



**Suicides by persons reported as missing prior to death: a retrospective cohort study**

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## Suicides by persons reported as missing prior to death: a retrospective cohort study

27 Jerneja Sveticic, Lay San Too & Diego De Leo<sup>1</sup>

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## Abstract

**Objective:** A first study to compare suicides by missing persons to other suicide cases.

**Design:** Retrospective cohort study for period 1994-2007.

**Geographical location:** Queensland, Australia.

**Population:** 194 suicides by missing persons and 7,545 other suicides were identified through the Queensland Suicide Register and the National Coroners Information System.

**Main outcome measure:** Chi square statistics and binary logistic regression were used to identify distinct characteristics of suicides by missing persons.

**Results:** Compared to other suicide cases, missing persons significantly more often died by motor vehicle gas toxicity (23.7% vs. 16.4%;  $X^2$  7.32,  $p < 0.01$ ), jumping from height (6.7% vs. 3.2%;  $X^2$  7.08,  $p < 0.01$ ) or drowning (8.2% vs. 1.8%;  $X^2$  39.53,  $p < 0.01$ ), but less frequently by hanging (29.4% vs. 39.9%;  $X^2$  8.82,  $p < 0.01$ ). They were most frequently located in natural, outdoors locations (58.2% vs. 11.1%;  $X^2$  388.25,  $p < 0.01$ ). Persons gone missing were less likely to have lived alone at time of death (OR 0.45; 95% CI 0.26 to 0.76), yet more likely to be institutionalised (OR 3.12; 95% CI 1.28 to 7.64). They were less likely to have been physically ill (OR 0.64; 95% CI 0.43 to 0.95) or have a history of problematic consumptions of alcohol (OR 0.52; 95% CI 0.31 to 0.87). In comparison to other suicide cases, missing persons more often communicated their suicidal intent prior to death (OR 1.58; 95% CI 1.13 to 2.22).

**Conclusions:** Suicides by missing persons show several distinct characteristics in comparisons to other suicides. The findings have implications for development of suicide prevention strategies focusing on early identification and interventions targeting this group. In particular, it may offer assistance to police in designing risk assessment procedures and subsequent investigations of missing persons.

## Article summary

### *Article focus*

- Many countries are affected by the phenomenon of missing persons. In Australia, approximately 35,000 people are formally reported as missing every year.
- One of the reasons people gone missing is to commit suicide.
- This study is the first comparison of suicides by missing persons to other suicide cases.

### *Key messages*

- Suicides by persons gone missing accounted for 2.5% of all suicides in Queensland, Australia.
- Compared to other suicides, missing persons were more often found in natural, outdoors locations and used methods such as motor vehicle gas toxicity, jumping from height or drowning. Hanging was proportionately less frequent in suicides by missing persons, compared to all other suicides.
- Missing persons were more likely to be institutionalised at time of death than other suicide cases, and more often communicated their suicidal intent. In addition, they were less likely to live alone, have a physical illness and/or alcohol problems.

### *Strengths and limitations of this study*

- The methodological strength of the study was its cohort design.
- The limitations of this study include likely under-enumeration of missing persons who died by suicide due to inconsistencies in police recording procedures and identification of such cases through utilised data sources, and the fact that information obtained from the deceased's next of kin were subjected to recall bias.

## Introduction

In Australia, an estimated 35,000 persons are reported as missing to the police and other search agencies each year, corresponding to a rate of 1.7/1,000.<sup>1</sup> A definition currently in use in Australia states that a missing person is “*anyone who is reported missing to police, whose whereabouts are unknown, and where there are fears for the safety or concerns for the welfare of that person*”.<sup>2(p4)</sup> However, the implementation of the definition varies as each police agency has its own criteria and procedures by which it records missing persons. It has been reported that many missing persons remain unreported among certain sub-groups, such as youth, homeless, indigenous, LGBT (lesbian, gay, bisexual, transgender persons), persons with intellectual disabilities, and those from culturally and linguistically diverse backgrounds.<sup>2</sup>

The reasons why people go missing are numerous and diverse. Most missing persons leave voluntarily to avoid some adverse physical, social or economic circumstances or following stressful events.<sup>3</sup> A study proposed a ‘continuum of missingness’ to describe different groups within the missing persons population; this ranges from intentional to unintentional absence, with intervals spanning ‘decided’ (relationship breakdown, escaping personal problems or violence), ‘drifted’ (losing contact and a transient lifestyle), ‘unintentional absence’ (Alzheimer’s disease or other mental health problems, accident or misadventure) to ‘forced’ (being a victim of foul play).<sup>4</sup> Without differentiating between reasons for going missing, mental health concerns are on average recognized in almost half of reports of missing persons, and particularly common among older persons.<sup>3</sup> Furthermore, the majority of missing persons is found alive within a short time frame: 35 % on the same day and more than three quarters within the following 2 days.<sup>5</sup> The percentage of those found dead either due to foul play or suicide has been estimated to be between 0.3%<sup>4</sup> and 1%.<sup>6-7</sup> However, at present it remains difficult to accurately quantify the proportion of missing persons suffering harm whilst missing, as the outcomes of their disappearances are not routinely recorded by most police forces.<sup>2,7</sup>

An Australian study that examined differences between persons in three different categories of reasons for going missing (runaway, foul play, suicide) found that missing persons with suicidal intention were more likely to be male, single, aged between 41 and 65 years, and without children.<sup>8</sup> Other distinct characteristics were a history of suicide attempt or

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3 threats, depression, and a wide range of short- and long-term life stressors. Their  
4 disappearance was thought to be out of character for great majority of persons that went  
5 missing, and in almost 80% of these cases the reporting person correctly identified suicide as  
6 a possible motive for disappearance. While representing a significant contribution to the field,  
7 the study was limited by the fact that it merged suicide attempts and completed suicides in  
8 one group when in fact these two populations are distinguished by a number of factors;<sup>9</sup>  
9 however, these remain to be assessed on a population of missing persons. To the best of our  
10 knowledge, the present study is the first to explore characteristics of cases of completed  
11 suicides reported to police as missing persons prior to death in comparison to all other  
12 suicides, in an attempt to determine whether persons that go missing represent a unique sub-  
13 population of persons at-risk for suicide.  
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## 23 **Method**

### 24 *Data sources*

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26 The Queensland Suicide Register (QSR), an independent databank on suicide mortality, and  
27 the National Coroners Information System (NCIS), an Internet database of coronial cases,  
28 were used to identify all suicide cases reported as missing persons prior to death. In the QSR,  
29 information on possible deaths by suicide is gathered for all Queensland residents from four  
30 sources: the police report to the Coroner following a possible suicide (which includes a  
31 psychological autopsy questionnaire since 1994), post mortem report, toxicology results and  
32 coroner's findings. Information was obtained predominately by the deceased's next-of-kin,  
33 and occasionally supplemented by records from police or hospital documents. Only cases  
34 classified as 'beyond reasonable doubt' and 'probable' based on the suicide classification  
35 used in the QSR were included in the analysis (for more details on the criteria used in  
36 determination of level of certainty for death to be concluded as suicide, see example from  
37 studies).<sup>10-11</sup>  
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### 48 *Analysis*

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50 Suicides by missing persons were compared to 'non-missing' suicides with Chi square  
51 statistics for sociodemographic, medical and psychiatric variables, past suicidality and life  
52 events preceding death, as well as distribution of suicide methods and locations where bodies  
53 were found. Independent variables differentiating between the two groups were tested with  
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3 binary logistic regression model, using method of forced entry. Statistically significant  
4 differences were identified by using level of significance set at  $p < 0.05$ .  
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## 8 **Results**

### 9 *Prevalence*

10 Of the 7,739 suicide deaths by Queensland residents between 1994 and 2007, 194 cases were  
11 reported to police as missing persons prior to death, accounting for 2.5% of all suicides. Of  
12 those, 153 or 78.9% were males and 41 or 21.1% were females. The number of all other  
13 suicide cases ('non-missing') over the observed time period was 7,545.  
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### 18 *Suicide methods*

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20 As previously observed in Queensland<sup>12</sup> and Australia<sup>13</sup>, most common suicide method used  
21 in both groups was hanging, though utilised significantly more often by 'non-missing'  
22 suicides than all other suicides (39.9% and 29.4%, respectively;  $X^2 = 8.82$ ,  $df = 1$ ,  $p < 0.01$ )  
23 (Figure 1). Overall, methods used significantly more frequently in suicides by missing  
24 persons were: motor vehicle exhaust gas toxicity (MVCO) (23.7% vs. 16.4%;  $X^2 = 7.32$ ,  $df =$   
25  $1$ ,  $p < 0.01$ ), drowning (8.2% vs. 1.8%;  $X^2 = 39.53$ ,  $df = 1$ ,  $p < 0.01$ ) and jumping from high  
26 places (6.7% vs. 3.2%;  $X^2 = 7.08$ ,  $df = 1$ ,  $p < 0.01$ ).  
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### 61 *Locations of suicide*

62 In 'non-missing' cases, the most common location of suicide was person's own residence  
63 (68.0% vs. 12.4% of missing persons;  $X^2 = 263.74$ ,  $df = 1$ ,  $p < 0.01$ ) (Figure 2). Missing  
64 person bodies were mostly found in 'natural' locations, such as bushland, roads, on  
65 beaches/river banks, and under cliffs or mountains (58.2% vs. 11.1% of 'non-missing' cases,  
66  $X^2 = 388.25$ ,  $df = 1$ ,  $p < 0.01$ ). About one quarter of missing persons cases were found in  
67 urban places, such as other person's homes, hotels, or parklands, compared to 17.1% of 'non-  
68 missing' persons ( $X^2 = 12.52$ ,  $df = 1$ ,  $p < 0.01$ ).  
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### 8 *Characteristics*

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10 Table 1 presents socio-demographic, medical and psychiatric characteristics and recent life  
11 events of suicide cases by persons reported as missing prior to death and all other suicides.  
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21 No significant differences between the two groups were found in their age or gender  
22 distribution, but missing persons were significantly more likely to be married (50.9%) and of  
23 non-indigenous ethnicity (97.3%) than other suicide cases. At the time of death, missing  
24 persons more often lived with a spouse (41.6%) or in an institution (5.2%), had at least one  
25 diagnosed mental disorder (49.0%) and had contacts with mental health professionals during  
26 last 3 months prior to death (29.9%) (Table 1). In comparison to all other suicides, missing  
27 persons had less frequent history of drug use (16.0%) or problematic consumption of alcohol  
28 (9.3%).  
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36 In terms of history of suicidality, missing persons more often communicated suicide  
37 intent during their lifetime (44.8%) and left a suicide note (43.8%). Similar percentages of  
38 suicides in both groups experienced at least one significant stressful life event preceding  
39 death (about 57%), with most common events recorded in missing persons cases being:  
40 relationship breakdown or separation (14.9%), conflict with partner (13.4) or other significant  
41 persons (11.3%), bereavement or financial problems (each in 7.7% of cases), recent  
42 unemployment (6.7%) or pending legal matters (6.2%). Nevertheless, no significant  
43 differences were found between the two groups in the prevalence of specific stressful life  
44 events prior to death.  
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53 After adjusting for confounding effects of age and gender, logistic regression analysis  
54 identified several characteristics (independent predictors) differentiating between the two  
55 groups (Table 2). Missing persons were less likely to have lived alone (OR = 0.45; 95% CI =  
56 0.26-0.76), yet more likely to be institutionalised at time of death (OR = 3.12; 95% CI =  
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3 1.28-7.64). In addition, they were less likely to have a physical illness (OR = 0.64; 95% CI =  
4 0.43-0.95), have a history of problematic consumption of alcohol (OR = 0.52; 95% CI =  
5 0.31-0.87) or drug use (OR = 0.64; 95% CI = 0.41-1.01). In comparison to all other suicide  
6 cases, they more often communicated their intent to suicide (OR = 1.58; 95% CI = 1.13-  
7 2.22).  
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## 20 Discussion

21 The problem of missing persons represents a huge social issue with far-reaching  
22 consequences. Even though most people reported missing to Australian police are located  
23 within a short period of time (about 85% within a week and 95% within a month),<sup>2</sup> the  
24 trauma faced by family and friends of persons that go missing is considerable. A study has  
25 found that for every case of a missing person, an average of at least 12 people suffer adverse  
26 effects on their quality of life, with over a third of these persons developing physical and/or  
27 mental health problems as a direct consequence.<sup>3</sup> This represents an additional health-related  
28 burden to the economic costs stemming from searches of missing persons, which were in  
29 1997 estimated to be over \$72 million annually.<sup>3</sup> However, at the moment the knowledge of  
30 how many people go missing with the intention to complete suicide remains very limited, due  
31 to inconsistencies in classification of missing persons, insufficient inter-agency  
32 communication, and lack of rigorous research.  
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43 Our study aimed to determine whether persons that die by suicide after being reported  
44 as missing person show any distinct characteristics in comparisons to other suicides. Specific  
45 characteristics of this group related to their use of suicide methods; while these displayed  
46 similar rankings as in suicides by 'non-missing' persons, significant differences in their  
47 distributions were observed between the two groups. Bivariate analysis showed that missing  
48 persons more often died by motor vehicle exhaust gas toxicity, drowning and jumping, yet  
49 less frequently by hanging. Further, remains of more than half of missing persons were  
50 located in natural, outdoor locations such as bushland, besides roads, on beaches/river banks,  
51 and under cliffs or mountains. This was in contrast with the majority of other suicides (about  
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3 two thirds), which occurred in one's own home. While results of our study do not allow for  
4 conclusions on whether the choice of location influenced the selection of suicide method or  
5 *vice versa*, this should be explored in future studies, as it carries significant potentials for  
6 improving searches of missing persons based on the detailed assessment of availability and  
7 accessibility of specific means of suicide in relation to movements of the missing persons.  
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13 In terms of their socio-demographic characteristics, missing persons' cases were more  
14 likely to involve married persons, living with their spouse at time of death. After controlling  
15 for confounding variables, results confirmed that suicide cases by missing persons less often  
16 lived alone than other suicides. Though the data used in our study do not permit any  
17 conclusions about the motives for going missing before death, it is possible that a significant  
18 proportion of these persons were driven by the desire of sparing their significant others the  
19 trauma of finding their dead bodies at home. Additional motives might include the attempt to  
20 prevent their acts from being interrupted, and thus increase the likelihood of a completed  
21 suicide; avoid for their families the stigma attached to suicide; and have their deaths declared  
22 '*in absentia*', which would allow survivors to collect insurance premiums.  
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32 Furthermore, suicides by missing persons were found more likely than other suicides  
33 to be institutionalised before death. This is in line with findings from the report on missing  
34 persons in Australia,<sup>3</sup> which showed that 32% of persons had gone missing from an  
35 institution, and more than half of those from a psychiatric or mental health institution.  
36 Psychiatric in-patients are a well-recognised group of persons at high risk for suicide, with  
37 absconding representing an additional factor increasing this risk.<sup>14-15</sup> A recent study<sup>16</sup>  
38 observed distribution of suicide methods among absconders to be different to the patterns  
39 recorded in general population, with less frequency of hanging and self-poisoning, and more  
40 suicides occurring by jumping and drowning. In addition, absconders were on average found  
41 to be young persons, with high rates of schizophrenia, substance misuse, and medication non-  
42 compliance.<sup>17</sup> The need for special attention in allocating resources when looking for  
43 absconders has been highlighted in most guidelines for risk assessments, yielding immediate  
44 police action.<sup>18-19</sup> Though our study did not identify any suicides among youth that have gone  
45 missing from other forms of care such as juvenile detention or foster care, data from  
46 Australian Capital Territory show that these youngsters account for three-quarters of all  
47 young person missing incidents.<sup>2</sup> Often experiencing other factors increasing vulnerability  
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3 (alcohol/drug misuse, adverse social and living circumstances, inadequate coping skills, etc.),  
4 this is a sub-population of missing persons that also warrants particular attention.  
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8 In terms of physical and mental health, significant differences between the two groups  
9 were only found in the prevalence of physical illness, suggesting that those who went missing  
10 prior to death were less likely to have (at least one) physical illness. At the speculative level,  
11 this might indicate that physical health represents a prerequisite for a person to plan and  
12 execute their disappearance, and access remote locations where they finally choose to suicide.  
13 On average, missing persons suicides had a higher prevalence of mental illnesses than all  
14 other suicides (recorded in about 50% of cases), yet with no differences in the prevalence of  
15 specific disorders. Though this discrepancy was not confirmed as statistically significant in  
16 multivariate models (which among other factors accounted for placement in a psychiatric  
17 institution at time of death), mental illness undoubtedly represents one of the strongest risk  
18 factors for completed suicide<sup>20-21</sup> and should as such be one of the most vital components of  
19 police protocols used in identifying risk for suicide in missing persons. Compared to ‘non-  
20 missing’ cases, missing persons more often expressed their suicidal intent and left a suicide  
21 note prior to disappearance, With some studies finding verbal and behavioural clues  
22 indicating intent to suicide in up to 90% of suicidal deaths,<sup>22</sup> this information should  
23 represent crucial evidence in directing immediate search actions, and be routinely assessed in  
24 all investigations of missing persons. Frequent communication of intent in missing persons  
25 suicides might also be seen as an indicator of a (more) thought-out suicide plan,<sup>11,23</sup>  
26 particularly when that plan involved complex preparations or travelling to distant locations  
27 with minimal chances of their suicide acts being interrupted. Greater determination to die and  
28 less impulsiveness might be confirmed by the lower prevalence of problematic use of alcohol  
29 (including dependence, excessive consumption or frequent binge drinking, associated with  
30 violent or non-violent behaviours) or use of illicit drugs. Based on these results, assessment  
31 of patterns of use of alcohol and drugs – both known to promote impulsive suicidal  
32 behaviours<sup>24</sup> – could serve as a helpful indicator of individuals’ risk for self-harm after their  
33 disappearance.  
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#### 51 52 53 *Practical implications of the study*

54 Currently, police uses priority ratings for each case to determine the degree of risk to which  
55 people could be exposed after their disappearances or the harm the persons may present to  
56 themselves, dividing cases into high-, medium- and low risk. In general, mental health  
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3 conditions and signs of suicidality are important factors in determining the category of risk,<sup>2</sup>  
4 yet the frequency and depth with which they are assessed remains unknown. In Australia,  
5 currently there is no standardised form with which information is collected, leaving police  
6 officers to rely on their personal judgment in recognizing most vulnerable cases and deciding  
7 on responses. Clearly, the availability of a statistically sound risk prediction score would be  
8 desirable. A handful of studies to date attempted to evaluate the accuracy of predicting  
9 certain outcomes of lodgement of missing persons' reports. For example, a survey among  
10 friends and relatives of missing persons showed they expressed safety concerns for the  
11 missing person in 19% of cases, yet they turned out to be justified only in 1% of cases.<sup>3</sup> On the  
12 other hand, when looking specifically at suicide cases, a study found that nearly 80% of  
13 reporting persons correctly suspected that the missing person had left to die by suicide, since  
14 indication of intent was present for a large majority of cases.<sup>8</sup> The author further attempted to  
15 identify reasons for going missing: using a list of 26 variables related to disappearances, she  
16 was able to accurately predict 59% of suicide cases, a percentage much lower than in 'foul  
17 play' or 'runaway' cases.  
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### 28 29 30 *Strengths, limitations and need for future research*

31 A major strength of this study was its cohort design which allows comparisons of suicides by  
32 persons reported as missing to police with other suicide victims not recorded as missing at the  
33 time of death. As the majority of information used in this analysis was obtained through an  
34 interview by police officers with the deceased's next-of-kin, accuracy is likely to be  
35 influenced by recall bias resulting from both complex grief following the disappearance and  
36 suicide of their loved one, as well as retrospective recollection of events.<sup>25-26</sup> In addition, our  
37 study was unable to capture all factors that may be relevant to suicidality among missing  
38 persons, such as broader consideration of societal and cultural factors related to their  
39 disappearances. In the future, this limitation could be partly overcome by conducting  
40 psychological autopsy interview,<sup>27</sup> modified in a way to allow for targeted examination of the  
41 motivations behind disappearances. A similar study could be performed with persons  
42 reported as missing persons but whose suicidal acts were interrupted, as they could offer an  
43 even more reliable insight into reasons for going missing before engaging in suicidal  
44 behaviours.  
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56 An indefinite number of suicides occur annually by persons whose whereabouts are  
57 unknown but are never reported as missing persons to police,<sup>3</sup> or have failed to be identified  
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3 as such through utilised data sources. This is partly due to confusion created by various  
4 definitions of missing persons and procedures in recording missing person currently used in  
5 Australia.<sup>19</sup> Achieving uniform classification of missing person and consistency in collections  
6 of resolution details<sup>28</sup> is therefore of paramount importance and represents a crucial milestone  
7 in advancing with research in this area.  
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## 11 12 13 **Conclusions**

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15 Every year, the total number of missing persons might harbour a significant percentage of  
16 suicides in Australia. Persons officially recorded as ‘missing’ accounted for approximately  
17 2.5% of all suicides considered in this study. Obviously, there might be a bigger than this  
18 number of persons who eventually died by suicide, whose cause of death would never be  
19 classified as such (i.e., ‘unreported’ cases); so, the global dimension of the phenomenon can  
20 only be estimated but never precisely defined.  
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27 The present study demonstrated several distinct characteristics of suicides by missing persons  
28 compared to all other suicides. Significant differences were evident in terms of suicide  
29 methods and locations where the deceased were found, as well as factors related to living  
30 circumstances and physical and mental well-being. While this area of research is still in its  
31 infancy, it carries significant potential for successful translation of its findings into practice,  
32 eventually by developing an algorithm able to predict possible outcomes of missing persons.  
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3 **Contributors:** JS participated in the design of the study, performed the statistical analysis  
4 and contributed to the writing of the paper. LST contributed to the data analysis and the  
5 writing of the paper. DDL conceived the project, participated in the design of the study and  
6 helped to finalize the manuscript for publication. All authors read and approved the final  
7 manuscript.  
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14 Queensland Suicide Register, which was used as the primary data source for the study.  
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18 **Competing interest:** The authors declare that they have no competing of interests as  
19 indicated on the unified competing interest form at [www.icmje.org/coi\\_disclosure.pdf](http://www.icmje.org/coi_disclosure.pdf)  
20 (available on request from the corresponding author).  
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24 **Ethical approval:** The use of data from the Queensland Suicide Register has continuing  
25 ethical approval from the Griffith University Ethics Committee (GU Ref No:  
26 CSR/02/10/HREC), and use of data from National Coronial Information System has approval  
27 by Department of Justice Human Research Ethics (CF/09/5759).  
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33 **Data sharing:** No additional data available.  
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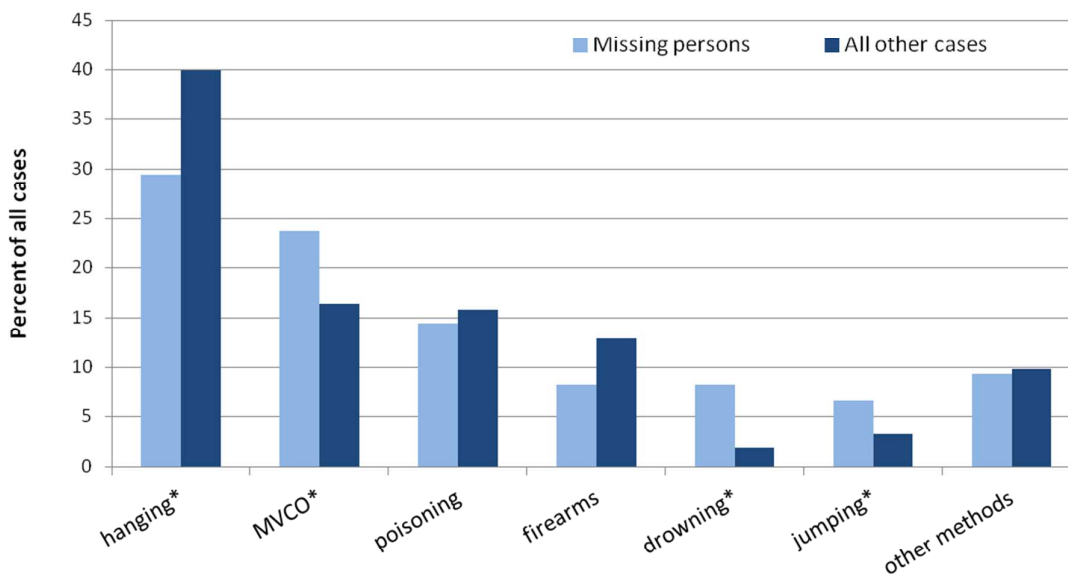
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Tables and Figures:

Figure 1. Suicide methods by missing persons and all other cases



\* Difference is significant at level  $p < 0.05$

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Figure 2. Locations of suicide by missing persons and all other cases



\* Difference is significant at level  $p < 0.05$

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Table 1. Characteristics of suicides by missing persons and all other suicides.

	Missing persons N (%)	All other suicides N (%)	t	p	
<b>Mean age</b>	41.3 years	41.4 years	-0.074	.941	
	Missing persons N (%)	All other suicides N (%)	Chi square	df	p
<b>Gender</b>			0.004	1	.948
Male	153 (78.9)	5965 (79.1)			
Female	41 (21.1)	1580 (20.9)			
<b>Marital status<sup>†</sup></b>			8.416	1	<b>.004</b>
Married	81 (50.9)	2464 (39.5)			
Not-married	78 (49.1)	3768 (60.5)			
<b>Ethnicity</b>			4.656	1	<b>.031</b>
Indigenous	5 (2.7)	469 (6.7)			
Non-Indigenous	180 (97.3)	6542 (93.3)			
<b>Remoteness area</b>			1.455	2	.483
Metropolitan	116 (60.1)	4147 (56.3)			
Regional	69 (35.8)	2814 (38.2)			
Remote	8 (4.1)	409 (5.5)			
<b>Employment status<sup>†</sup></b>			3.456	2	.178
Employed	77 (47.5)	2627 (41.0)			
Unemployed	42 (25.9)	1691 (26.4)			
Not in labour force	43 (26.5)	2091 (32.6)			
<b>Living arrangements<sup>†</sup></b>			29.142	3	<b>.000</b>
With spouse	64 (41.6)	1776 (29.1)			
Alone	21 (13.6)	1836 (30.1)			
Institution	8 (5.2)	121 (2.0)			
Other arrangements	61 (39.6)	2365 (38.8)			
<b>Physical and mental health</b>					
Physical illness (at least one)	48 (24.7)	2331 (30.9)	3.363	1	.067
Diagnosed mental illness (at least one)	95 (49.0)	2995 (39.7)	6.782	1	<b>.009</b>
Undiagnosed/suspected mental illness	42 (21.6)	1274 (16.9)	3.042	1	.081
Contact with mental health professional (last 3 months)	58 (29.9)	1772 (23.5)	4.306	1	<b>.038</b>
Drug use	31 (16.0)	1729 (22.9)	5.179	1	<b>.023</b>
Problematic alcohol use	18 (9.3)	1317 (17.5)	8.859	1	<b>.003</b>
<b>Expressions of suicidality</b>					
Communicated suicidal intent (lifetime)	87 (44.8)	3011 (39.9)	5.078	1	<b>.024</b>
Past suicide attempt (lifetime)	36 (18.6)	2109 (28.0)	2.377	1	.123
Suicide note	85 (43.8)	2767 (36.7)	4.145	1	<b>.042</b>
<b>Preceding stressful life event</b>					
Any life event	111 (57.2)	4349 (57.6)	0.014	1	.906
Relationship breakdown, separation	29 (14.9)	1451 (19.2)	2.243	1	.134
Conflict with partner	26 (13.4)	736 (9.8)	2.834	1	.092

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Conflict with other persons	22 (11.3)	670 (8.9)	1.406	1	.236
Bereavement	15 (7.7)	608 (8.1)	.236	1	.869
Pending legal matters	12 (6.2)	561 (7.4)	.431	1	.512
Financial problems	15 (7.7)	585 (7.8)	.000	1	.991
Recent unemployment	13 (6.7)	402 (5.3)	.703	1	.402
Work/school problems	9 (4.6)	395 (5.2)	.136	1	.712

Note: P values in bold denote statistical difference at level  $p < 0.05$

† Cases with unknown or missing value were excluded (Marital status: 1348 or 17.4%, Ethnicity: 543 or 7%, Remoteness area: 176 or 2.3%, Employment status: 1168 or 15.1%, Living arrangements: 1487 or 19.2%)

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Table 2. Results of binary logistic regression - independent factors differentiating between suicides by missing persons and all other suicides.

	$\beta$	S.E.	OR	95 % CI	
				Low	High
Institutionalisation	1.14	0.46	3.12*	1.28	7.64
Living alone	-0.80	0.27	0.45**	0.26	0.76
Physical illness	-0.45	0.20	0.64*	0.43	0.95
Problematic use of alcohol	-0.66	0.27	0.52**	0.31	0.87
Drug use	-0.45	0.23	0.64*	0.41	1.01
Communication of suicide intent – lifetime	0.46	0.17	1.58**	1.13	2.22

Note: Variables entered into regression analysis included: age, gender, marital status, ethnicity, suicide note, mental illness, recent contact with mental health professional, physical illness, lifetime communication of suicide intent, alcohol use, drug use, living with spouse, living alone, institutionalisation.

\* $p < 0.05$ , \*\*  $p < 0.01$



**Suicides by persons reported as missing prior to death: a retrospective cohort study**

Journal:	<i>BMJ Open</i>
Manuscript ID:	bmjopen-2011-000607.R1
Article Type:	Research
Date Submitted by the Author:	16-Feb-2012
Complete List of Authors:	Sveticic, Jerneja; Australian Institute for Suicide Research and Prevention, Too, Lay San; Australian Institute for Suicide Research and Prevention, De Leo, Diego; Australian Institute for Suicide Research and Prevention,
<b>Primary Subject Heading</b>:	Public health
Secondary Subject Heading:	Mental health
Keywords:	Suicide, Missing persons, Risk assessment

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## Suicides by persons reported as missing prior to death: a retrospective cohort study

27 Jerneja Sveticic<sup>1</sup>, Lay San Too<sup>1</sup> & Diego De Leo<sup>1</sup>

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## Abstract

**Objective:** A first study to compare suicides by missing persons to other suicide cases.

**Design:** Retrospective cohort study for period 1994-2007.

**Geographical location:** Queensland, Australia.

**Population:** 194 suicides by missing persons and 7,545 other suicides were identified through the Queensland Suicide Register and the National Coroners Information System.

**Main outcome measure:** Chi square statistics and binary logistic regression were used to identify distinct characteristics of suicides by missing persons.

**Results:** Compared to other suicide cases, missing persons significantly more often died by motor vehicle gas toxicity (23.7% vs. 16.4%;  $X^2 = 7.32$ ,  $p < 0.01$ ), jumping from height (6.7% vs. 3.2%;  $X^2 = 7.08$ ,  $p < 0.01$ ) or drowning (8.2% vs. 1.8%;  $X^2 = 39.53$ ,  $p < 0.01$ ), but less frequently by hanging (29.4% vs. 39.9%;  $X^2 = 8.82$ ,  $p < 0.01$ ). They were most frequently located in natural, outdoors locations (58.2% vs. 11.1%;  $X^2 = 388.25$ ,  $p < 0.01$ ). Persons gone missing were less likely to have lived alone at time of death (OR 0.45; 95% CI: 0.26 to 0.76), yet more likely to be institutionalised (OR 3.12; 95% CI: 1.28 to 7.64). They were less likely to have been physically ill (OR 0.64; 95% CI: 0.43 to 0.95) or have a history of problematic consumptions of alcohol (OR 0.52; 95% CI: 0.31 to 0.87). In comparison to other suicide cases, missing persons more often communicated their suicidal intent prior to death (OR 1.58; 95% CI: 1.13 to 2.22).

**Conclusions:** Suicides by missing persons show several distinct characteristics in comparisons to other suicides. The findings have implications for development of suicide prevention strategies focusing on early identification and interventions targeting this group. In particular, it may offer assistance to police in designing risk assessment procedures and subsequent investigations of missing persons.



## Article summary

### *Article focus*

- Many countries are affected by the phenomenon of missing persons. In Australia, approximately 35,000 people are formally reported as missing every year.
- One of the reasons people gone missing is to commit suicide.
- This study is the first to compare suicides by missing persons to other suicide cases.

### *Key messages*

- Suicides by persons gone missing accounted for 2.5% of all suicides in Queensland, Australia.
- Compared to other suicides, missing persons were more often found in natural, outdoors locations and used methods such as motor vehicle gas toxicity, jumping from height or drowning. Hanging was proportionately less frequent in suicides by missing persons, compared to all other suicides.
- Missing persons were more likely to be institutionalised at time of death than other suicide cases, and more often communicated their suicidal intent. In addition, they were less likely to live alone, have a physical illness and/or alcohol problems.

### *Strengths and limitations of this study*

- The methodological strength of the study was its cohort design.
- The limitations of this study include likely under-enumeration of missing persons who died by suicide due to inconsistencies in police recording procedures and identification of such cases through utilised data sources. Also, accuracy of information obtained from the deceased's next of kin could be impacted by recall bias.

## Introduction

In Australia, an estimated 35,000 persons are reported as missing to the police and other search agencies each year, corresponding to a rate of 1.7/1,000.<sup>1</sup> A definition currently in use in Australia states that a missing person is “*anyone who is reported missing to police, whose whereabouts are unknown, and where there are fears for the safety or concerns for the welfare of that person*”.<sup>2(p4)</sup> However, the implementation of the definition varies as each police agency has its own criteria and procedures by which it records missing persons. It has also been reported that many missing persons remain unreported, particularly certain sub-groups, such as youth, homeless, indigenous, LGBT (lesbian, gay, bisexual, transgender persons), persons with intellectual disabilities, and those from culturally and linguistically diverse backgrounds.<sup>2</sup>

The reasons why people go missing are numerous and diverse. Most missing persons leave voluntarily to avoid some adverse physical, social or economic circumstances or following stressful events<sup>3</sup>. Biehal, Mitchell and Wade proposed a ‘continuum of missingness’ to describe different groups within the missing persons population, ranging from intentional to unintentional absence with the following categories: ‘decided’ (relationship breakdown, escaping personal problems or violence), ‘drifted’ (losing contact, transient lifestyle), ‘unintentional absence’ (Alzheimer’s disease or other mental health problems, accident, misadventure) to ‘forced’ (victim of foul play)<sup>4</sup>. Without differentiating between reasons for going missing, mental health concerns are on average recognized in almost half of reports of missing persons, and particularly common among older persons<sup>3</sup>. Majority of missing persons is found alive within a short time frame: 35 % on the same day and more than three quarters within the following 2 days<sup>5</sup>. The percentage of those found dead either due to foul play or suicide has been estimated to be between 0.3%<sup>4</sup> and 1%<sup>6-7</sup>. However, at present it remains difficult to accurately quantify the proportion of missing persons suffering harm whilst missing, as the outcomes of their disappearances are not routinely recorded by most police forces<sup>2,7</sup>.

An Australian study that examined differences between persons in three different categories of reasons for going missing (runaway, foul play, suicide) found that missing persons with suicidal intention were more likely to be male, single, aged between 41 and 65 years, and without children<sup>8</sup>. Other distinct characteristics of this group of missing persons

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3 were: depression, history of suicide attempt or threats, and a wide range of short- and long-  
4 term life stressors. Their disappearance was thought to be out of character for great majority  
5 of persons that went missing, and in almost 80% of these cases the reporting person correctly  
6 identified suicide as a possible motive for disappearance. While representing a significant  
7 contribution to the field, the study was limited by the fact that it merged suicide attempts and  
8 completed suicides in one group when in fact these two populations are distinguished by a  
9 number of factors<sup>9</sup>. To the best of our knowledge, the present study is the first to explore  
10 characteristics of cases of completed suicides reported to police as missing persons prior to  
11 death in comparison to all other suicides, in an attempt to determine whether persons that go  
12 missing represent a unique sub-population of persons at-risk for suicide.  
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## 21 **Method**

### 22 *Data sources*

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24 Two data sources were used to identify suicide cases reported as missing persons prior to  
25 death: Queensland Suicide Register (QSR), an independent databank on suicide mortality,  
26 and the National Coroners Information System (NCIS), an Internet database of coronial  
27 cases. Only cases where a report was made of persons' disappearance and they were later  
28 found to have died by suicide were included (excluding persons who have been found alive  
29 after being declared missing and who suicided some time later).  
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35 In the QSR, information on possible deaths by suicide is gathered for all Queensland  
36 residents from four sources: the police report to the coroner following a possible suicide  
37 (which includes a psychological autopsy questionnaire), post mortem report, toxicology  
38 results and coroner's findings. Information was obtained predominately from the deceased's  
39 next-of-kin, and occasionally supplemented by records from police or hospital documents.  
40 Only cases classified as 'beyond reasonable doubt' and 'probable' based on the suicide  
41 classification used in the QSR were included in the analysis (for more details on the criteria  
42 used in determination of level of certainty for death to be concluded as suicide, see examples  
43 from past studies<sup>10-11</sup>.  
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### 51 *Analysis*

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53 Bivariate analyses (Chi square statistics) were used to compare suicides by missing persons  
54 to 'non-missing' suicides in sociodemographic, medical and psychiatric variables, past  
55 suicidality and life events preceding death, as well as distribution of suicide methods and  
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3 locations where bodies were found. Variables found to significantly differentiate between the  
4 two groups in bivariate models were then entered into binary logistic regression model (using  
5 method of forced entry). Statistically significant differences were identified by using level of  
6 significance set at  $p < 0.05$ .  
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## 11 Results

### 13 Prevalence

14 Of the 7,739 suicide deaths by Queensland residents between 1994 and 2007, 194 cases were  
15 reported to police as missing persons prior to death, accounting for 2.5% of all suicides. Of  
16 those, 153 or 78.9% were males and 41 or 21.1% were females. The number of all other  
17 suicide cases ('non-missing') over the observed time period was 7,545.  
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### 23 Suicide methods

24 As previously observed in Queensland<sup>12</sup> and Australia<sup>13</sup>, most common suicide method used  
25 in both groups was hanging, though utilised significantly more often by 'non-missing'  
26 suicides than all other suicides (39.9% vs. 29.4%;  $X^2 = 8.82$ ,  $df = 1$ ,  $p < 0.01$ ) (Figure 1). On  
27 the other hand, methods used significantly more frequently in suicides by missing persons  
28 were: motor vehicle exhaust gas toxicity (MVCO) (23.7% vs. 16.4%;  $X^2 = 7.32$ ,  $df = 1$ ,  $p <$   
29  $0.01$ ), drowning (8.2% vs. 1.8%;  $X^2 = 39.53$ ,  $df = 1$ ,  $p < 0.01$ ) and jumping from high places  
30 (6.7% vs. 3.2%;  $X^2 = 7.08$ ,  $df = 1$ ,  $p < 0.01$ ).  
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### Locations of suicide

46 In 'non-missing' cases, the most common location of suicide was person's own residence  
47 (68.0% vs. 12.4% of missing persons;  $X^2 = 263.74$ ,  $df = 1$ ,  $p < 0.01$ ) (Figure 2). Missing  
48 person bodies were mostly found in natural locations, such as bushland, roads, on  
49 beaches/river banks, and under cliffs or mountains (58.2% vs. 11.1% of 'non-missing' cases,  
50  $X^2 = 388.25$ ,  $df = 1$ ,  $p < 0.01$ ). About one quarter of missing persons cases were found in  
51 urban places, such as other person's homes, hotels, or parklands, compared to 17.1% of 'non-  
52 missing' persons ( $X^2 = 12.52$ ,  $df = 1$ ,  $p < 0.01$ ).  
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11 *Characteristics*

12 Table 1 presents socio-demographic, medical and psychiatric characteristics and recent life  
13 events of suicide cases by persons reported as missing prior to death and all other suicides.  
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25 No significant differences between the two groups were found in their age or gender  
26 distribution, but missing persons were significantly more likely to be married (50.9%) and of  
27 non-indigenous ethnicity (97.3%) than other suicide cases. At the time of death, missing  
28 persons more often lived with a spouse (41.6%) or in an institution (5.2%), had at least one  
29 diagnosed mental disorder (49.0%) and had contacts with mental health professionals in last 3  
30 months prior to death (29.9%) (Table 1). In comparison to all other suicides, less missing  
31 persons had a history of drug use (16.0%) or problematic consumption of alcohol (9.3%).  
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38 In terms of history of suicidality, missing persons more often communicated suicide  
39 intent during their lifetime (44.8%) and left a suicide note (43.8%). Similar percentages of  
40 suicides in both groups experienced at least one significant stressful life event preceding  
41 death (about 57%), with most common events recorded in missing persons cases being:  
42 relationship breakdown or separation (14.9%), conflict with partner (13.4%) or other  
43 significant persons (11.3%), bereavement or financial problems (each in 7.7% of cases),  
44 recent unemployment (6.7%) or pending legal matters (6.2%). Nevertheless, no significant  
45 differences were found between the two groups in the prevalence of specific stressful life  
46 events prior to death.  
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54 After adjusting for confounding effects of age and gender, logistic regression analysis  
55 identified several characteristics (independent predictors) differentiating between the two  
56 groups (Table 2). Missing persons were less likely to have lived alone (OR = 0.45; 95% CI =  
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0.26-0.76), yet more likely to be institutionalised at time of death (OR = 3.12; 95% CI = 1.28-7.64). In addition, they were less likely to have a physical illness (OR = 0.64; 95% CI = 0.43-0.95), have a history of problematic consumption of alcohol (OR = 0.52; 95% CI = 0.31-0.87) or drug use (OR = 0.64; 95% CI = 0.41-1.01). In comparison to all other suicide cases, they more often communicated their intent to suicide (OR = 1.58; 95% CI = 1.13-2.22).

- Please, insert Table 2 about here -

## Discussion

The problem of missing persons represents a huge social issue with far-reaching consequences. Even though most people reported missing to Australian police are located within a short period of time (about 85% within a week and 95% within a month)<sup>2</sup>, the trauma faced by family and friends of persons that go missing is considerable. One study found that for every case of a missing person, an average of at least 12 people suffer adverse effects on their quality of life, with over a third of these persons developing physical and/or mental health problems as a direct consequence<sup>3</sup>. This represents an additional health-related burden to the economic costs stemming from searches of missing persons, which were in 1997 estimated to be over \$72 million annually<sup>3</sup>. However, at the moment the knowledge of how many people go missing with the intention to complete suicide remains very limited, due to inconsistencies in classification of missing persons, insufficient inter-agency communication, and lack of rigorous research.

Our study aimed to determine whether persons that die by suicide after being reported as missing person show any distinct characteristics in comparisons to other suicides. Specific characteristics of this group related to their use of suicide methods; while these displayed similar rankings as in suicides by 'non-missing' persons, significant differences in their distributions were observed between the two groups. Bivariate analysis showed that missing persons more often died by motor vehicle exhaust gas toxicity, drowning and jumping, but less frequently by hanging. Further, remains of more than half of missing persons were located in natural, outdoor locations such as bushland, besides roads, on beaches/river banks,

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3 and under cliffs or mountains. This was in contrast with the majority of other suicides (about  
4 two thirds), which occurred in one's own home. While results of our study do not allow for  
5 conclusions on whether the choice of location influenced the selection of suicide method or  
6 *vice versa*, this should be explored in future studies, as it carries significant potentials for  
7 improving searches of missing persons based on the detailed assessment of availability and  
8 accessibility of specific means of suicide in relation to movements of the missing persons.  
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14 In terms of their socio-demographic characteristics, missing persons were more likely  
15 to be married and living with their spouse at time of death. After controlling for confounding  
16 variables, results confirmed that suicide cases by missing persons less often lived alone than  
17 other suicides. Though the data used in our study do not permit any conclusions about the  
18 motives for going missing before death, it is possible that a significant proportion of these  
19 persons were driven by the desire of sparing their significant others the trauma of finding  
20 their dead bodies at home. Additional motives might include attempts to prevent their acts  
21 from being interrupted and thus increase the likelihood of a completed suicide; avoidance of  
22 the stigma attached to suicide for their families; and an attempt to have their deaths declared  
23 '*in absentia*', which would allow survivors to collect insurance premiums.  
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33 Furthermore, suicides by missing persons were found more likely than other suicides  
34 to be institutionalised before death. This is in line with findings from the report on missing  
35 persons in Australia<sup>3</sup>, which showed that 32% of persons had gone missing from an  
36 institution, and more than half of those from a psychiatric or mental health institution.  
37 Psychiatric in-patients are a well-recognised group of persons at high risk for suicide, with  
38 absconding representing an additional factor increasing this risk<sup>14-15</sup>. A recent study<sup>16</sup>  
39 observed distribution of suicide methods among absconders to be different to the patterns  
40 recorded in general population, with smaller frequency of hanging and self-poisoning but  
41 higher proportion of suicides occurring by jumping and drowning. In addition, absconders  
42 were on average found to be young persons, with high rates of schizophrenia, substance  
43 misuse, and medication non-compliance<sup>17</sup>. The need for special attention in allocating  
44 resources when looking for absconders has been highlighted in most guidelines for risk  
45 assessments, yielding immediate police action<sup>18-19</sup>. Though our study did not identify any  
46 suicides among youth that have gone missing from other forms of care such as juvenile  
47 detention or foster care, data from Australian Capital Territory show that these youngsters  
48 account for three-quarters of all young person missing incidents<sup>2</sup>. Often experiencing other  
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3 factors increasing vulnerability (alcohol/drug misuse, adverse social and living  
4 circumstances, inadequate coping skills, etc.), this is a sub-population of missing persons that  
5 also warrants particular attention.  
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10 In terms of physical and mental health, significant differences between the two groups  
11 were only found in the prevalence of physical illness, suggesting that those who went missing  
12 prior to death were less likely to have some physical illness. At the speculative level, this  
13 might indicate that physical health represents a prerequisite for a person to plan and execute  
14 their disappearance, and access remote locations where they choose to suicide. On average,  
15 missing persons' suicides had a higher prevalence of mental illnesses than all other suicides  
16 (recorded in about 50% of cases), yet with no differences in the prevalence of specific  
17 disorders. Though this discrepancy was not confirmed as statistically significant in  
18 multivariate models (which among other factors accounted for placement in a psychiatric  
19 institution at time of death), mental illness undoubtedly represents one of the strongest risk  
20 factors for completed suicide<sup>20-21</sup> and should as such be one of the most vital components of  
21 police protocols used in identifying risk for suicide in missing persons. Compared to 'non-  
22 missing' cases, missing persons more often expressed their suicidal intent and left a suicide  
23 note prior to disappearance. With some studies finding verbal and behavioural clues  
24 indicating intent to suicide in up to 90% of suicidal deaths<sup>22</sup>, this information should be  
25 routinely assessed in all investigations of missing persons and direct immediate search  
26 actions. Frequent communication of intent in missing persons suicides might also be seen as  
27 an indicator of a (more) thought-out suicide plan<sup>11,23</sup>, particularly when that plan includes  
28 complex preparations or travelling to distant locations with minimal chances of their suicide  
29 acts being interrupted. Greater determination to die and smaller impulsiveness in these sub-  
30 population could be confirmed by the lower prevalence of problematic use of alcohol  
31 (including dependence, excessive consumption or frequent binge drinking, associated with  
32 violent or non-violent behaviours) or use of illicit drugs. Based on these results, assessment  
33 of patterns of use of alcohol and drugs – both known to promote impulsive suicidal  
34 behaviours<sup>24</sup> – could serve as a helpful indicator of individuals' risk for self-harm after their  
35 disappearance.  
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#### 38 *Practical implications of the study*

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3 themselves, dividing cases into high-, medium- and low risk. In general, mental health  
4 conditions and signs of suicidality are important factors in determining the category of risk<sup>2</sup>,  
5 yet the frequency and depth with which they are assessed remains unknown. In Australia,  
6 there is currently no standardised form with which information is collected, leaving police  
7 officers to rely on their personal judgment in recognizing most vulnerable cases and deciding  
8 on responses. Clearly, the availability of a statistically sound risk prediction score would be  
9 desirable. A handful of studies to date attempted to evaluate the accuracy of predicting  
10 certain outcomes of lodgement of missing persons' reports. For example, a survey among  
11 friends and relatives of missing persons showed they expressed safety concerns for the  
12 missing person in 19% of cases, yet they turned out be justified only in 1% of cases<sup>3</sup>. On the  
13 other hand, when looking specifically at suicide cases, a study found that nearly 80% of  
14 reporting persons correctly suspected that the missing person had left to die by suicide, since  
15 indication of intent was present for a large majority of cases<sup>8</sup>. Foy further attempted to  
16 identify reasons for going missing: using a list of 26 variables related to disappearances, she  
17 was able to accurately predict 59% of suicide cases, a percentage much lower than in 'foul  
18 play' or 'runaway' cases<sup>8</sup>.  
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### 31 *Strengths, limitations and need for future research*

32 A major strength of this study was its cohort design which allows for comparisons of suicides  
33 by persons reported as missing to police at the time of death with other suicide victims. As  
34 the majority of information used in this analysis was obtained through an interview by police  
35 officers with the deceased's next-of-kin, their accuracy is likely to be influenced by recall  
36 bias resulting from both complex grief following the disappearance and suicide of their loved  
37 one, as well as retrospective recollection of events<sup>25-26</sup>. In addition, our study was unable to  
38 capture all factors that may be relevant to suicidality among missing persons, such as broader  
39 consideration of societal and cultural factors related to their disappearances. In the future, this  
40 limitation could be partly overcome by conducting psychological autopsy interview<sup>27</sup>,  
41 modified in a way to allow for targeted examination of the motivations behind  
42 disappearances. A similar study could be performed with persons reported as missing persons  
43 but whose suicidal acts were interrupted, as they could offer an even more reliable insight  
44 into reasons for going missing before engaging in suicidal behaviours.  
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56 An indefinite number of suicides occur annually by persons whose whereabouts are unknown  
57 but are never reported as missing persons to police<sup>3</sup>, or have failed to be identified as such  
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3 through utilised data sources. This is partly due to confusion created by various definitions of  
4 missing persons and procedures in recording missing person currently used in Australia<sup>19</sup>.  
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6 Achieving uniform classification of missing person and consistency in collections of  
7 resolution details<sup>28</sup> is therefore of paramount importance and represents a crucial milestone in  
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9 advancing with research in this area.  
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## 11 12 13 **Conclusions**

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15 Every year, the total number of missing persons might harbour a significant percentage of  
16 suicides in Australia. Persons officially recorded as ‘missing’ accounted for approximately  
17 2.5% of all suicides considered in this study; however, it should be noted there might be a  
18 bigger than this number of persons who eventually died by suicide but their cause of death  
19 has not been classified as such (i.e., ‘unreported’ cases). Consequently, the global dimension  
20 of the phenomenon can only be estimated but not precisely defined.  
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26 The present study demonstrated several distinct characteristics of suicides by missing persons  
27 compared to all other suicides. Significant differences were evident in terms of suicide  
28 methods and locations where the deceased were found, as well as factors related to living  
29 circumstances and physical and mental well-being. While this area of research is still in its  
30 infancy, it carries significant potential for successful translation of its findings into practice.  
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5 **Contributors:** JS participated in the design of the study, performed the statistical analysis  
6 and contributed to the writing of the paper. LST contributed to the data analysis and the  
7 writing of the paper. DDL conceived the project, participated in the design of the study and  
8 helped to finalize the manuscript for publication. All authors read and approved the final  
9 manuscript.  
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16 Queensland Suicide Register, which was used as the primary data source for the study.  
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19  
20 **Competing interest:** The authors declare that they have no competing of interests as  
21 indicated on the unified competing interest form at [www.icmje.org/coi\\_disclosure.pdf](http://www.icmje.org/coi_disclosure.pdf)  
22 (available on request from the corresponding author).  
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27 **Ethical approval:** The use of data from the Queensland Suicide Register has continuing  
28 ethnical approval from the Griffith University Ethics Committee (GU Ref No:  
29 CSR/02/10/HREC), and use of data from National Coronial Information System has approval  
30 by Department of Justice Human Research Ethics (CF/09/5759).  
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35 **Data sharing:** No additional data available.  
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Table 1. Characteristics of suicides by missing persons and all other suicides.

	Missing persons N (%)	All other suicides N (%)	t	p	
<b>Mean age</b>	41.3 years	41.4 years	-0.074	.941	
	Missing persons N (%)	All other suicides N (%)	Chi square	df	p
<b>Gender</b>			0.004	1	.948
Male	153 (78.9)	5965 (79.1)			
Female	41 (21.1)	1580 (20.9)			
<b>Marital status<sup>†</sup></b>			8.416	1	<b>.004</b>
Married	81 (50.9)	2464 (39.5)			
Not-married	78 (49.1)	3768 (60.5)			
<b>Ethnicity</b>			4.656	1	<b>.031</b>
Indigenous	5 (2.7)	469 (6.7)			
Non-Indigenous	180 (97.3)	6542 (93.3)			
<b>Remoteness area</b>			1.455	2	.483
Metropolitan	116 (60.1)	4147 (56.3)			
Regional	69 (35.8)	2814 (38.2)			
Remote	8 (4.1)	409 (5.5)			
<b>Employment status<sup>†</sup></b>			3.456	2	.178
Employed	77 (47.5)	2627 (41.0)			
Unemployed	42 (25.9)	1691 (26.4)			
Not in labour force	43 (26.5)	2091 (32.6)			
<b>Living arrangements<sup>†</sup></b>			29.142	3	<b>.000</b>
With spouse	64 (41.6)	1776 (29.1)			
Alone	21 (13.6)	1836 (30.1)			
Institution	8 (5.2)	121 (2.0)			
Other arrangements	61 (39.6)	2365 (38.8)			
<b>Physical and mental health</b>					
Physical illness (at least one)	48 (24.7)	2331 (30.9)	3.363	1	.067
Diagnosed mental illness (at least one)	95 (49.0)	2995 (39.7)	6.782	1	<b>.009</b>
Undiagnosed/suspected mental illness	42 (21.6)	1274 (16.9)	3.042	1	.081
Contact with mental health professional (last 3 months)	58 (29.9)	1772 (23.5)	4.306	1	<b>.038</b>
Drug use	31 (16.0)	1729 (22.9)	5.179	1	<b>.023</b>
Problematic alcohol use	18 (9.3)	1317 (17.5)	8.859	1	<b>.003</b>
<b>Expressions of suicidality</b>					
Communicated suicidal intent (lifetime)	87 (44.8)	3011 (39.9)	5.078	1	<b>.024</b>
Past suicide attempt (lifetime)	36 (18.6)	2109 (28.0)	2.377	1	.123
Suicide note	85 (43.8)	2767 (36.7)	4.145	1	<b>.042</b>
<b>Preceding stressful life event</b>					
Any life event	111 (57.2)	4349 (57.6)	0.014	1	.906
Relationship breakdown, separation	29 (14.9)	1451 (19.2)	2.243	1	.134

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Conflict with partner	26 (13.4)	736 (9.8)	2.834	1	.092
Conflict with other persons	22 (11.3)	670 (8.9)	1.406	1	.236
Bereavement	15 (7.7)	608 (8.1)	.236	1	.869
Pending legal matters	12 (6.2)	561 (7.4)	.431	1	.512
Financial problems	15 (7.7)	585 (7.8)	.000	1	.991
Recent unemployment	13 (6.7)	402 (5.3)	.703	1	.402
Work/school problems	9 (4.6)	395 (5.2)	.136	1	.712

Note: P values in bold denote statistical difference at level  $p < 0.05$

† Cases with unknown or missing value were excluded (Marital status: 1348 or 17.4%, Ethnicity: 543 or 7%, Remoteness area: 176 or 2.3%, Employment status: 1168 or 15.1%, Living arrangements: 1487 or 19.2%)

Table 2. Results of binary logistic regression - independent factors differentiating between suicides by missing persons and all other suicides.

	$\beta$	S.E.	OR	95 % CI	
				Low	High
Institutionalisation	1.14	0.46	3.12*	1.28	7.64
Living alone	-0.80	0.27	0.45**	0.26	0.76
Physical illness	-0.45	0.20	0.64*	0.43	0.95
Problematic use of alcohol	-0.66	0.27	0.52**	0.31	0.87
Drug use	-0.45	0.23	0.64*	0.41	1.01
Communication of suicide intent – lifetime	0.46	0.17	1.58**	1.13	2.22

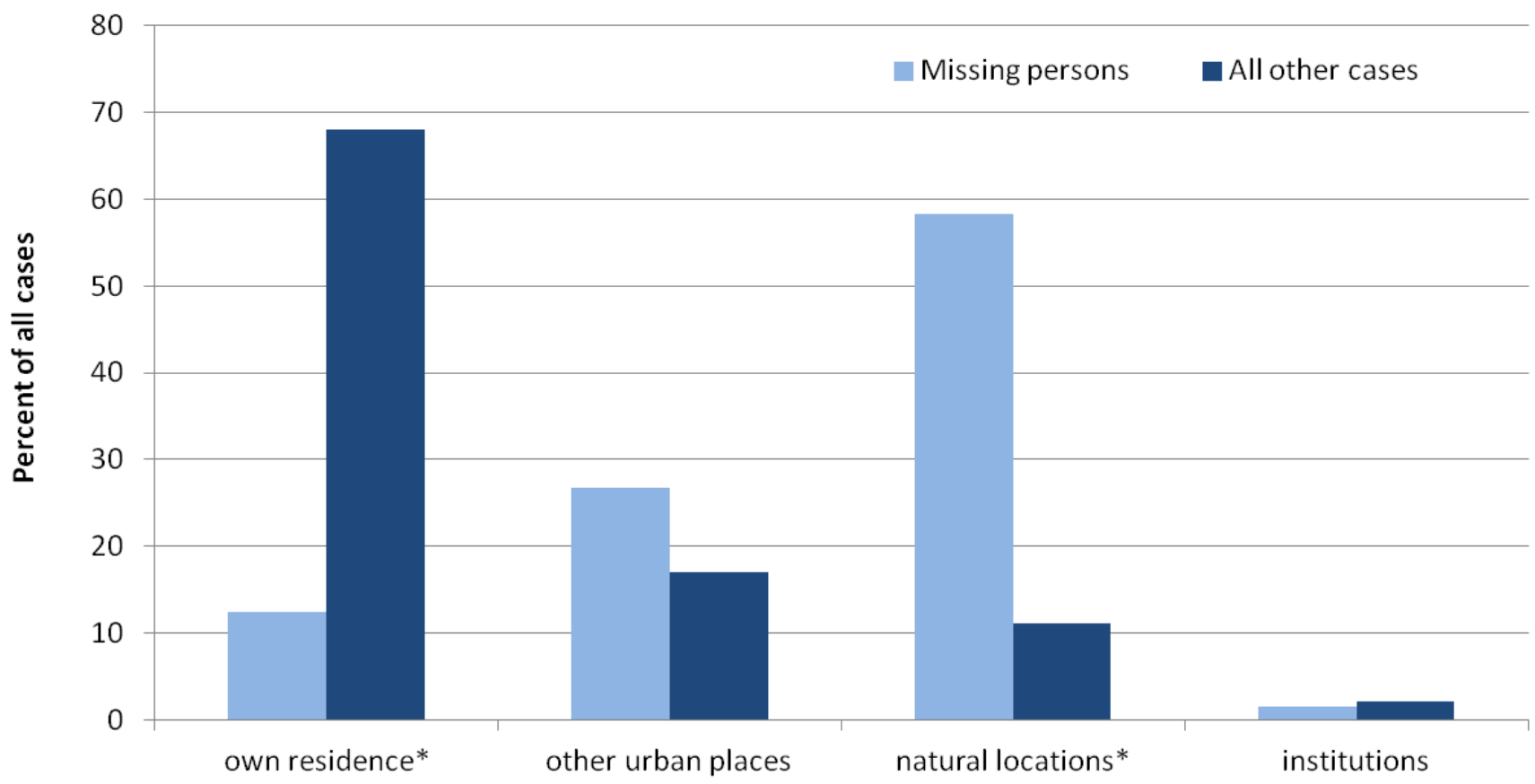
Note: Variables entered into regression analysis included: age, gender, marital status, ethnicity, suicide note, mental illness, recent contact with mental health professional, physical illness, lifetime communication of suicide intent, alcohol use, drug use, living with spouse, living alone, institutionalisation.

\* $p < 0.05$ , \*\*  $p < 0.01$



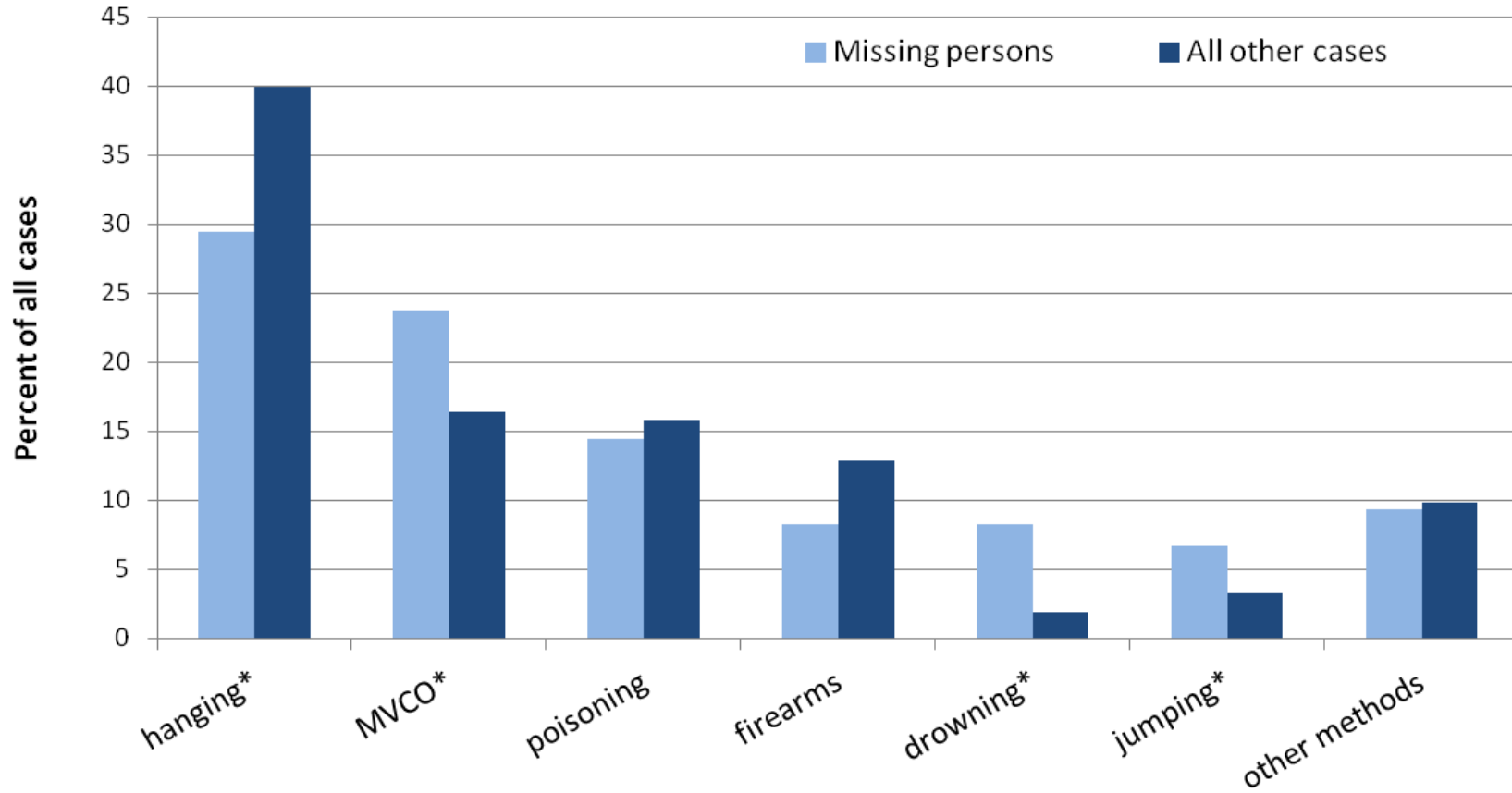
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Figure 2. Locations of suicide by missing persons and all other cases



\* Difference is significant at level  $p < 0.05$

Figure 1. Suicide methods by missing persons and all other cases



\* Difference is significant at level  $p < 0.05$