

The relationship between suicide and day of the week, major
holidays, and national events in Denmark 1970-1998

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Summary

Fluctuations in suicide rates have been observed in many countries. The aim of the present study was to investigate the distribution of suicides in Denmark as to day of week and examine whether major holidays or national events exert any direct influence on completed suicides. Danish data on suicidal deaths 1970-1998 ($n = 35.680$) were analysed statistically. A significant excess of total suicidal deaths was observed on Mondays and a trough on Saturdays, with no significant difference between gender patterns. An association between specific national holidays and events and suicides was found, which was explained through a psychosocial theory of “broken promises”. Identifying rhythmic patterns in suicidal behaviour may have implications for understanding the aetiology of suicide and for planning and staffing prevention and support services. This article concludes the research project: ”Swing: The seasonality of Suicidal Behaviour” (see Jessen et al., 1998; 1999*a*; 1999*b*), which has attempted to examine several types of rhythmic patterns in the prevalence or incidence of suicidal behaviour.

Key words: suicide, weekly fluctuations, public holidays, elections

Introduction

According to Durkheim (1951[1897]), seasonal fluctuations in suicide rates are caused by the varying intensity of communal life and social activity. A popular way to study the effect of the intensity of social activity on suicidal behaviour is to examine the incidence of completed suicides around weekends or major public holidays. It is commonly known that certain days of the year have special meanings. Special occasions, such as major public holidays, national sport events, or the deaths of cultural icons, often seem to bring family, friends, and acquaintances closer together. These occasions are also likely to provide a sense of belonging, fellowship and social integration. Durkheim argued

that the suicide rate of a society is inversely related to the social integration of the society, and he equated a person's social integration with his or her subjectively felt obligation to participate in the ceremonies of the society:

“An individual, in his turn, if he is strongly attached to the society of which he is a member, feels that he is morally held to participating in its sorrows and joys; not to be interested in them would be equivalent to breaking the bonds uniting him to the group” (Durkheim, 1961[1915]:446)

The level of integration in a society determines how strongly an individual is linked to the collective order. When the social integration level is weak, egoistic suicide is likely to occur. Durkheim hypothesized that political crises, wars, and major socio-political events could increase the social integration level and reduce egoism – and consequently reduce people's propensities toward (egoistic) suicide. Based on Durkheim's theory, it is possible to speculate that persons highly integrated in the society might postpone suicidal behaviour in order to participate in important social ceremonies (Phillips & Liu, 1980).

Durkheim's (1951[1897]: 202-205) theory of political integration states, that public elections produce behaviour which increases social integration and thereby reduces the incidence of suicide. Durkheim's theory has to some extent received empirical support. Presidential elections in the United States have been shown to reduce the number of suicides significantly (Boor, 1981; Phillips & Feldman, 1973). Impending elections, thus, seem to foster increased social integration and sensations of social cohesion and national identity.

In the general population, concepts like 'holiday depression', 'Christmas blues', and 'millennium madness' are common assumptions, but strictly intuitive notions and common beliefs – often boosted by the incorrect linking of suicide to holidays in the press – are often quite misleading. Counter-intuitively, researchers tend to find a low frequency of suicides before and during holidays. Like social ceremonies, holidays, too, seem to have a death-dip effect (Phillips & Liu, 1980). Indeed, major holiday periods may include several kinds of stressors, e.g. increased alcohol consumption and altered

sleeping and eating patterns, family conflicts, and financial burdens, not to mention loneliness, the remembrance of loved ones passed away, or the frustration that arises from excessive traffic (Jessen *et al.*, 1999b). Therefore, it is understandable that Cattell (1955: 39) characterized the “holiday syndrome” as a condition of

“diffuse anxiety, numerous regressive phenomena including marked feelings of helplessness, possessiveness and increased irritability, nostalgic or bitter ruminations about holiday experiences of youth, depressive affect and wish for magical resolution of problems”.

In contrast, most research suggests that holidays have a protective or delaying effect on suicides (Philips & Wills, 1987; Jessen *et al.*, 1999b). The protective effect of holidays, however, appears to be diminishing due to cultural changes and secularization in the past few hundred years, as already Durkheim (1961[1915]: 476) noticed: “The French Revolution established a whole cycle of holidays to keep the principles with which it was inspired in a state of perpetual youth”, but at the same time he observed that

“the great things of the past which filled our fathers with enthusiasm do not excite the same ardour in us [...] We can no longer impassionate ourselves for the principles of [...] Christianity [...] and human equality and fraternity seems to us today to leave too large a place for unjust inequalities [...] In a word, the old gods are growing old, or already dead, and others are not yet born” (Durkheim, 1961[1915]: 475)

The religious or symbolical meaning and content of holidays and religious ceremonies appear to have been reduced in modern society (Philips & Feldman, 1973).

Weekends, too, have often been associated with a suicidal death-dip. Using data collected in France, De Guerry in 1835 published the first known systematic investigation into the weekly distribution of suicides (Altamura *et al.*, 1999). He observed that the greatest number of suicides were committed in

the beginning of the working week, particularly on Mondays, with a decline throughout the week to a trough in the weekends. Similarly, in USA Philips & Liu (1980) and MacMahon (1983) observed higher frequency of suicidal deaths on Mondays and Tuesdays than on Sundays. It has been suggested that this tendency is more predominant today than ever before (Jessen & Jensen, 1998; Maldonado & Kraus, 1991; Massing & Angermeyer, 1985). The vast majority of studies have found that the beginning of the working week, often Mondays, tend to have the highest incidence of suicide (Hassan, 1994; Jessen *et al.*, 1999a; Lester, 1971; Lester, 1979; Maldonado & Kraus, 1991; Zung & Green, 1974). It seems as if weekends shield against suicide. The fact that the maximum of suicides among the Jews in Israel occur on Sundays, being the start of the working week for this part of the population, lends support to this hypothesis (Massing & Angermeyer, 1985). In the present study we intend to investigate the weekly distribution of suicides in Denmark and examine whether there is an effect of holidays and national events on completed suicides.

Method

1. Effect of sex and age on weekly distribution of suicides and attempted suicides.

The analysis is based on suicidal deaths in Denmark in the period 1970-1998 ($n = 35.680$, age 15+ years). The effect of sex and age on the weekly distribution of suicides and attempted suicides was analysed by a saturated hierarchical log-linear model with a backward elimination (one at the time) of terms with the highest degree of interaction. (Christensen, 1997). An initial screening procedure was performed on day of the week, sex, and different age groups (5-year, 10-year, 15-year 20-year and 25-year age groups). If the screening procedure disclosed an interaction between age and day of the week, a procedure for joining adjacent age groups was performed. The basis of the analysis was 5 year age groups. All pairs of adjacent age groups were compared (15 5-year age groups, 14 tests). The pair with the largest resemblance, estimated from chi-square test for independence was joined). This procedure was repeated with 14 age groups, 13 tests, etc. The joining of adjacent periods was conducted in the same way, starting with six 5-year periods for suicides and two 5-year periods for attempted suicides.

A secondary test of hierarchical log-linear model for the new age groups and periods was performed.

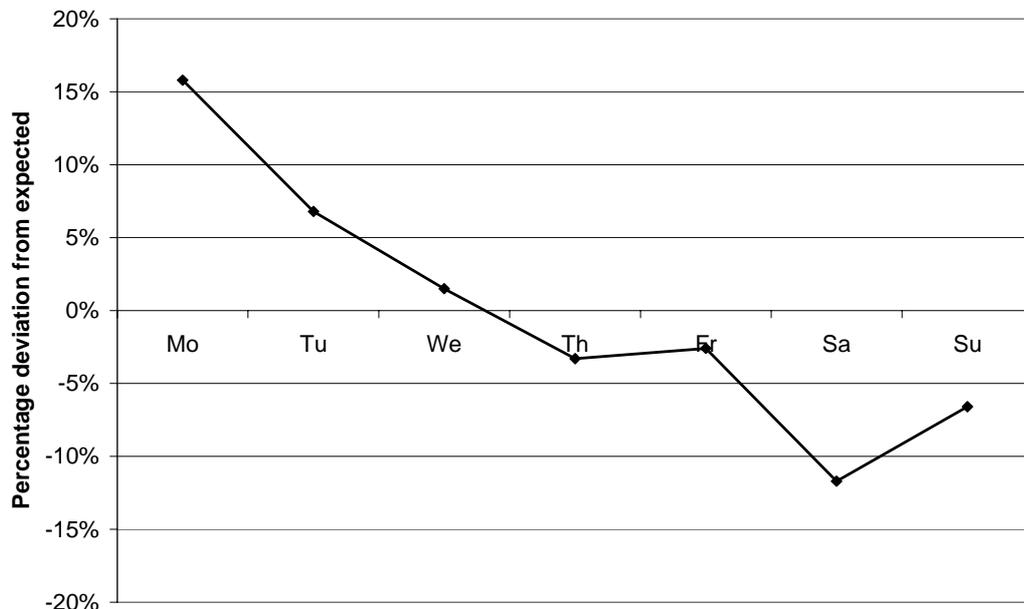
2. Analysis for holidays and media-events using a Poisson distribution

The number of suicides/attempted suicides is assumed to follow a Poisson distribution. The number of suicides in a holiday period is compared to other days within the same year, month and day of the week outside the period. The conditional distribution of the number of suicides is binomial and the addition theorem for binomial distributions allows aggregation of individual holidays. One- or two-tailed test of significance for each day in the period was applied.

Results

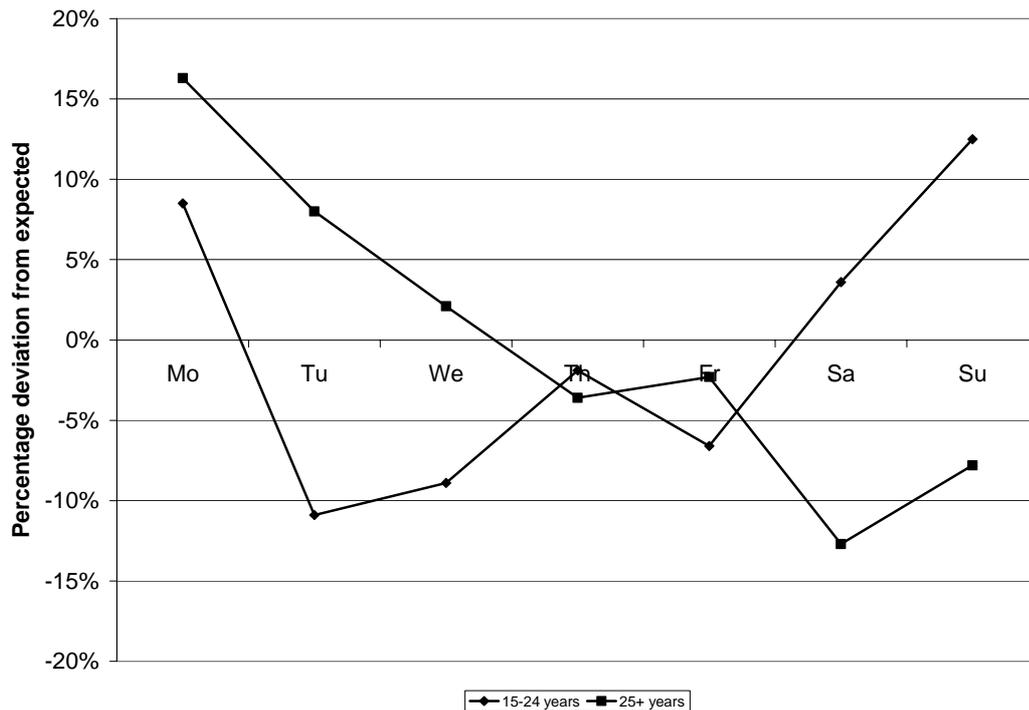
Our data showed a cyclic trend in the weekly distribution of suicide (χ^2 -test for equal distribution, $p = 0.000$). The suicide rate peaked on Monday (15.8% more suicides than expected) and declined during the week until Saturday, which was the low point (11.7% lower rate than expected) (figure 1).

Figure 1. Suicides by day of the week 1970-1998. Percentage deviation from expected



The initial screening procedure disclosed the influence of age on the weekly distribution, joining of adjacent age groups resulted in two age groups of 15-24 years and 25+ years (χ^2 -test for homogeneity of age groups, $p = 0.000$). Younger individuals (aged 15-24 years) tend to use the weekend more often than adults (age group 25+ years) to commit suicide (figure 2).

Figure 2. Suicides by day of the week 1970-1998. Age 15-24 years and 25 + years. Percentage deviation from expected



We also investigated whether attempted suicides did exhibit a weekly pattern, but failed to observe any clear weekly cycle.

The intra-monthly distribution is significant (χ^2 -test for equal distribution, $p = 0.000$) and exhibits a steadily decline during the month. A similar tendency was observed in attempted suicides. The first 14 days in each month were compared to the rest of the month. The pattern of increased suicide rate in the first half of a month is not universal, i.e. apparent throughout the year, but is particularly marked in December and January ($p = 0.000$), likely due to the effects of Christmas and New Year, and with a

similar tendency, less significant however, present in July ($p = 0.002$), maybe related to vacation periods (figure 3).¹

Figure 3. Intra-monthly distribution of suicides by month 1970-1998. Percentage deviation from expected (corrected for monthly distribution)

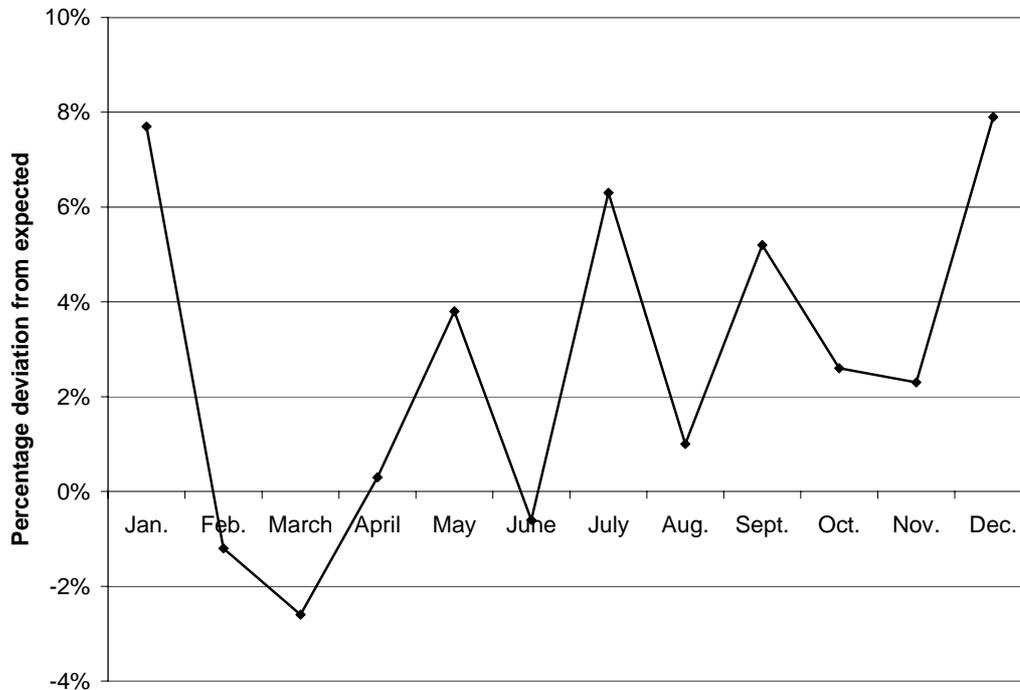


Figure 3 indicates that holidays probably have an effect on suicidal behaviour. The interpretation of increased suicide rates in the beginning of December and January as an effect of Christmas and New Year was strengthened by a day by day analysis of the period from December 15th to January 14th. This showed very clearly that there is a major decrease in suicide risk from December 15th to December 31st ($p < 0.05$, one-tailed for Dec. 23rd to Dec. 26th) compared to the first part of the month. Additionally, there is a major increase in suicide risk from January 1st to January the 14th ($p < 0.05$, one-tailed for January 1st to January 3rd and January 6th to January 8th).

We observed a significant distribution of suicides in the following holiday periods: Christmas, Easter, Praying Day², and Whitsun. For a more elaborate analysis and discussion of suicides around

¹ Figures 2 and 3 have previously been viewed and commented on by Gert Jessen when he was a member of the staff at Centre for Suicide Research, Denmark.

major Danish holidays, see Jessen & Jensen (1998). The exact opposite was true for attempted suicides, in that we observed a negative effect, non-significant, however, of holiday periods on attempted suicides (cf. Jessen et al., 1999b).

Our findings concerning the effect of elections on suicides are somewhat inconsistent. Figure 5 shows a significant suicidal death-dip on the days of national elections to the Danish Parliament (*Folketing*) ($p = 0.0080$), whereas the exact opposite is true for elections to the EU-parliament ($p = 0,0068$).

In addition to this, we examined the impact of e.g. royal events, the death of celebrities, foreign or domestic disasters, riots or major demonstrations, as well as wars, and significant national sport events on suicidal behaviour, but found none or small effects.

Discussion

The maximum of suicides in the beginning of the working week is a puzzling phenomenon. In order to offer an explanation to the ‘Monday effect’, Gabennesch (1988) published a psychosocial theory of a so-called “broken-promise effect”, i.e. a feeling of despair in the onset of a week due to the disappointment over a weekend, which was supposed to be a new psychological beginning but failed to be so. Thoughts of a weekend tend to stimulate hope or positive expectations in despondent individuals that if they can hold on until the arrival of the weekend, their distress will actually be ameliorated or be completely relieved. Sadly, weekends often turn out not to be any different than the previous days. It seems as if a promise has been broken. The broken promise can have serious and detrimental effects on mental health, because the unmet expectations may lead to a greater sense of deprivation in the suicidal person, when he or she fails to find any psychological relief at these times. According to Gabennesch (1988), the person might sink further into hopelessness and consequently fall below the suicide threshold, impelling him or her to take action, when the disappointing weekend is over. This hypothesis is a guiding thought in the present study.

² Praying Day is a specific Danish tradition, originally started in 1686 as an accumulation of already existing days of prayer and penance.

The “Monday effect” seems to be a global phenomenon. Hassan (1994) found a distinct weekly cycle in the incidence of suicide in Australia: for men peaking on Mondays (and Tuesdays), with a decline throughout the week to a trough on Saturdays; for women peaking on Mondays (and Fridays), and with lowest average of suicides on Wednesdays. He thus observed a gender difference, in that the pattern seemed to be more pronounced for men than women. We found no difference between males and females in relation to the weekly distribution of suicides and neither did Maldonado & Kraus (1991), who reported a consistent pattern peaking on Mondays for both sexes and for most age groups.

As far as age differences are concerned, Frank & Lester (1988) observed a peak in suicide completions on Sundays for adolescents and young adults in the United States. Our data shows precisely the same tendency (figure 2): the incidence of suicide among younger individuals aged 15 to 24 years peaks on Sundays. This might be partly attributed to the drinking pattern of this age group in Denmark. Similarly, we might speculate that the peak in suicide incidence around January 1st (figure 4) can be attributed to increased alcohol consumption as well as to negative thoughts about the end of the holiday season and dim prospects of returning to everyday life and overwhelming workloads. Gabennesch (1988) has associated the prospect of a new beginning with increased suicide risk in vulnerable persons.

In the present study, our data suggests that the incidence of suicide is below average before and during holidays but rises significantly after the holidays. This finding is in accordance with previous research. In their examination of suicides around national holidays, Phillips & Liu (1980) found the incidence of suicide to be much lower than expected prior to and during holidays but significantly higher than expected on the first and second day following the holiday. This was confirmed by a comprehensive European study on attempted suicide (Jessen *et al.*, 1999b), as well as a British study on deliberate self-harm (Cullum *et al.*, 1993) and a Japanese study on suicides (Nishi *et al.*, 2000). Similarly, in the USA, Phillips & Wills (1987) observed a reduction in the suicide rate a few days before and during all holidays, which led them to divide holiday periods into two types: One set of holidays, e.g. Christmas, Whitsun and Easter, seemed to be related to low risk of suicide before, during and after the holiday, whereas another set of holidays, e.g. New Year’s Day, apparently were

associated with a low risk of committing suicide before the holiday and a markedly higher risk immediately afterwards. We might speculate that people with low tolerance for frustrated expectations may be especially vulnerable to the effects of the latter type of holidays. The theory of broken-promises can be supported by cognitive research on suicidal persons. Cognitive distortions, such as dichotomous thinking and overgeneralization, possibly associated with increased vulnerability to the “broken promise effect”, have been linked to suicidal ideation (Noble, 1996). Dichotomization might exaggerate the possibility of a new (psychological) beginning to be brought by a holiday or a social event and as a consequence enhance the feeling of despair when expectations remain unfulfilled. Furthermore, overgeneralization may lead the despondent individual to the conclusion that relief from depression will never occur. Especially vulnerable individuals thus tend to build up utopian, grandiose and unrealistic expectations towards holidays, social events, and elections which cannot be fulfilled, resulting in frustration, disappointment and ultimately hopelessness, which recently have been shown to be strongly correlated with suicidal behaviour (Lester, 1992).

In the present study, we found that the protective effects of holidays were only present in major holidays, such as Christmas, with a consistently lower incidence of suicide than expected. The reason for the occurrence of fewer suicides than expected on major holidays can be attributed to several factors: On one hand, it may be easier to repress troublesome and suicidal thoughts during times of greater social intercourse and social support. On the other hand, people tend to audit their lives more intensively and decisively during periods of leisure, e.g. vacations or holidays (Wenz, 1977). Our findings, thus, suggest a more dialectic approach to the holidays, reviewing their positive and negative consequences simultaneously. Particularly Christmas is interesting in this context. We found a significantly lower incidence of suicides than expected before and during Christmas (figure 4). In accordance with this observation, Masterton (1991) reported a 19% lower rate in female suicide attempters in December, which he attributed to the socio-emotional effects of Christmas. The sociological impact of Christmas on Christian societies is an apparent reduction in the suicide rate a few days before and during the Christmas holidays, likely due to increased social integration, as Durkheim hypothesized. An obvious sociological explanation for the December nadir is that the

increased level of emotional and social support this time a year may act as a buffer in regard to suicidal behaviour. This protective effect persists for several days after Christmas. A similar death-dip pattern has been observed in attempted suicides in Scotland following World Cup football finals (Masterton & Strachan, 1987). The postponement of suicidal behaviour might be related to positive expectations that the social and societal ceremonies will bring joyful, pleasant, uplifting experiences (Phillips & Liu, 1980).

The findings in the present study indicate a protective effect of national elections on suicidal behaviour. Durkheim's hypothesis of social integration as possibly providing some kind of insulation from suicide was also ventured by Phillips & Feldman (1973), who observed a suicidal death-dip during presidential election years in the United States. Likewise, fairly recently, Masterton & Platt (1989) found a possible effect of general elections on attempted suicides in Scotland, with the interesting twist that election of a Labour government was associated with reduced number of attempts, whereas the opposite was the case for an elected Conservative government, although the effect was brief. The interesting finding that the Danish suicide rate increases before and on the day of election to the European Union (EU) might be attributed to the general mistrust and scepticism many Danes hold in regard to the EU. Elections to the EU-parliament possibly do not increase social integration or social cohesion. The effect of the strength of political integration has often been measured using voting turnout and closeness of the elections as indicators (Schultz & Bazerman, 1980). The voting turnout among the Danes is relatively poor in regard to EU-elections (Borre, 1997).

Furthermore, the death of celebrities or major public figures, i.e. individuals who are well known and recognized by name and pictorial image by the larger public (Wasserman, 1984), has also been shown to have an influence on suicidal behaviour. Many sociologists have made clear that deaths are social losses, not just personal ones (Pargament, 1997). While mortality of cultural icons weakens the social structure, in the face of threat groups or nations tend to come together to reassert solidarity, as Durkheim (1961[1915]: 447-448) observed: "Since they weep together, they hold to one another, and the group is not weakened, in spite of the blow which has fallen upon it ... The group feels its strength gradually returning; it begins to hope and to live again". Recently Hawton *et al.* (2000) found an

increased frequency of suicide, particularly among females aged 25-44, during the month following the funeral of Diana, Princess of Wales. This apparently discredits the Durkheimian hypothesis that greater social cohesion should result in a decline in the incidence of suicide. However, we found none or only small effect of deaths of cultural icons on suicidal behaviour in Denmark.

Limitations and alternative explanations

MacMahon (1983) speculated that the high incidence of suicide on Mondays could – at least in part – be an artifact of suicidal deaths occurring over the weekend but without being discovered or recorded until Monday. On the other hand, he noted that the steady decline in suicides from Monday throughout the week argued against this interpretation. Similarly, Phillips & Feldman (1973) discuss an alternative interpretation of the death-dip phenomenon, namely *the effect of misregistration*, i.e. the disruption and postponement of the activities of medical or legal officials because of an impending societal event. Attempted suicides may also very well be spread out throughout the week. Danish doctors in private practice do not work weekends or holidays and, thus, would the suicide attempts, which normally would be covert become registered in hospitals in the weekends and on holidays and, hence, appear in the statistics. While it might be true that many medical centres are not open on holidays or weekends and that this may cause time lag between suicidal death or attempt and the confirmation of it, we find it somewhat unlikely to be an explanatory factor to the “Monday effect”.

Because this study employs aggregate data, it is difficult to test the psychosocial theory of broken promises adequately. Aggregation bias is an often cited methodological problem in using suicide statistics. It should be noted that in analyzing aggregate data there always is a subtle danger of an *ecological correlation fallacy*, i.e. making individual-level inferences from aggregate findings. However, as Pescosolido & Mendelsohn (1986: 81) concludes, “aggregate data can be used to make inferences about the effects of social structure on group behaviour as long as the theory, hypotheses and data are organized at the same level of aggregation”.

Exceptionally small sample size may likely lead to lack of power in statistical significance tests or to a Type II error, i.e. the ‘no association’ finding between suicidal behaviour and holidays. Nakamura et

al. (1994) found no association between attempted suicides in adolescents and holidays, possibly due to this phenomenon. However, because of the large sample size in the present study, it is unlikely that our findings are affected by this type of error.

Conclusion

Our empirical findings provide a replication of two key findings in previous research – the rise in suicides in the beginning of the working week and that holidays seem to have a postponing effect on suicide. Especially Christmas appears to possess a prophylactic effect in regard to suicide. December, with its gloomy and rainy winter days, is thought of by many as a psychologically troublesome month when problems, unresolved family conflicts, and loneliness might trigger suicide ideations and acts. In spite of this, studies tend to reveal that the suicide rate in December is remarkably lower than expected in almost all countries (Massing & Angermeyer, 1985). The findings, that Monday is the day of the week when most suicides occur, and that suicides are much more common the first few days after a major holiday than they are during and in the days immediately before the holiday, can to some extent be explained qua a psychosocial theory of broken-promises. According to our findings, the fluctuations are large enough to be useful in adequately staffing preventive and mental health services.

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