides was not estimated by regressing the number of suicides on a day on some time variables; nothing was expected or corrected for. Instead, the daily mean number of suicides in the 7 days before and after the holidays was calculated, thereby alleviating concerns stemming from seasonal, monthly, weekly, and possibly daily variations in suicides. Because the 7 days before and after the holidays are in the same season and mostly same month, seasonal and monthly variations might not be of concern. Furthermore, a whole week before and after the holidays was considered, since the order of a week changes every year on the solar calendar. For example, the week before lunar New Year’s Day in 2014 lay in the fourth and fifth weeks in January in 2014 but in the second week in 2013. Pooling all years, it was possible to ignore a weekly variation. The daily average of suicides in each of the weeks was then calculated, thereby substantially reducing a daily variation.

In this study, I did not include suicides that occurred beyond the immediate week before and after the holidays to estimate some expected numbers of suicides. Such methods compare what happened around the holidays with the averages for all years. This was not the purpose of this research; I simply wanted to compare what happened immediately before and after the holidays. Furthermore, pooling suicides across 18 years should cancel out variations unrelated to the holidays. This concept might be clearer if one considers, as an example, Phillips and Wills (1987), who used regressions to estimate expected numbers of suicides. They distinguished two groups of holidays. They said that while Type 1 holidays exhibited a drop in suicides before the holiday and a peak thereafter, Type 2 holidays exhibited no peak at all, but a nearly consistent drop and a reduced risk of suicide before, during, and after the holiday. These patterns were true compared to the expected numbers of suicides. When only the number of suicides before and after holidays were compared, however, both types exhibited a dip and peak pattern. Because they investigated whether suicides increased around the holidays, their methods were appropriate for their aims, but inappropriate for this study. In addition, I analyzed not a sample but a population, so did not estimate confidence intervals. Overall, the study data were complete, and the methods were straightforward.

As a robustness check, however, the daily number of suicides were regressed on the number of days from the holiday, month fixed effects, year fixed effects, and the interaction terms of month and year fixed effects; the reference day was the
holiday. The range of days were widened from the holiday (3 weeks before and after the holiday or 43 days) to see the bigger picture. This specification flexibly controlled for all time-invariant factors in the same month in the same year. Therefore, it automatically controlled for the holiday’s season, order of the week in the month, and day of the week.

RESULTS

Lunar New Year’s Day and Thanksgiving Day

An unambiguous dip and peak pattern around the two holidays (for convenience, a vertical line was added at zero, i.e., on the holidays) is presented in Figure 1. The number of suicides was stable until immediately before lunar New Year’s Day, then plunged. The number shot up immediately after the holiday. The daily mean of suicides was 419 in the 7 days before the holiday and 488 in the 7 days after the holiday. The dip and peak pattern was more pronounced for Thanksgiving Day, and the corresponding numbers were 492 and 600. It is also interesting that the plunge before Thanksgiving Day started earlier than that before New Year’s Day, thereby causing a deeper dip. The regression results shown in Figure 2 produced the same patterns, suggesting that the main method was simple and accurate. Note the upward trend between 1 and 3 weeks after Lunar New Year’s Day and the downward trend between 1 and 3 weeks after Thanksgiving Day. As the two trends were opposite, they were unlikely to be influenced by some common holiday effects (e.g., the broken promise effect). Instead, they probably reflected the unimodal pattern that the number of suicides peaked in May.

Figure 1. Trends in suicide derived from 7-day mean differences. Note: The daily means indicated by the horizontal bars concern the 7 days before and after the holidays.
When different subgroups were observed (Figure 3), the dip and peak pattern was ubiquitous for Lunar New Year, but more pronounced for married men aged 50+ in nonmetropolitan areas in 2006–2014. Table 2 provides the daily mean of suicides in the 7 days before and after the holidays for each subgroup. The same patterns appeared for Thanksgiving Day (Figure 4), but the difference between the dip and the peak was greater for Thanksgiving Day than for New Year’s Day. This is consistent with that for the total population (Figure 1), and Table 2 confirms this finding by specific numbers. Almost all subgroups exhibited a dip not during but immediately before the holidays and a peak immediately after the holidays. In addition, the daily mean of postholiday suicides was greater than that of preholiday suicides for all subgroups.

If the postholiday peak over the preholiday dip decreased over time, the dip and peak pattern would be less interesting. To chart the trend, the daily mean of suicides in the 7 days before and after the holidays were calculated. As the number of suicides increased over time both before and after the holidays, it was necessary to compare the relative size between the two means. Thus, the difference was divided by the daily mean of suicides in the 7 days before the holidays. The relative difference fluctuated for both holidays (see Figure 5), but in almost all years, the values were positive, indicating that the postholiday peak was greater than the preholiday dip, and the trend was flat, indicating that the postholiday peak remained relatively greater than the preholiday dip. I then regressed the relative difference on year for each holiday and found that the coefficient on year was small and statistically nonsignificant (not shown).

**Christmas Day and Solar New Year’s Day**

Although Christmas Day and New Year’s Day on the solar calendar were not...
the holidays of interest, we repeated the analysis was repeated for these holidays, because they have been widely considered in the literature. However, analysis of these holidays is not as straightforward as that of the other holidays since Christmas
Day precedes solar New Year’s Day by 7 days. Between these two holidays, the causes of the postholiday peak would be nullified by the causes of preholiday dip, so a peak and dip during this interholiday period was not expected. Figure 6 confirms this conjecture and presents other interesting differences. A dip was not observed immediately before but during Christmas Day. There was no dip at all immediately before or during solar New Year’s Day—the seeming dip in the 7 days before this holiday coincided with Christmas Day. The trend reversed immediately after Christmas Day, but not quite as greatly as for the other holidays. The daily mean of suicides was 395 in the 7 days before Christmas Day and 386 in the 7 days after. The smaller postholiday mean was opposite to the greater postholiday mean for the two holidays of interest.

**DISCUSSION**

A dip and peak pattern around major public holidays has been found in some developed countries. I replicated this pattern for lunar New Year’s Day and Thanksgiving Day in Korea, which has exhibited the highest total suicide rate in the OECD countries since 2003. The flat trend in the relative difference between the postholiday peak and preholiday dip indicates that the dip and peak pattern around the holidays has been influential and probably will be in the future. The group found to be most vulnerable were married men aged 50+ in nonmetropolitan areas in 2006–2014.

The pattern and the vulnerable group are consistent with the broken promise effect proposed by Gabennesch (1988). That is, the holidays promoted the aspiration or expectation for feeling better, which caused the dip in suicides immediately
before the holidays. The holidays failed to deliver the promise, which caused the peak immediately after the holidays. This mood swing is harmless for most people, but fatal for some people on the threshold of suicide; the swing pushes them over the threshold into suicide. During the holidays, influenced by Confucianism, adult offspring are expected (or even obliged) to visit their parents, and senior men lead the ancestor worship rites. Modernization, however, has weakened the importance of the visits and the rites (Moon, 2007; Ok & Chin, 2011)—thus, the more pronounced dip and peak pattern in the second half of the period studied. For the same reasons, old married men anticipate their offspring’s visits, but some offspring do not show up. The reduced importance of the rites reduces the respect that senior men used to enjoy during the holidays. Senior men in the metropolitan cities are probably modernized enough to adapt themselves to the new trends, but those outside the cities may have difficulty in adapting. Another complementary reason can be attributed to more isolation felt by senior men outside the cities. This is because working-age adults have migrated from rural to urban areas over time (Koo, 2001, ch. 2). Immediately before the holidays, Koreans travel to non-metropolitan areas to visit their parents and then return to the cities immediately after the holidays. The severe congestion of highway traffic follows this timing and direction. Thus, whereas senior men in the cities can maintain close contact with their offspring after the holidays, those outside the cities may not easily do this. All militate against this subgroup.

The difference between the dip and peak was greater around Thanksgiving Day than around New Year’s Day. If the broken promise effect applies to Korea, this finding suggests that the promise or the failure of the delivery was greater before Thanksgiving Day. This deduction is not unreasonable because the holiday celebrates the blessing

![Graphs showing trends in the relative difference between the peak and the dip for Lunar New Year and Thanksgiving.](image)
of the harvest, and consequently the atmosphere tends to be more buoyant. This is magnified by the weather during that time of year, which is cool and crisp. In contrast, the weather during lunar New Year’s Day is freezing.

One could object that the dip-peak pattern was generated by white noise or other types of temporal variations. The concern of white noise could be valid if only one or two subgroups had displayed this pattern. When all of 24 subgroups (12 subgroups times two holidays) displayed this pattern, however, white noise does not pose a serious threat. Furthermore, when seasonal, monthly, weekly, and daily variations were removed, no other types of temporal variations that might affect the robust pattern could be identified.

In general, the daily mean of suicides in the 7 days after each of lunar New Year’s Day and Thanksgiving Day was greater than that in the 7 days before. Although the concerned holidays and empirical methods differed from those analyzed here, Phillips and Liu (1980) observed a similar phenomenon in all suicides in the United States in 1972–1976.1 The opposite was true, however, when Phillips and Wills (1987) changed the holidays and the empirical methods in analysis of all suicides in the United States in 1973–1979.2 To make matters more complicated, after tabulating all suicides in Hokkaido, Japan, in 1979–1994, Nishi et al. (2000) reported that the number of suicides was greater on 1 day after than before the holiday. It is thus unclear whether the Korean case is typical.

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1I summed all differences between the observed and expected suicides 3 days before and after their seven holidays, but excluded suicides on the holidays in the summation.

2I summed all differences between the observed and expected suicides 5 days before and after their six holidays, but excluded suicides on the holidays in the summation.
This study revealed a dip during Christmas and a peak immediately after solar New Year’s Day. For the United States in 1973, Lester (1979) found that the number of suicides was smaller during Christmas Day and solar New Year’s Day than the average of the number exactly 7 days earlier and 7 days later. His finding for Christmas Day was consistent with mine, but not for solar New Year’s Day. For the United States in 1972–1978, Lester (1985) observed a lower number of suicides on December 23 than on Christmas Day (332 vs. 387) and a particularly high number on January 1 (531), both findings differing from those in this study. For the United States in 1973–1979, Phillips and Wills (1987) observed a dip on December 23 and a peak on January 1, which also differs from this study. For Denmark in 1970–1994, Jessen and Jensen (1999) found a dip on Christmas Eve (not Christmas Day as in our case) and a peak immediately after solar New Year’s Day (similar to this case). Phillips and Liu (1980) provided suicide patterns roughly similar to this study only when focused on Christmas Day and solar New Year’s Day; the broader patterns around the holidays varied from this research. Therefore, the Korean case adds another complication to the literature on suicide patterns during these two holidays. Incidentally, no dip and peak pattern around Christmas Day and solar New Year’s Day agrees with the usual findings during the other two holidays; the broader patterns around the holidays varied from this research. Therefore, the Korean case adds another complication to the literature on suicide patterns during these two holidays. Incidentally, no dip and peak pattern around Christmas Day and solar New Year’s Day suggests that the dip and peak pattern around the other two holidays was genuine and not due to a deferment of the date of death in the preparation for the holidays; otherwise, the typical dip before both holidays would be observed.

More importantly for this study, no clear dip and peak pattern for these holidays was found. One way to reconcile the differences between these holidays and the holidays of interest is to regard the period between Christmas Day and solar New Year’s Day as one long holiday. Then, the familiar dip and peak pattern emerges. However, this reconciliation is imperfect because the dip still occurred during Christmas Day, while the broken promise effect expects a dip immediately before Christmas Day. In addition, the postholiday daily mean of suicides (416) during the elongated holiday was not much greater than the preholiday mean (395). Therefore, the suicidal mechanisms for lunar New Year’s Day and Thanksgiving Day appear to differ from those for Christmas and solar New Year’s Day, implying that different holidays require different measures to prevent suicides.

Of course, one commits suicide for many reasons, and the broken promise effect is only one of them. The effect is, however, important in that it is the last link in the chain of events leading to suicide for the vulnerable. This study made it possible to determine a cause of suicide that has been neglected for Koreans but that affects all (i.e., New Year’s Day and Thanksgiving Day), and to be able to identified a particularly vulnerable group. Families, friends, and policy makers can use these results to anticipate the postholiday peak and to cut the last link for the vulnerable. Furthermore, the unwavering relative difference between the peak and the dip recommends that one pay constant attention to this link at least in the near future.

We acknowledge some limitations. All are due to the nature of the administrative data. First, the study answered a “what” question but not a “why” question—I could only provided some speculations. The administrative data offered width but lacked depth. Ideally, a large number of representative individuals would be followed for a long period, while measuring and assessing their physical and mental health. Clearly, this method is costly and impractical. A practical method is to follow a small group of suicidal people, but this group provides low statistical power and is not representative of the population. Only an accumulation of research can answer the “why” question, and this study contributes one piece to the accumulation. Second, a particularly vulnerable subgroup was identified and it was recommended that more
attention be paid to these groups around the holidays. However, what symptoms were displayed by those in this subgroup before committing suicide or whether these symptoms differed from those of suicides on nonholidays. These are herculean tasks but necessary to prevent more suicides around the holidays. Third, although Statistics Korea does its best to minimize misclassification error, its extent could not be discerned. If the error was systematic in such a way that more deaths were misclassified as suicides after than before the holidays, the results would be biased. This bias, however, was probably modest because Statistics Korea has incorporated information provided by the National Prosecution Office since 2002.

REFERENCES


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