Social support and suicide in Japanese men and women e The Japan Public Health Center (JPHC)-based prospective study (Journal of Psychiatric Research)

Kalpana Poudel-Tandukar, University of Massachusetts - Amherst
Akiko Nanri
Tetsuya Mizoue
Yumi Matsushita
Yoshihiko Takahashi, et al.

Available at: https://works.bepress.com/kalpana-poudel-tandukar/19/
Social support and suicide in Japanese men and women – The Japan Public Health Center (JPHC)-based prospective study

Kalpana Poudel-Tandukar, Akiko Nanri, Tetsuya Mizoue, Yumi Matsushita, Yoshihiko Takahashi, Mitsuhiro Noda, Manami Inoue, Shoichiro Tsugane

A B S T R A C T

Although the important role of social support in mental health is acknowledged, no prospective study has yet examined the relation of social support to suicide. Here, we investigated the association between social support and suicide in a cohort of Japanese men and women. A total of 26,672 men and 29,865 women aged 40–69 years enrolled in the Japan Public Health Center-based prospective study in 1993–1994, completed a self-administered questionnaire which included four items of social support, and were followed for death through December 2005. Hazard ratios (HRs) and 95% confidence intervals (95% CI) of suicidal death by social support index were estimated using a Cox proportional hazards regression model. A total of 180 suicidal deaths were recorded during an average of 12 years’ follow-up. Men and women with the highest level of social support had a significantly decreased risk of suicide, with HRs (95% CI) for the highest versus lowest social support group of 0.56 (0.33–0.94) and 0.38 (0.16–0.89) in men and women, respectively. Esteem support and having four or more friends were associated with a lower risk of suicide in both sexes [men: 0.56 (0.36–0.88); women: 0.65 (0.32–1.30)], respectively, whereas confident support was not. These findings suggest that social support may be important for suicide prevention. Avoiding social isolation may decrease the incidence of suicide in men and women, and esteem support can provide additional benefit for women.

Keywords: Suicide, Social support, Longitudinal study, Japan

1. Introduction

Studies have suggested that social support has a beneficial effect on mental health (Hefner and Eisenberg, 2009; Wilcox et al., in press; Zhang et al., 2010). Among mechanisms, social support may alleviate the impact of stress appraisal by providing a solution to problems, reducing the perceived importance of a problem, and tranquillizing the neuroendocrine system so that the individual is less reactive to perceived stress (House, 1981). Social support may exert a direct effect by diminishing the negative effects of stressors (Cohen and Wills, 1985; Glantz et al., 1997) and an indirect effect by providing both emotional support and tangible resources to deal with life crises (Cohen and Wills, 1985).

Epidemiological studies using different definitions of social support have concluded that the presence of low perceived social support is associated with increased depression (Hefner and Eisenberg, 2009; Vilhjalmsson et al., 1993; Kendler et al., 2005) and suicide attempts (Wilcox et al., in press; Kaslow et al., 2005; Compton et al., 2005; Harris and Molock, 2000; Arria et al., 2009) among various population groups. In relation to suicide, two case-control psychological autopsy studies in China (Zhang et al., 2004, 2010) based on information collected from proxy informants of suicide victims reported a decreased risk of suicide with increased social support. However, no prospective study has examined the association between social support and death from suicide.

Here, we investigated the association between social support and death from suicide in a Japanese population, in which the death rate from suicide is already very high (27.0 per 100,000 in 2006) (National Police Agency, 2005; Ministry of Health, Labour and Welfare, 2005), by using data of the Japan Public Health Center-based prospective study.

2. Method

2.1. Study cohort

The Japan Public Health Center (JPHC)-based prospective study is a population-based cohort study conducted among 54,498 residents who registered their address in 14 administrative districts supervised by 4 public health center (PHC) areas in Cohort I (1990), and among 62,398 residents who registered their address in 13 administrative districts supervised by 5 PHC areas in Cohort II (1993). The study design has been described in detail elsewhere (Tsugane and Sobue, 2001).

The present study was conducted in Cohort II because items on social support were not included in Cohort I. The age of the study subjects was 40–69 years. Of 78,632 eligible subjects, 63,113 (80.2%) responded to the baseline questionnaire survey in 1993–1994. We excluded those subjects who did not have information on social support (n = 6576). Finally, 56,537 subjects (26,672 men, 29,865 women) were included in our analysis. The study protocol was approved by the Institutional Review Board of the National Cancer Center, Japan.
2.2. Assessment of social support

The study participants completed a self-administered questionnaire, which included queries on social support, living arrangements, lifestyle, anthropometric, and socio-demographic characteristics. Social support was measured by indices of three types of social support: esteem support, confidant support, and social isolation. Esteem support was assessed by a single item: “Do you have someone who is supportive of your opinions and actions? (yes or no)” Confidant support was assessed by two items: “Do you have someone that you feel safe and comfortable with? (yes or no)” Social isolation was defined as not having a friend whom the respondent knew well enough to meet at least once per week, and was assessed by the item: “How many friends do you meet at least once per week: none, one to three friends, or more than four friends?” These four items were combined to create an overall index of social support according to a method described elsewhere (Ikeda et al., 2008). Questions with yes/no responses were scored 1/0, whereas the question with three response categories was scored from 0 (“none”) to 2 for the highest category. The overall index of social support had a range of 0 (lowest level of social support) to 5 (highest level). The index has acceptable internal consistency reliability, with a Cronbach’s coefficient of 0.68.

2.3. Follow-up and identification of suicide

The study subjects were followed until December 31, 2005. The residential registry in each area was reviewed annually to obtain information on changes in residence status, including survival. The status of subjects who had moved out of the study area was assessed through the municipal office of the area to which they had moved. Mortality data for persons in the residential registry are forwarded to the Ministry of Health, Labour and Welfare and are coded for inclusion in the National Vital Statistics.

Information on deaths for subjects who remained in their original area was obtained from their public health center (PHC), and for subjects who died after moving from their original PHC area from death certificates maintained by the Ministry of Health, Labour and Welfare, Japan. Information on the cause of death was obtained from the death certificate, as provided by the Ministry of Health, Labour, and Welfare with the permission of the Ministry of Internal Affairs and Communications. Death from suicide is defined according to the International Classification of Diseases, 10th Revision (ICD-10), as codes X60–X84.

2.4. Statistical analyses

The number of person-years in the follow-up period was calculated from the date of response to the baseline questionnaire to the date of death or December 31, 2005, whichever came first. Hazard ratios and 95% confidence intervals (CI) were calculated for the social support index and the categories of social support for men and women separately using Cox proportional hazards models, with the “low” social support index and “no” social support, respectively, as references. Dummy variables were created for missing data and body mass index (BMI) <14 or ≥40 kg/m².

We initially calculated hazard ratios for suicide risk with adjustment for age at baseline (continuous) in model 1. In the final multivariate model 2, we further adjusted for study area (11 public health center areas), self-reported stress (mild, moderate, and severe), BMI (<21, 21 to <23, 23 to <25, 25 to <27, or ≥27 kg/m²), alcohol consumption (nondrinker, occasional drinker, or drinker with a consumption of <150, 150–299, 300–449, or ≥450 g ethanol/day for men; and nondrinker, occasional drinker, or drinker with a consumption of <150 or ≥150 g ethanol/day for women), smoking (lifetime nonsmoker, former smoker, or current smoker with a consumption of <20 or ≥20 cigarettes/day), lifetime physical activity (<1 day/month, 1–3 days/month, or >1 day/week), history of any chronic disease such as cancer, cerebrovascular disease, ischemic heart disease, and chronic liver disease (yes, no), current regular drug use prescribed by a doctor (yes, no), unemployment (yes, no), and living arrangements (living with spouse (yes, no) for men; living only with parents (yes, no) and living with spouse and child (yes, no) for women). The category of living arrangements adjusted in the sex-specific model was based on our previous study findings among the same Japanese cohort that men living without a spouse and women living with a parent(s) only were at increased risk of suicide whereas women living together with a spouse and child(ren) were at decreased risk of suicide (Poudel-Tandukar et al., in press).

We tested trends across the social support index using the ordinal numbers 0–2 assigned to the social support index categories. We also conducted stratified analyses according to age group (40–59 years and 60–69 years). All reported p values are two-sided, and significance level was set at p < 0.05. All statistical analyses were performed with SAS software version 9.1 (SAS Institute, Inc., Cary, NC).

3. Results

A total of 127 and 53 suicide cases were recorded during 315,031 and 365,304 person-years of follow-up in men and women, respectively. Subjects were categorized into three levels of social support based on the distribution of our combined index: low (scores of 0–3, 29%), medium (score of 4, 43%), and high (score of 5, 28%).

3.1. Suicide risk factors by social support index

The distribution of suicide risk factors across social support index by sex is presented in Table 1. Among men, lower social support was associated with younger age, lower body mass index, less current drinking, less physical exercise, higher perceived stress, higher history of chronic disease, and higher unemployment rate. Among women, lower social support was associated with younger age, lower body mass index, less physical exercise, and higher perceived stress.
3.2. Sex-specific suicide risk by social support index

Table 2 shows the HRs of death from suicide according to level of social support by sex. Men and women with the highest level of social support had 44% and 62% less risk of death from suicide, respectively, in the multivariable-adjusted models (p for linear trend for men and women of 0.04 and 0.02, respectively). Table 3 shows the HRs of death from suicide according to the level of each constituent item making up the social support index by sex. Among men, confidant supports and esteem support were not significantly associated with death from suicide. Among women, no significant association was found between confidant supports and suicide. Women with esteem support had a 68% lower risk of death from suicide than those with no esteem support. Regarding social isolation, men and women with four or more friends had a 44% and 35% lower risk of death from suicide than those with fewer than four friends, respectively; this relationship was significant in men and not in women, albeit that a tendency was present.

3.3. Age-specific suicide risk by social support index

In stratified analyses by age, the overall significant protective effect against suicide of having four or more friends in men and esteem support in women remained significant in younger (40–59 years) but not in older age groups (60–69 years) (data not shown in the table). Specifically, the HR (95% CI) of suicide with four or more versus no or few friends in younger men was 0.38 (0.21–0.69), while that with having esteem support versus not having this support in younger women was 0.24 (0.08–0.70). In older groups, in contrast, HR (95% CI) of suicide with four or more versus no or few friends in men was 1.19 (0.58–2.48) and that with having versus not having esteem support in women was 0.63 (0.13–2.97). Sub-cohort sizes of the younger and older age groups were 19,233 and 7439, respectively, for men and 21,215 and 8650, respectively, for women, while the number of suicide cases in the younger and older groups was 90 and 37 in men, respectively, and 34 and 19 in women, respectively. The relationship between social support and suicide did not change when subjects with a history of chronic disease, or moderate or severe stress were excluded from analysis.

4. Discussion

In this large-scale, population-based, prospective study in Japan, we found that men and women with a high level of perceived social support had a reduced risk of suicide. With regard to social support type, we found a gender difference in association for esteem support. Having esteem support was independently and significantly associated with a reduced risk of death from suicide in women, but not in men. Having four or more friends was significantly associated with a reduced risk of death from suicide in men, while a similar tendency was observed in women, albeit without statistical significance. To our knowledge, this is the first population-based, prospective study to investigate the association between social support and suicide risk with control for a wide range of individual and lifestyle factors known to influence suicide risk.

We found that a higher level of social support was protective against suicide in both sexes. Two case-control psychological autopsy studies in China (Zhang et al., 2004, 2010), based on information collected from proxy informants of suicide victims, reported a decreased risk of suicide with increased social support. Several other studies have identified relationships between a lack of social support and depression (Vilhjalmsson, 1993; Kendler et al., 2005; Hefner and Eisenberg, 2009) or suicide attempts (Harris and Molock, 2000; Compton et al., 2005; Kaslow et al., 2005; Arria et al., 2009; Wilcox et al., in press), and both are considered to be
important precursors to later attempted and completed suicide (Conwell et al., 1996; Lewinsohn et al., 1996; Gili-Planas et al., 2001).

The present findings supporting a protective role of social support against suicide can be explained by reference to theoretical and biological perspectives. Theoretically, the social integration theory and symbolic interactionism theory note that a lack of social support results in meaninglessness and negative evaluations of self, which in turn increase the risk of mental problems (Vilhjalmsson, 1993). Biologically, social support may increase our sense of control over an environment that might dampen physiological arousal, strengthen immune responses, and promote healthy behavior to deal with life crises (Cohen and Wills, 1985).

Interestingly, esteem support had a strong protective effect against suicide among women but not in men in our study. We found no comparable data in the literature. A possible explanation for this esteem support-suicide association in women but not in men might be attributable to the gender difference in emotional involvement in social networks. Women are socially channeled toward nurturing others, one component of which is the provision of social support, and tend to have more emotionally intimate relationships than men (Belle, 1987). Compared to men, women tend to discuss topics with their close persons and seek help from people with whom they communicate their concerns (Stephens et al., 1978; McFarlane et al., 1981). Accordingly, women may psychologically benefit more strongly from socially supportive relationships than men (Elliott, 2001). More research is required to confirm whether having a person who gives support for one’s opinion and activity can improve mental status and thus decrease suicide risk in women.

Men and women with four or more friends were at decreased risk of suicide in the present study, although the association in women did not reach statistical significance. This result in women may reflect limited statistical power due to the small number (n = 53) of suicides in women over the study period. We are unaware of similar studies reporting a suicide risk in relation to number of friends. However, some studies have reported that having many friends was associated with less physical and psychological symptoms (Miller and Ingham, 1996) and greater happiness (Fischer and Phillips, 1982) as compared to not having friends. These data support the notion that having a greater number of friends is a marker of good mental health status, and leads to a lower risk of suicide in later life.

The major strengths of the present study are its population-based prospective design, large sample size, gender-specific analysis, and adjustment for potential confounding variables. Several methodological limitations also warrant mention. First, social support was assessed through simple questions related to emotional support and social isolation. We did not have information on other aspects of social support, such as instrumental, appraisal, and informational support that may also affect relations. However, studies have suggested that emotional support is probably the most important type of social support for mental health (Berkmann and Glass, 2000; Lin and Peek, 1999; Turner, 1999). Second, we used social support measured at the baseline survey only, and thus could not assess the effect of changes in social support during the study period on suicide risk. The onset, recurrence, or chronicity of one or more mental disorders may bring a change in social support. Third, random variation in social support measurement probably led to attenuation of the magnitude of the association. Fourth, the JPHC study did not collect information on depression, which may influence both social support and suicide risk. We did adjust for those variables measured in the study cohort which are known to influence suicide risk, for example the level of stress and other socio-economic and lifestyle variables. Fifth, we cannot exclude the possibility of confounding by unmeasured factors such as anxiety disorders, personality disorders, psychoses, substance use disorders, and negative emotion. Sixth, the quality of cause-of-death coding and the completeness of the ascertainment of suicide cases might be of concern. However, death registration is compulsory in Japan and deaths are recorded on the death certificate by medical personnel. Further, Japanese society's attitude toward suicide has been termed “tolerant,” and on many occasions a suicide is seen as a morally responsible action (Ozawa-de Silva, 2008). Given this, we assume that suicide cases are unlikely to be underreported, but if present, any underreporting was unlikely to have affected the results because the recording system remained unchanged throughout the study period. Seventh, the quality of the self-reported medical history of chronic disease might also be of concern. Although validation has not been done for all reported chronic diseases, validation studies conducted in study cohorts with a few chronic diseases reported sensitivity data of 83% for

---

**Table 3**

Cox proportional hazard ratios and 95% confidence intervals of suicide with social support types.

<table>
<thead>
<tr>
<th></th>
<th>Confident support&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Esteem support</th>
<th>Confident support&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Social isolation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Men</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number at risk</td>
<td>20,756</td>
<td>5916</td>
<td>22,675</td>
<td>3997</td>
</tr>
<tr>
<td>Person-years</td>
<td>245,584</td>
<td>69,447</td>
<td>268,532</td>
<td>46,498</td>
</tr>
<tr>
<td>Number of suicides</td>
<td>99</td>
<td>28</td>
<td>100</td>
<td>27</td>
</tr>
<tr>
<td>Model 1</td>
<td>1.38 (0.84–2.28)</td>
<td>1.00 (Reference)</td>
<td>0.86 (0.37–1.15)</td>
<td>1.00 (Reference)</td>
</tr>
<tr>
<td>Model 2</td>
<td>1.44 (0.87–2.40)</td>
<td>1.00 (Reference)</td>
<td>0.71 (0.41–1.26)</td>
<td>1.00 (Reference)</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number at risk</td>
<td>25,442</td>
<td>4423</td>
<td>26,595</td>
<td>3270</td>
</tr>
<tr>
<td>Person-years</td>
<td>311,205</td>
<td>54,099</td>
<td>325,445</td>
<td>39,858</td>
</tr>
<tr>
<td>Number of suicides</td>
<td>43</td>
<td>10</td>
<td>40</td>
<td>13</td>
</tr>
<tr>
<td>Model 1</td>
<td>1.22 (0.53–2.83)</td>
<td>1.00 (Reference)</td>
<td>0.31 (0.13–0.73)</td>
<td>1.00 (Reference)</td>
</tr>
<tr>
<td>Model 2</td>
<td>1.10 (0.47–2.58)</td>
<td>1.00 (Reference)</td>
<td>0.32 (0.13–0.77)</td>
<td>1.00 (Reference)</td>
</tr>
</tbody>
</table>

Model 1: age at baseline (continuous) adjusted in the model.

Model 2: age at baseline (continuous), areas (PHCs), self-reported stress (mild, moderate, and severe), BMI (< 21, 21 to < 23, 23 to < 25, 25 to < 27, or ≥ 27 kg/m²), smoking (lifetime nonsmoker, former smoker, or current smoker with a consumption of < 20 or ≥ 20 cigarettes/day), alcohol consumption (nondrinker, occasional drinker, or drinker with a consumption of < 150, 150–299, 300–449, or ≥ 450 g ethanol/day for men; and nondrinker, occasional drinker, or drinker with a consumption of < 150 or ≥ 150 g ethanol/day for women), leisure-time physical activity (< 1 day/month, 1–3 days/month, or ≥ 1 day/week), history of any chronic disease (yes, no), and unemployment (yes, no), living arrangements (living with spouse (yes, no); for male) and living only with parents or living with spouse and child (yes, no; for female) were adjusted in the model.

<sup>a</sup> Having someone who you can share intimate feelings and secrets with.

<sup>b</sup> Having someone who you can share intimate feelings and secrets with.
diabetes (Kato et al., 2009), 73% for stroke, and 82% for myocardial infarction (Yamagishi et al., 2009). Importantly, the relationship between social support and suicide did not change when we excluded subjects with a history of chronic disease. Finally, the conclusions drawn from the subgroup analyses might be due to chance, and should thus be interpreted with caution. For example, the age-specific analysis in women showed an inverse relationship between social support and suicide in both younger and older age groups, but without statistical significance in the older group, which recorded only 19 cases of suicide. It therefore remains unclear whether suicide risk associated with esteem support differs by age.

In conclusion, the present study suggests that social support is protective against suicide in Japanese men and women. More specifically, avoiding social isolation may decrease suicidal risk in men and women, and esteem support might provide an additional benefit for women.

References


Vilhjalmsson R. Life stress, social support and clinical depression: a reanalysis of the literature. Social Science and Medicine 1993;37:331–42.


