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Research report

Prevalence of suicide attempters in emergency departments in Japan: A systematic review and meta-analysis

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ABSTRACT

Background: The number of hospital admissions related to suicide attempts is increasing worldwide. The Emergency Department (ED) is recognized in Japan as an opportunity to intervene with suicide attempters however, the prevalence of suicide attempters in the ED is unknown. Therefore, a meta-analysis was conducted to provide this information.
Methods: We conducted searches of databases (PubMed, PsycINFO, CINAHL, ICHUSHI, CiNii) to identify studies about suicide attempters in the ED in Japan. A meta-analysis was used to calculate the pooled prevalence proportion of suicide attempters in the ED, and their prevalence proportion of psychiatric disorder and method of suicide in suicide attempters.
Results: The search of Japanese studies identified 3338 records, of which 70 were included in the meta-analysis. A total of 25 studies reported the psychiatric diagnosis and 62 studies reported the method of suicide. The pooled prevalence proportion of suicide attempters was 4.7%. Mood disorders were the most frequent psychiatric disorders (ICD: 30%, DSM: 35%), and poisoning was the most frequent method of attempting suicide (52%).
Limitations: There might be a publication bias because only published studies were included. There also might be an information bias, such as reporting bias or misclassification, because most of studies included in the analysis used retrospective designs.
Conclusions: The results provide clear evidence of the prevalence of suicide attempters in the ED in Japan. The results indicate that suicide attempters in the ED have a higher proportion of mood disorders, and that the most common method of suicide is poisoning.

1. Background

It is widely recognized that prior suicide attempts and a history of non-suicidal, self-harm behaviors are risks for death by suicide and repeated self-harm behaviors (Ekeberg et al., 1991; Isometsa and Lonnqvist, 1998; Nielsen et al., 1990; Nordstrom et al., 1995; Beautrais, 2004). For suicide attempters, the emergency department (ED) frequently functions as the primary, or sole point of contact with the health care system (Kurz and Moller, 1984; Talor and Stansfeld, 1984). In recent years, the number of hospital admissions attributable to attempted suicides and self-inflicted injuries has been increasing worldwide.

In the UK, it has been estimated that approximately 220,000 patients with self-inflicted injuries visit hospitals annually (Hawton et al., 2007). The average number of ED visits for attempted suicide and self-inflicted injuries, per year, in the United States of America (US) more than doubled from approximately 244,000 in 1993–1996 to 538,000 in 2005–2008 (Ting et al., 2012a). A national registry study in Ireland reported that the increased rate of deliberate self harm among Irish men in 2008 and 2009 coincided with the advent of the economic recession in Ireland (Perry et al., 2012).

A national US survey estimated there were approximately 412,000 annual ED visits for attempted suicide and self-inflicted injury during the 5-year period between 1997 and 2001, which was 0.4% of all ED visits (Doshi et al., 2005). The data were obtained from the National Hospital Ambulatory Medical Care Survey in the US, which is a national probability sample of ED visits.

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The suicide rate in Japan at approximately 25.0 per 100,000 individuals is the highest among developed countries (National Police Agency, 2012; World Health Organization, 2012). Therefore, ED visits are increasingly recognized in Japan as an opportunity for psychiatrists and clinical psychologists to intervene with suicide attempters. Indeed, the care of suicide attempters is specifically emphasized in the General Principles of Suicide Prevention Policy (GPSP), which was adopted in Japan (Cabinet Office, Government of Japan, 2007, 2012). Given this situation, a number of small studies have examined the prevalence of suicide attempters in the ED, as shown in the result section of this manuscript. However, the prevalence of suicide attempters among all individuals in the ED is still unknown in Japan.

Therefore, in this study, we conducted a systematic review and meta-analysis of the prevalence of suicide attempters among all individuals who are treated at the ED in Japan. In addition, the study examined: (a) the prevalence of psychiatric disorders among the suicide attempters; and (b) the methods of suicide.

2. Methods

2.1. Search strategies

We searched for published studies related to suicide in the following electronic databases, from their inception to March 2013: PubMed (from 1949), PsycINFO (from 1806), and CINAHL (from 1981). The search phrase was: ((suicid*) OR (self-harm*) OR (self harm*)) AND ((emergency) OR (critical care)) AND (japan*).

Two additional databases were also searched: ICHUSHI (from 1983) and CiNii (from 1881). ICHUSHU (http://search.jamas.or.jp/) contains bibliographic citations and abstracts from biomedical journals and other serial publications published in Japan. CiNii (http://ci.nii.ac.jp/) provides information about academic articles published in academic society journals, university research bulletins or articles included in the National Diet Library's Japanese Periodicals Index Database and other databases. Since these two databases are electronic databases in Japanese, we used comparable Japanese search terms without the term (japan*) to search them. In addition, we examined the list of references included in the articles.

2.2. Definition of terms used in this study

The terminology for suicide attempt and self-harm has been inconsistent (Hawton et al., 2012). Therefore, we defined suicide attempters as individuals who survived a suicide attempt or self-harm, and our definition of suicide attempt included self-harm.

2.3. Inclusion criteria

We included studies if they met the following inclusion criteria: (1) All participants had been treated at an emergency department because of a suicide attempt; (2) The study was conducted in Japan; and (3) The study was an original article.

2.4. Exclusion criteria

We excluded studies if they met the following exclusion criteria: (1) The number of all individuals treated at the ED was not described in manuscripts; (2) The subjects included only psychiatric patients with specific psychiatric diagnoses and specific methods of suicide.

2.5. Review process

All records that were identified from searches of the electronic databases and hand searches were loaded into the ENDNOTE software version X5 (Thomson Reuters, USA). After the records were loaded, we removed duplicate records and all the authors independently screened the titles and abstracts to identify potentially eligible studies. Then, articles that were potentially eligible for inclusion in the review were obtained and independently assessed for inclusion by all authors. In cases of disagreement, a decision was reached by mutual consent after discussion.

2.6. Extraction of data

All authors independently extracted data about the number of total individuals in the ED, suicide attempters, and psychiatric diagnosis. The diagnoses were classified in the studies, according to International Statistical Classification of Diseases and Related Health Problems (ICD, WHO) or the Diagnostic and Statistical Manual of Mental Disorders (DSM, APA), including the Mini-International Neuropsychiatric Interview (MINI) and the Structured Clinical Interview for the DSM-IV (SCID). We also extracted data about the method of suicide mentioned in the studies. Any disagreements about extraction of data were resolved by consensus after discussion.

2.7. Data synthesis and statistical analysis

Our primary outcome was the pooled prevalence proportion of suicide attempters in all individuals treated at the ED. The pooled prevalence proportion of deaths after admission to the ED was also calculated. Additionally, we calculated the pooled prevalence proportion of psychiatric disorder according to the ICD and the DSM in suicide attempters.

Using the ICD classification, we identified and extracted the data for: F1 disorders (mental and behavioral disorders due to psychoactive substance use), F2 disorders (schizophrenia, schizotypal and delusional disorders), F3 disorders (mood disorders), F4 disorders (neurotic, stress-related and somatoform disorders), F5 disorders (behavioral syndromes associated with physiological disturbances and physical factors), F6 disorders (disorders of adult personality and behavior). We identified substance-related disorders, schizophrenia, mood disorders, adjustment disorders, anxiety disorders, eating disorders, and personality disorders, according to the DSM from the extracted data. We did not divide the data into subcategories among the psychiatric diagnosis in the ICD and DSM, because some studies had few data about the subcategories among the psychiatric diagnoses.

Furthermore, we calculated the pooled prevalence proportion of method of suicide in suicide attempters. We identified the data about poisoning, cutting, jumping, hanging, and burning from the extracted data. The meta-analysis and related statistical analyses were carried out with the StatsDirect statistical software version 2.7.9 (Cheshire, UK). We calculated the pooled prevalence proportion and its 95% confidence intervals (CIs) with a fixed effects model and a random effects model (DerSimonian and Laird, 1986). If the heterogeneity was low, we used a fixed effects model to calculate the pooled prevalence proportion. Otherwise, we used a random effects model. We used the I^2 statistic and its 95% CIs to estimate heterogeneity. The I^2 was considered to be low when it was 0–24% (Higgins et al., 2003). We performed subgroup analysis by hospital type (university or others) or urban density (rural or urban areas).

2.8. Literature review of previous studies in other countries

We conducted a literature review with PubMed to compare our findings with previous studies in other countries. We identified the prevalence proportions of suicide attempters in the ED from selected articles identified by the literature review.

3. Results

3.1. Searches and article selection

The search strategy identified 3338 records for potential inclusion in the study (Fig. 1): PubMed (n=171), PsycINFO (n=28), CINAHL (n=5), ICHUSHI (n=2784), CiNii (n=346), and hand-searching (n=4). After reviewing the abstracts, the full texts of 205 articles were obtained for further assessment of their eligibility. Eventually, 70 studies that were determined to be eligible were included in the meta-analysis.

3.2. Prevalence of suicide attempters

We identified a total of 70 studies that described the number of suicide attempters in the ED. The pooled prevalence proportion of suicide attempters in the ED was 4.7% (95% CI=4.0–5.6) for the 70 studies, which included 1,319,848 individuals in the ED (Table 1). The heterogeneity was I^2=99.8% (95% CI=99.8–99.8). The prevalence proportion of suicide attempters in the 70 studies did not vary by hospital type or urban density. The pooled prevalence proportion of suicide attempters who died at the ED was 0.7% (95% CI=0.5–0.8) for 50 studies, which included 997,517 individuals in the ED. The heterogeneity was I^2=98.4% (95% CI=98.3–98.5).

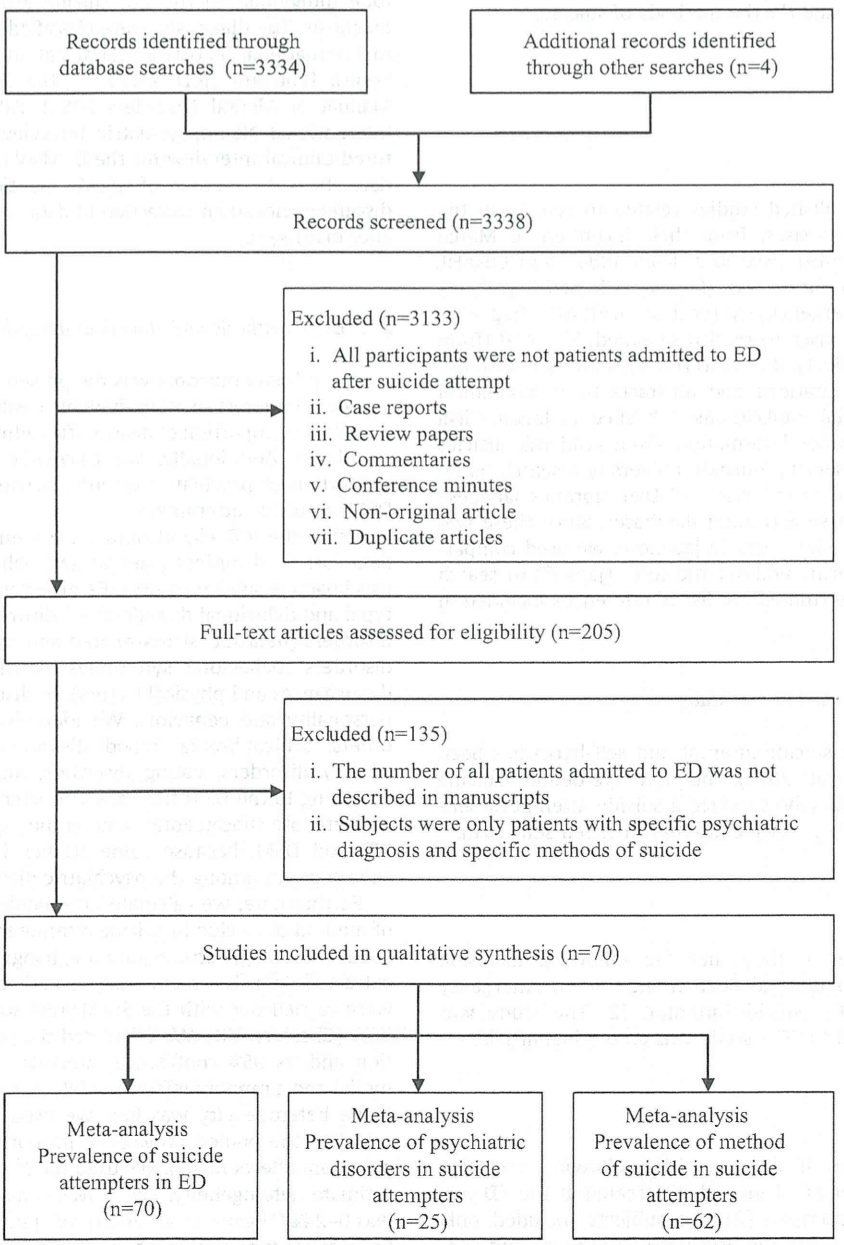

Fig. 1. Flowchart of the process of selecting studies for inclusion.

Table 1
Pooled prevalence of suicide attempters in the ED.

	Number of studies	Pooled prevalence (95% CI)	Heterogeneity (95% CI)
Suicide attempters	70	4.7% (4.0–5.6)	99.8% (99.8–99.8)
Delayed death[a]	50	0.7% (0.5–0.8)	98.4% (98.3–98.5)

[a] Delayed death: suicide attempters who died after their admission to the ED.

Table 2
Pooled prevalence of psychiatric disorders among suicide attempters.

	Number of studies	Pooled prevalence (95% CI)	Heterogeneity (95% CI)
ICD[a]			
F1	14	4% (3–4)	0.0% (0–47.4)
F2	19	13% (12–14)	37.9% (0–63.1)
F3	19	30% (27–32)	78.8% (66.4–85.2)
F4	19	27% (24–31)	91% (87.9–93.0)
F5	5	–[c]	–[c]
F6	19	13% (11–16)	89.5% (85.6–92.0)
DSM[b]			
Substance-related disorders	4	14% (6–26)	96.1% (93.5–97.4)
Schizophrenia	6	19% (15–22)	79.4% (44.1–88.9)
Mood disorders	6	35% (24–46)	96.3% (94.5–97.2)
Adjustment disorders	4	28% (17–40)	96.7% (94.8–97.7)
Anxiety disorders	4	–[c]	–[c]
Eating disorders	2	–[c]	–[c]
Personality disorders	5	41% (24–60)	98.5% (98.0–98.8)

[a] **F1**: mental and behavioral disorders due to psychoactive substance use, **F2**: schizophrenia, schizotypal and delusional disorders, **F3**: mood disorders, **F4**: neurotic, stress-related and somatoform disorders, **F5**: behavioral syndromes associated with physiological disturbances and physical factors, **F6**: disorders of adult personality and behavior.
[b] DSM included the MINI and SCID-I, II.
[c] We did not calculate pooled prevalence proportion because of the small number of studies and the small sample sizes.

Fig. 1 of Supporting information shows the forest plot for the proportion of suicide attempters by study.

3.3. Psychiatric disorders among suicide attempters

We identified a total of 25 studies that described the prevalence proportion of psychiatric disorders (Fig. 1). There were 19 studies that used the ICD and 6 studies that used the DSM. Table 2 shows the pooled prevalence proportion and heterogeneity for the studies.

The top portion of Table 2 shows the pooled prevalence and heterogeneity measures for the studies that used the ICD. We identified 14 studies that included 7114 individuals in the ED with ICD-F1 disorders. As seen in Table 2, the pooled prevalence proportion of ICD-F1 disorders was 4%. See Supporting information for the forest plots for the proportion of ICD psychiatric disorders by study.

The next three rows of Table 2 show the pooled prevalence and heterogeneity for studies reporting data on ICD disorders F2–F4 in the ED. The measures were derived from 19 studies, which included 8633 individuals. The pooled prevalence proportions for these three ICD disorders were: 13% for F2, 30% for F3, and 27% for F4. As seen in the table, their heterogeneities were, respectively, 37.9%, 78.8% and 91%.

We identified 5 studies with ICD-F5 disorders, which included 1135 individuals in the ED. However, we did not calculate the pooled prevalence proportion of F5 disorders because the total number of cases with these disorders was rather small. The next row of Table 2 shows the pooled prevalence and heterogeneity for ICD-F6 disorders, which were derived from the same 19 studies as those for F2–F4.

Four of the six studies using the DSM included substance-related disorders among 1262 individuals in the ED. The pooled prevalence proportion was calculated to be 14% and the heterogeneity was 96.1%. See Supporting information for the forest plots for the proportion of DSM psychiatric disorders by study.

The pooled prevalence proportions of schizophrenia and mood disorders were 19%, and 35%, respectively, based on 6 studies that included 2352 individuals in the ED. The pooled prevalence proportion was nearly as high for adjustment disorders (28%), based on 4 studies that included 1994 individuals. The heterogeneity for these studies ranged from 79.4% to 96.7%.

We identified 2 studies that included eating disorders among 475 individuals and 4 studies including anxiety disorders among 1565 individuals in the ED. We did not calculate the pooled prevalence proportion of anxiety disorders or eating disorders because the total number of cases with these disorders was rather small.

Five studies using the DSM included patients with personality disorders among 2149 individuals in the ED. The pooled prevalence proportion of personality disorders was 41%, and the heterogeneity for the studies was 98.5%.

3.4. Methods of suicide in suicide attempters

We identified a total of 62 studies that described methods of suicide (Fig. 1). The pooled prevalence proportion of poisoning was 52% for the 62 studies including 13,801 individuals in the ED with a heterogeneity of I^2=92.9% (Table 3). The pooled prevalence proportion of cutting was 18% for 57 studies that included 12,097 individuals, and the pooled prevalence proportion of jumping was 12% for 58 studies that included 12,278 individuals.

The pooled prevalence proportion for hanging was 7%, based on 52 studies including 11,134 individuals in the ED, and the proportion for burning was 4%, based on 33 studies including 7963 individuals. See Supporting information for the forest plots for the proportions of suicide methods by study.

3.5. Previous studies in other countries

We identified only one study that described the prevalence proportion of suicide attempters in all individuals in the ED (Doshi et al., 2005) (Table 4). We also identified two studies using the ICD (Doshi et al., 2005; Bilén et al., 2011) and three studies using the DSM for suicide attempters in the ED (Bi et al., 2010; Elliott et al., 1996; Hur et al., 2008). Finally, we identified six studies that reported the method of suicide (Doshi et al., 2005; Bilén et al., 2011; Bi et al., 2010; Elliott et al., 1996; Lee et al., 2012; Bergen et al., 2010).

Table 3
Pooled prevalence of method of suicide among suicide attempters.

Method	Number of studies	Pooled prevalence (95% CI)	Heterogeneity (95% CI)
Poisoning	62	52% (48–55)	92.9% (91.8–93.7)
Cutting	57	18% (16–19)	80.7% (75.5–84.3)
Jumping	58	12% (10–14)	92.3% (91.0–93.3)
Hanging	52	7% (6–9)	86.5% (83.4–88.8)
Burning	33	4% (3–5)	75.5% (65.0–81.7)

Table 4
Review of studies in other countries on the prevalence proportion of suicide attempters, psychiatric disorders, and method of suicide.

Study	Country	Number of participants	SA[a] (%)	ICD[b] (%)						DSM[c] (%)							Method[d] (%)				
				F1	F2	F3	F4	F5	F6	SRD	Sz	MD	AdjD	AnxD	ED	PD	Poison	Cut	Jump	Hang	Burn
Doshi et al., 2005	U.S.	513,600,000	0.4	9[e]	–	18[f]	–	–	–	–	–	–	–	–	–	–	68	20	–	<1	–
Bilén et al., 2011	Sweden	1524	–	18	6	29	18	–	26	–	–	–	–	–	–	–	86	12	–	–	–
Bi et al., 2010	China	239	–	–	–	–	–	–	–	3	8	44	5	11	–	–	92	–	–	–	–
Hur et al., 2008	Korea	344	–	–	–	–	–	–	–	–	11	79[g]	3	–	–	1	–	–	–	–	–
Elliott et al., 1996	U.S.	97	–	–	–	–	–	–	–	30[h] 19[i]	5	39[g]	26	–	–	34[j]	72	15	4	2	1
Lee et al., 2012	Korea	2996	–	–	–	–	–	–	–	–	–	–	–	–	–	–	69	16	3	6	–
Bergen et al., 2010	U.K.	44330	–	–	–	–	–	–	–	–	–	–	–	–	–	–	78	15	–	–	–

[a] **SA**: suicide attempters.
[b] **F1**: mental and behavioral disorders due to psychoactive substance use, **F2**: schizophrenia, schizotypal and delusional disorders, **F3**: mood disorders, **F4**: neurotic, stress-related and somatoform disorders, **F5**: behavioral syndromes associated with physiological disturbances and physical factors, and **F6**: disorders of adult personality and behavior.
[c] **SRD**: substance-related disorders, **Sz**: schizophrenia, **MD**: mood disorders, **AdjD**: adjustment disorders, **AnxD**: anxiety disorders, **ED**: eating disorder, and **PD**: personality disorders
[d] **Poison**: poisoning, **Cut**: cutting, **Jump**: jumping, **Hang**: hanging, and **Burn**: burning.
[e] This score is the percentage of alcohol abuse only.
[f] This score is the percentage of only ICD-9-CM code 311.
[g] This score is the percentage of major depressive disorder and bipolar disorders only.
[h] This score is the percentage for only alcohol abuse or dependence.
[i] This score is the percentage for only drug abuse or dependence.
[j] This score is the percentage for only borderline personality disorders and antisocial personality disorders.

4. Discussion

4.1. Prevalence of suicide attempters

Our study found that the pooled prevalence proportion of suicide attempters was 4.7% among all individuals in the ED in Japan, using systematic and comprehensive procedures. On the other hand, the Centers for Disease Control and Prevention (CDC) reported that attempted suicide and self-inflicted injury accounted for 0.4% of all ED visits in the US (Doshi et al., 2005). The pooled prevalence proportion calculated in our study was higher than that reported by CDC. This difference might reflect the difference in suicide rates between Japan and the US. The suicide rate in the US (14 per 100,000 population) is rather low (Kessler et al., 2005), when compared with the suicide rate in Japan (25 per 100,000 population) (World Health Organization, 2012). Another possibility is that accessibility to emergency medical services in each country might cause the differences in prevalence. In Japan, free access for ambulance services is covered by the National Health Insurance System, which enables virtually all suicide attempters to have access to emergency medicine. In addition, in Japan, the ED visit is increasingly recognized as an important setting to intervene with suicide attempters, which might affect the difference between Japan and the US.

Interestingly, our study also revealed that the pooled prevalence proportion of suicide attempters who died at the ED was 0.7% in Japan. This is the first study to report the prevalence of suicide attempters who died at the ED in Japan. The findings clearly demonstrate that ED visits for suicide attempts are relatively common and serious in Japan.

4.2. Psychiatric disorders in suicide attempters

It has been reported that many suicide attempters suffer from psychiatric disorders (Beautrais et al., 1996; Hawton et al., 2003). Interestingly, the present study revealed that the pooled prevalence proportion of ICD-F3 disorders (mood disorders) was 30%, and that ICD-F3 disorders were the most frequent psychiatric disorders among suicide attempters in the ED in Japan. Our findings are consistent with those of previous studies. In Sweden, the proportion of ICD-F3 disorders was 29% (Bilén et al., 2011). The proportion of depressive disorders (ICD-9-CM code 311 only) in the US was 18% among suicide attempters in the ED (Doshi et al., 2005). Our results also revealed that the pooled prevalence proportion of mood disorders (DSM) was 35% and that mood disorders were the most common psychiatric disorders among the DSM Axis I disorders. Our findings are consistent with some previous studies using the DSM; the proportion of mood disorders reported in China was 44% in 2010 (Bi et al., 2010) and 39% in the US in 1996 (Elliott et al., 1996). In contrast, the proportion of mood disorders has been reported to be much higher in Korea (79%; Hur et al., 2008).

The current study also revealed that the pooled prevalence proportion of ICD-F4 disorders (neurotic, stress-related and somatoform disorders) was 27%, and that ICD-F4 disorders were the second most frequent psychiatric disorders among suicide attempters in the ED in Japan. The pooled prevalence proportion calculated in our study was higher than that reported in Sweden, where the prevalence was 18% among suicide attempters in the ED (Bilén et al., 2011). The pooled prevalence proportion of adjustment disorders (DSM) in Japan was 28%. Our findings were similar to the proportion (26%) in the US (Elliott et al., 1996). However, it was much higher than that reported in China (5%; Bi et al., 2010) and Korea (3%; Hur et al., 2008).

The present study found that the pooled prevalence proportion of ICD-F2 disorders (schizophrenia, schizotypal and delusional disorders) was 13% in suicide attempters in the ED in Japan. This proportion is higher than that reported in Sweden (6%; Bilén et al., 2011). On the other hand, the pooled prevalence proportion of ICD-F6 disorders (disorders of adult personality and behavior) was 13% in our study, which is lower than the 26% reported in Sweden (Bilén et al., 2011).

The pooled prevalence proportion of schizophrenia (DSM) was 19% among suicide attempters in Japanese studies, which is higher than that reported in other countries. For example, studies using the DSM have reported that the proportion of schizophrenia was 8% in China (Bi et al., 2010), 11% in Korea (Hur et al., 2008), and 5% in the US (Elliott et al., 1996) among suicide attempters in the ED.

The pooled prevalence proportion of personality disorders (DSM Axis II disorders) was 41% in studies on suicide attempters

in Japan, which is higher than that reported in other countries. The proportion of personality disorders was reported to be 1% in Korea (Hur et al., 2008), while the proportion of personality disorders (borderline personality disorder and antisocial personality disorders) was reported to be 34% in the US (Elliott et al., 1996). Care must be taken when interpreting the data in studies using the DSM because personality disorders are classified as Axis II disorders and assessed independently from Axis I disorders.

The present study found that the pooled prevalence proportion of ICD-F1 disorders (mental and behavioral disorders due to psychoactive substance use) was 4% in suicide attempters in the ED in Japan, which is lower than the 18% reported in Sweden (Bilén et al., 2011). In the US, among ICD-F1 disorders, only the prevalence for alcohol abuse (9%) was reported (Doshi et al., 2005). In contrast, the pooled prevalence proportion of substance-related disorders (DSM) was 14%. Thus, the pooled prevalence proportion calculated in our study was higher than that reported in China (3%; Bi et al., 2010). In the US, among substance-related disorders, only the prevalence for alcohol abuse or dependence (30%) and drug abuse or dependence (19%) has been reported (Elliott et al., 1996).

Most ED clinicians do not routinely assess suicidal ideation, suicidal behavior, or psychiatric disorders among their patients (Boudreaux et al., 2013) and ED assessment of self-harm was highly variable among institutions (Caterino et al., 2013). However, the NICE guidelines recommend that patients presenting at hospitals with self-harm should receive a psychosocial assessment and suicide screening before their discharge (NICE, 2004; Ting et al., 2012b). The high prevalence of psychiatric disorders in suicide attempters in the ED suggests that mental health issues should be considered during the management and disposition of these patients.

4.3. Methods of suicide in suicide attempters

Poisoning was found to be the most common method of suicide, with a pooled prevalence proportion of 52%. Our findings are comparable to previous research results (Table 4) reported in the US (68%, Doshi et al., 2005; 72%, Elliott et al., 1996), Sweden (86%, Bilén et al., 2011), China (92%, Bi et al., 2010), Korea (69%, Lee et al., 2012), and the United Kingdom (78%, Bergen et al., 2010).

The second most frequent method among suicide attempters in the ED in Japan was cutting, which had a pooled prevalence proportion of 18%. Our findings are also comparable to previous findings (Table 4) reported in the US (20%, Doshi et al., 2005; 15%, Elliott et al., 1996), Sweden (12%, Bilén et al., 2011), Korea (16%, Lee et al., 2012), and the United Kingdom (15%, Bergen et al., 2010).

The study also revealed that the pooled prevalence proportion of jumping was 12% in suicide attempters in the ED in Japan. The prevalence is higher than that reported in the US (4%, Elliott et al., 1996) and Korea (3%, Lee et al., 2012). The prevalence proportion of hanging was lower (7%), which is similar to the 6% reported in Korea (Lee et al., 2012). The prevalence of hanging as a suicide method is even lower (less than 1%) in the US (Doshi et al., 2005; 2%, Elliott et al., 1996). The use of burning as a method of suicide is also less than 1% in the US (Elliott et al., 1996), whereas we found the pooled prevalence proportion of burning to be 4% in suicide attempters in the ED in Japan.

The high prevalence of poisoning in suicide attempters in the ED suggests that the ED is an appropriate setting to conduct clinical studies of suicide attempts by poisoning. It is known that suicide attempters who use poisoning as a suicide method are a high-risk group for repeated suicide attempts after discharge from the ED. For example, it was found that 12% of patients in the ED after poisoning subsequently re-attended the ED due to poisoning within one year after their discharge (Owens et al., 1994). Because there is no known effective intervention for them (Kapur et al., 2010), it is necessary to conduct further ED research on suicide attempters who use poisoning.

5. Limitation

The present study has two primary limitations. First, there might be a publication bias, since our analyses only included published articles. The calculated prevalence in this study could be overestimated because these articles are published by researchers who are more concerned with suicide attempters. Second, there might be an information bias, such as reporting biases and misclassification, since most of the included studies used retrospective designs.

6. Conclusion

The present study was able to estimate the prevalence of suicide attempters in the ED in Japan. The results indicate that suicide attempters in the ED have a higher proportion of mood disorders, and that the most common method of suicide is poisoning.

Role of funding source

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Conflict of interest

The authors declare that they have no conflict of interests.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.jad.2014.03.025.

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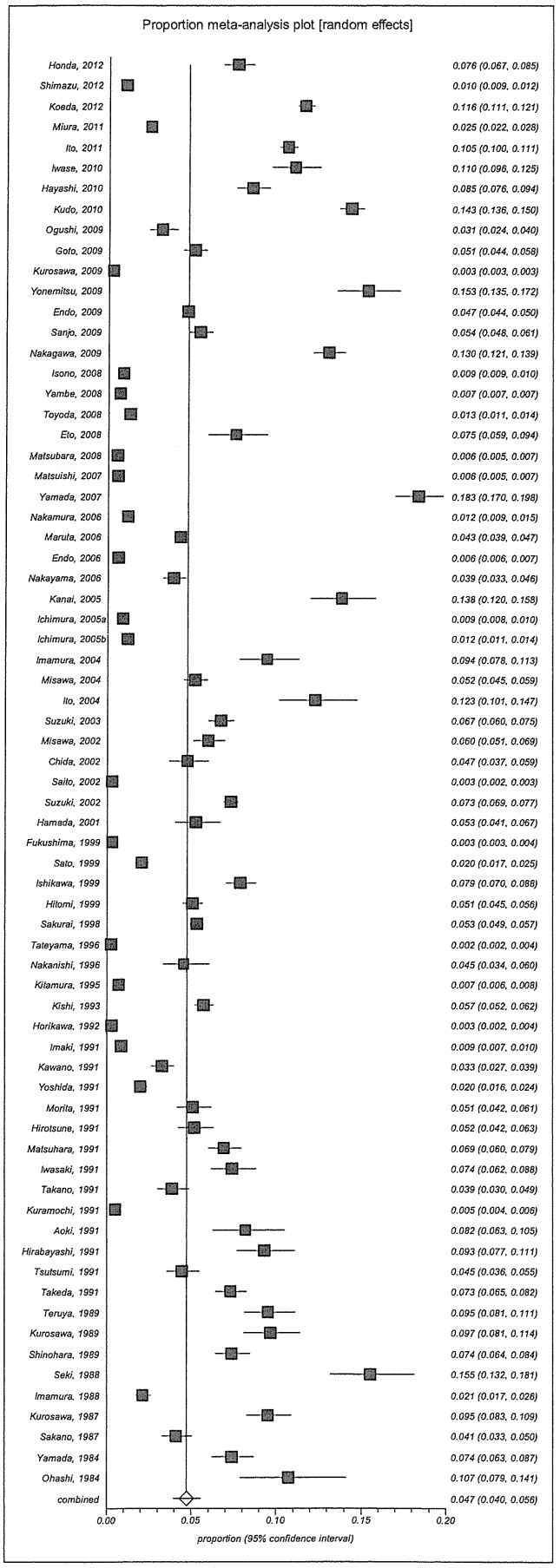
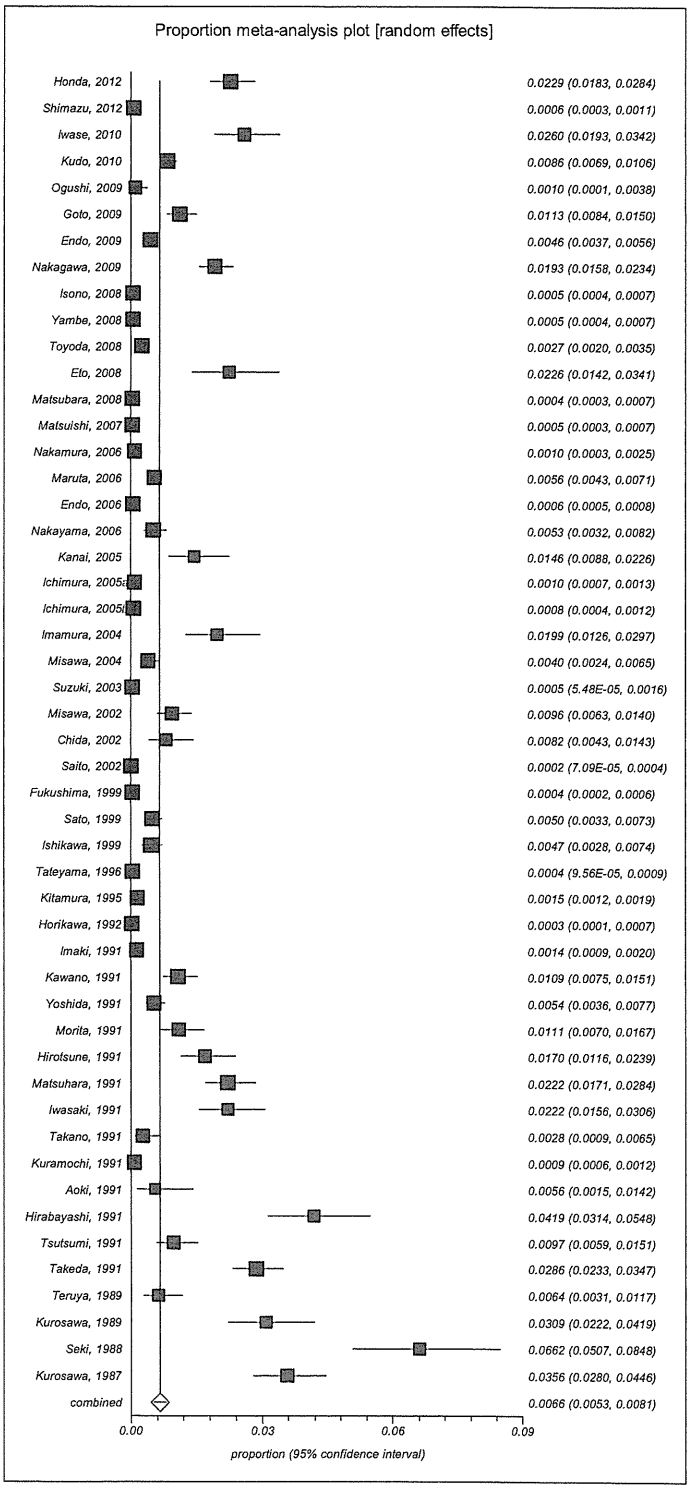


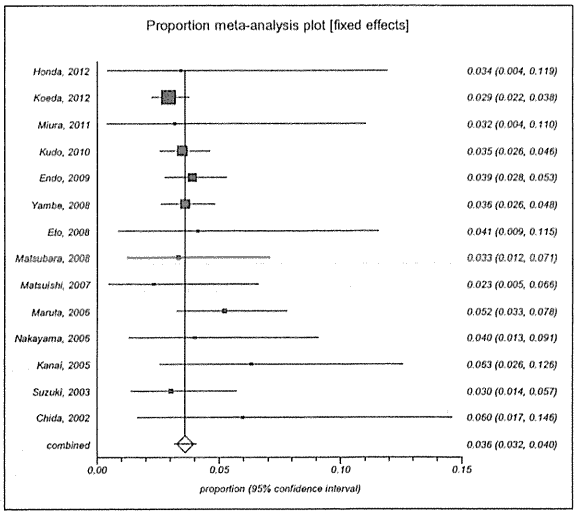
Suicide attempters



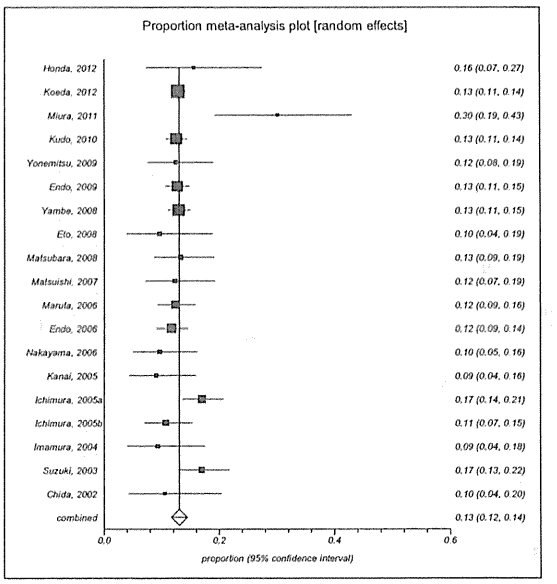
Suicide attempters who were died after their admission to the ED

Appendix Figure. 1. Prevalence proportions of suicide attempters in the ED.

* See Appendix List 1 for the detailed references.



ICD-F1 disorders



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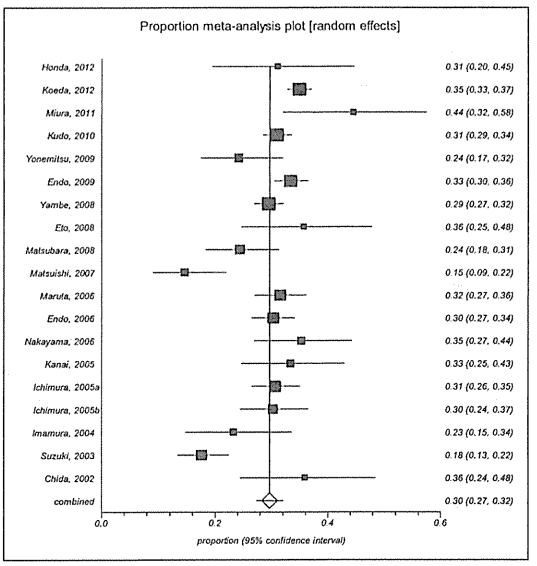

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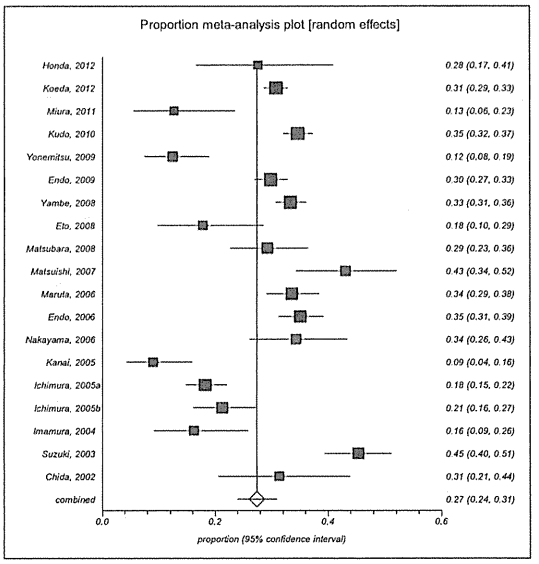

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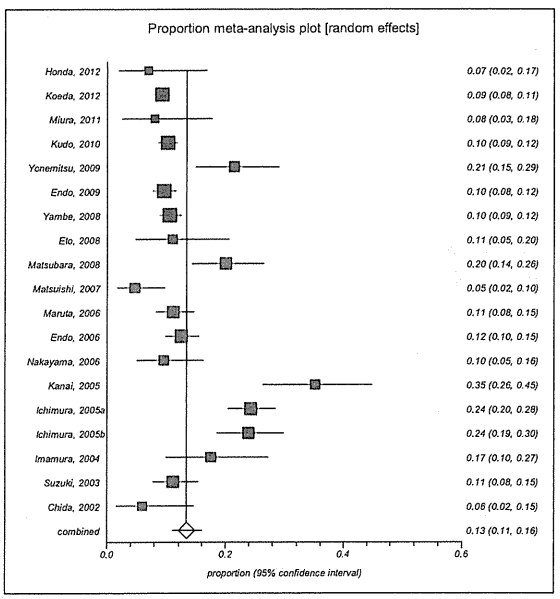
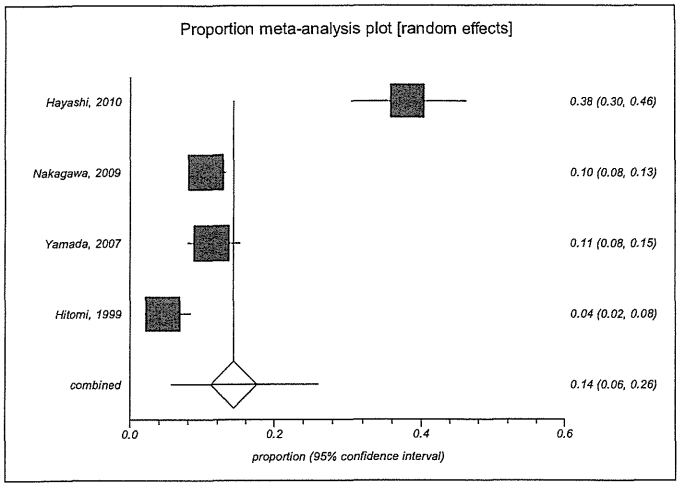


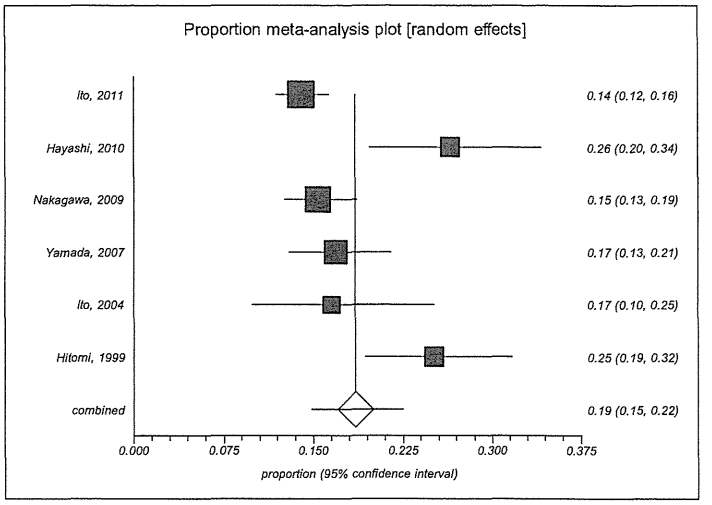
ICD-F6 disorders

Appendix Figure. 2. Prevalence proportions of ICD diagnosis in suicide attempters.

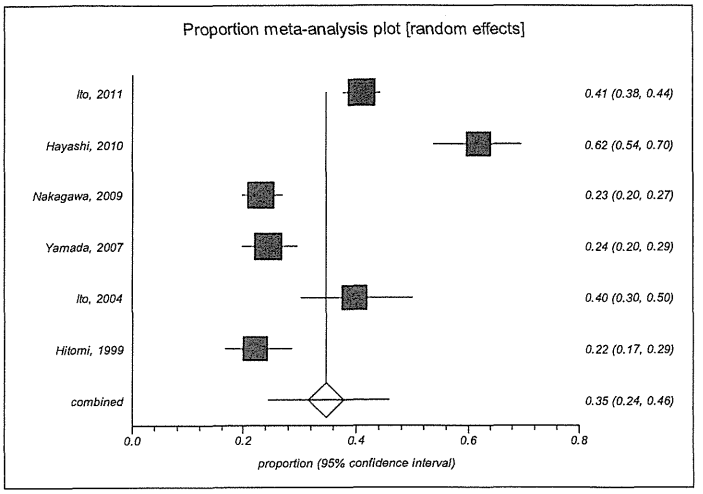
* See Appendix List 1 for the detailed references.



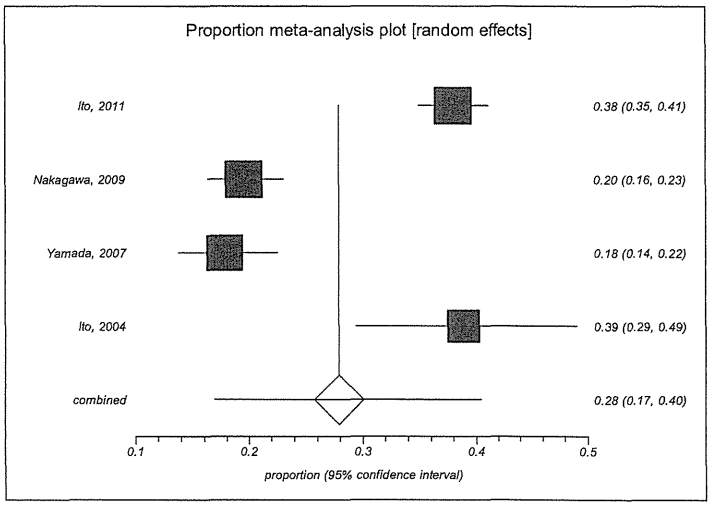
Substance-Related Disorders



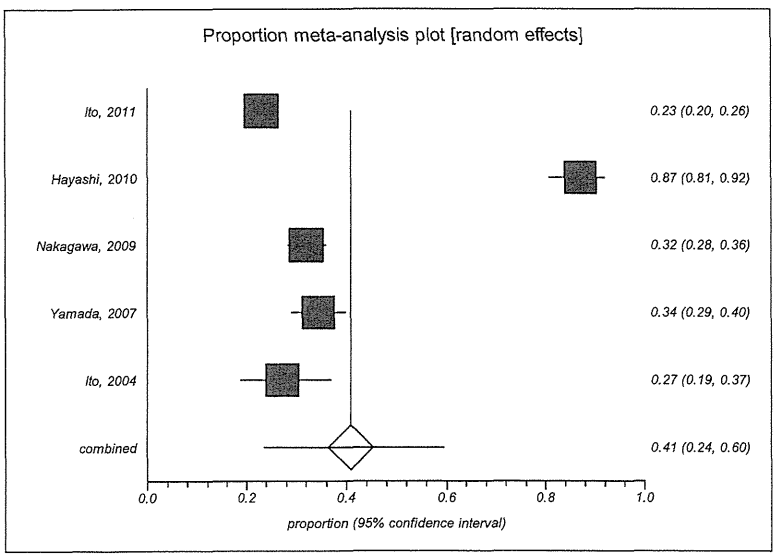
Schizophrenia



Mood disorders



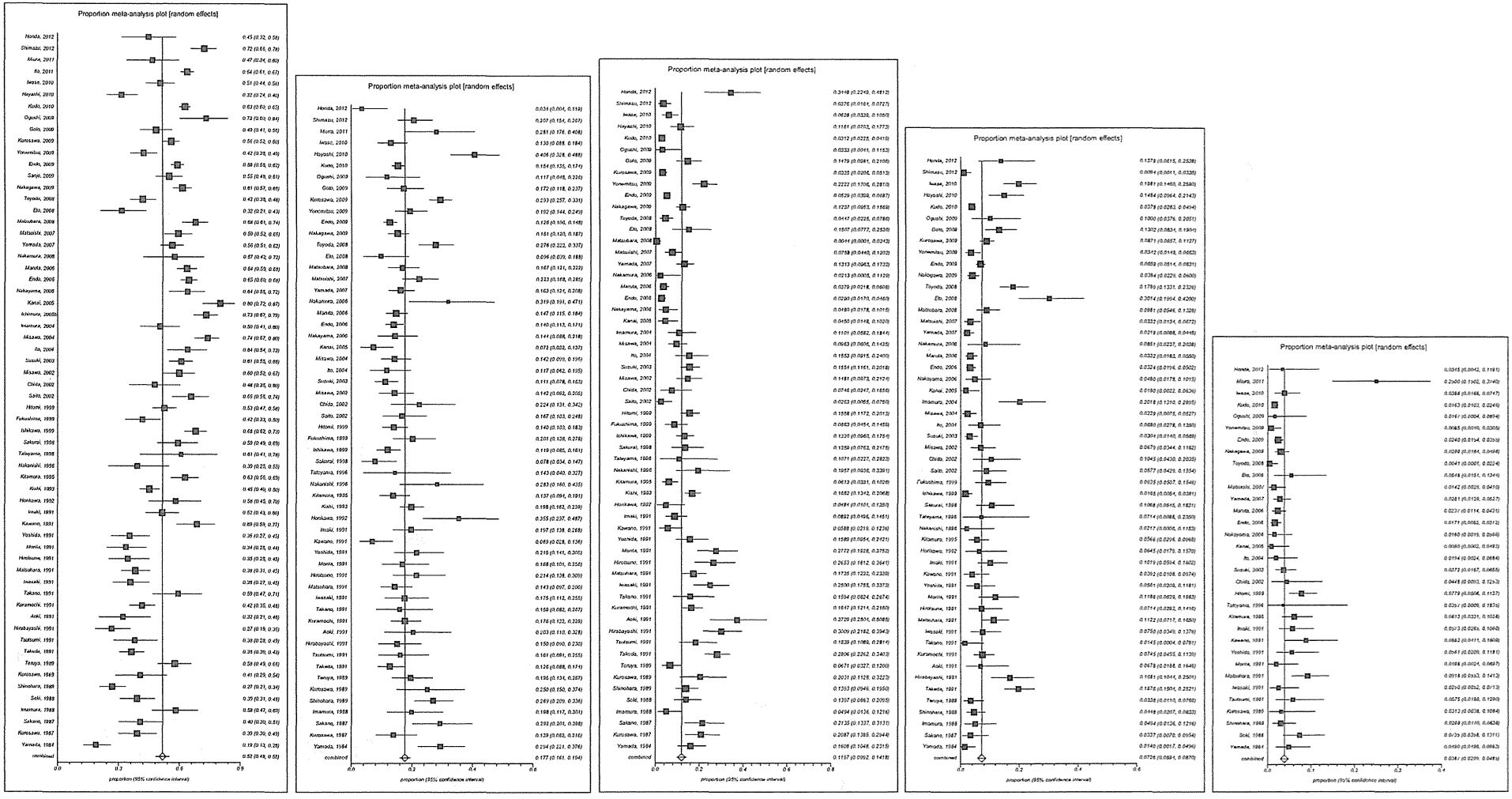
Adjustment disorders



Personality disorders

Appendix Figure. 3. Prevalence proportions of DSM diagnoses in suicide attempters.

* See Appendix List 1 for the detailed references.



Appendix Figure. 4. Prevalence proportions of methods of suicide.

* See Appendix List 1 for the detailed references.

Appendix List 1

Reference for Appendix Figures1–4 (70 studies for meta-analysis)

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