

# Suicidal Ideation, Quality of Life, and Psychometric Outcomes in Taiwanese Military Personnel with Subjective Hypersomnia or Insomnia

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## Abstract

**Background:** To clarify the symptom discrepancies in suicidality, psychiatry outcomes, and quality of life (QOL), we did a cross-sectional study recruiting military personnel with hypersomnia or insomnia in three camps in northern Taiwan. **Methods:** With consents of volunteer audience attending a one-hour mental health education program, all qualified active service military personnel were asked to fill out copies of questionnaire describing their current situation. **Results:** About one-fourth of the 135 samples admitted their current condition of subjective feelings of insomnia (28.15%) or hypersomnia (24.44%), but < 15% of them had ever asked health providers for psychological or clinical help. Compared with controls without any sleep problem, individuals with suicidal ideation in the other two groups were more prevalent, with higher anxiety, depression, and significantly lower total score of QOL ( $p < 0.05$ ). The insomnia group was significantly unsatisfied with their sleep the most ( $p < 0.001$ ). The hypersomnia group showed significantly higher mean scores of irritability ( $p < 0.001$ ). Those findings were more vigorous and predominate even adjusting for confounding effects of age and sex. **Conclusion:** This study revealed a different prevalence and adversity between subjective insomnia and hypersomnia groups among military population. Further relevant evaluation and management are warranted.

**Key words:** Beck Depression Inventory-Second Edition, irritability, Pittsburgh Sleep Quality Inventory, World Health Organization Quality of Life-BREF

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## Introduction

Growing awareness exists in having associations of sleep disturbances and comorbidity of physical and psychiatric disorders, quality of life (QOL) [1], and suicidality [2-4] in the community. A meta-analysis in 2019 supports that sleep disorders, particularly nightmares and insomnia, increase the risk of suicidal behavior in depressed patients [3]. Another research based on 423 patients with hypersomnia reported that hypersomnia is associated with lifetime suicidal attempt, poor outcome in acute depression and bipolarity [2]. Evidence exists to prove that insomnia can also have a determinative impact on both psychiatry and physical QOL in the general population [1]. In hypersomnia, the cross-sectional 2016 US National Health and Wellness Survey showed that persons with

the symptoms of excessive sleep are associated with higher prevalence of comorbidities, reduced health-related QOL, and greater impairment in productivity than those without [5].

In military population, the association between sleep problems (both insomnia and hypersomnia) and suicidality of military recruits in Taiwan has been established [4]. A survey in the US Army, Navy, and Air Force in 2010 has shown a prevalence of 24.7% for insomnia (and 27.2% of them for obstructive sleep apnea) [6]. Another study in the US Army indicated that insomnia is the most commonly reported symptom and a predictor for other symptoms of posttraumatic stress disorder [7]. In this study, we intended (a) to study the

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prevalence of subjective measured insomnia and hypersomnia among military population and (b) to explore the discrepancy between those two groups compared to controls in suicidal ideation and other psychiatry outcomes.

## Methods

This is a cross-sectional survey study. The experimental protocol was approved by the institutional review board at Tri-Service General Hospital, National Defense Medical Center in Taipei, Taiwan (protocol number = TSGHIRB 1-108-05-147 and date of approval = September 18, 2019) with the need for obtaining informed consent from the study participants.

### Study participants

All the study participants in this study were recruited from military personnel in three camps in northern Taiwan. First, we delivered an education program and an introduction, and then the whole audience was asked to join this study. We recruited 135 qualified participants totally. The study participants did not have any dropout or withdrawal from the study.

### Study procedures

In three military bases in northern Taiwan during March 2020, a series of two-hour suicidal prevention psycho-education programs were provided. All the participants, military active duty personnel, were recruited to join this study and filled out copies of questionnaire with their consents. The copies of the questionnaire included basic demographic data, five-item Brief Symptom Rating Scale (BSRS-5), Beck's Depression Inventory in Second Edition (BDI-II) for assessing participants' depression levels, Beck's Anxiety Inventory in Second Edition (BAI-II) for assessing participants' anxiety level, World Health Organization QOL-BREF (WHOQOL-BREF) for assessing their QOL, and Affective Reactivity Index (ARI) for assessing participants' levels of irritability (emotional dysregulation). For assessing participants' sleep problems, we used Insomnia Severity Index (ISI) and Pittsburgh Sleep Quality Index (PSQI) for assessing participants' insomnia condition and sleep satisfaction, respectively.

The participants' suicidal ideations were derived from the sixth item of BSRS-5. In addition, the participants' insomnia and hypersomnia conditions were derived from the participants' self-administered BDI scores as  $> 1$  in "16 a" item (I sleep somewhat more than usual) and "16 b" item (I sleep somewhat less than usual), respectively. Because those sleep-related questions are mutually contradictory, none of our samples suffered both hypersomnia and insomnia in this study.

With a series of simple "yes or no" questions, we also collected participants' experiences of calling for help about their experience for any consultation service offered by a psychologist or a psychiatrist, and any crisis intervention at the military suicide prevention center.

### Measures

#### Beck's Depression Inventory, Second Edition

The BDI-II, developed by Aaron T. Beck et al. [8], is a self-administered questionnaire, consisting of 21 multiple-choice

questions, which are scored on a 4-point Likert scale (0–3 points). It is one of the most commonly used instruments for measuring the severity of depression, with the global scores ranging from 0 to 63. A higher global score indicates greater severity of depression and associations with poor QOL among military recruits [9]. The reliability and validity of the Chinese version of BDI-II had been proven [10]. In this study, the individuals' subjective measured conditions of insomnia or hypersomnia were derived from their self-administered BDI-II scores as  $> 1$  in item "16 a" (I sleep somewhat more than usual.) and item "16 b" (I sleep somewhat less than usual), respectively.

#### Beck's Anxiety Inventory, Second Edition

BAI was also developed by Aaron T. Beck et al. [11]; similar to BDI-II, it is a self-administered instrument with 21 four-point Likert scale (0–3 points) questions. BAI-II is found to be a useful screening tool to detect the severity of an individual's anxiety. A high global score of BAI-II indicates considerable anxiety. The validity and reliability of the Chinese version of BAI have been established elsewhere [12].

#### World Health Organization Quality of Life-BREF Taiwan Version

The WHO developed a cross-culturally valid assessment of QOL named WHOQOL-BREF with 26 five-point Likert scale (1–5 points) items [13, 14]. The Chinese version of WHOQOL-BREF Taiwan consists of two additional appropriate culture-related items added by Taiwanese scholars [15]. With four domains, namely, physical, psychological, social, and environmental, a higher global or domain score indicates better QOL. The reliability and validity of the scales have been documented [15].

#### Irritability: Affective Reactivity Index

The ARI was developed as a dimensional measurement of irritability and impairment of emotional dysregulation with a self-report form [16]. This questionnaire, which is used to assess the symptoms of irritability in the previous six months, is composed of the sixth item on ARI-irritability, and the seventh item on functional impairment (ARI-impairment). The questionnaire is rated on a 3-point scale (ranging from 0 for "not true" to 2 for "certainly true"). The reliability and validity of the ARI in youth population have been confirmed [17]. The Chinese version of ARI has been widely used in relevant studies [18, 19].

#### Pittsburgh Sleep Quality Index

The PSQI was developed by Buysse et al. in 1989 [20] as a common self-assessment tool of sleep quality, which categorizes sleep quality into "poor" from "good" sleep by measuring seven areas of sleep quality [21], namely, sleep efficiency, sleep latency, average sleep disturbance per week, hours of actual sleep, subjective sleep quality, daytime dysfunction, and use of sleeping medication per week. Each component is scored with 0–3 points with a maximal possible score of 21. A higher score indicates poorer sleep quality. In

general, subjects with excellent sleep quality show their total PSQI score less than five. In 2005, a Chinese version of the PSQI was developed by Tsai et al. [22], showing an overall good reliability and validity.

### Insomnia Severity Index

The ISI is a simple and practical measurement to briefly screen patients with insomnia in clinics and also is a tool to easily assess treatment outcome in research [23]. The ISI consists of seven items of five-point Likert scales from 0 (no problem) to 4 (very severe problem). A cutoff score of 10 is suggested (86.1% sensitivity and 87.7% specificity) in detecting insomnia cases in the community sample [24]. The Chinese version of ISI has shown good reliability and validity (with PSQI) in the ethnic Chinese population [25].

### Five-item Brief Symptom Rating Scale

The BSRS-5 was originally designed as a screen tool for psychiatric illness screening in nonpsychiatric health settings [26]. In addition to the five-symptom items of anxiety, depression, hostility, interpersonal sensitivity/inferiority, and insomnia, the modified BSRS-5 by adding the sixth item of current suicidal ideation has been used as an effective screening instrument for suicidal ideation [27]. The validity and reliability of BSRS for the Taiwanese have been published by Lee et al. in 1990 [28]. In this study, the individuals' suicidal ideations were derived from the sixth item of BSRS-5.

### Statistical analysis

All the samples were categorized into three groups according to their self-reported subjective sleep conditions (insomnia, or hypersomnia) and normal control groups. Descriptive analyses were used to present the samples' demographic characteristics. Then, we compared the differences among the three groups with Chi-square models for categorical variables, and with the analysis of variance models for continuous variables. We also used logistic regression models to compare the effects (beta) of psychological factors on sleep outcomes adjusting for effects of age and sex. We arbitrarily categorized those relevant factors into four different groups, namely, sex, age, anxiety and depression, as well as irritability and related impairment, and four dimensions of QOL, to create four models (models 1, 2, 3, and 4) for controlling those variables. Accordingly, we designed four statistical models in logistic regression analysis with sex and age as confounders.

All the statistical analyses were done using the Statistical Package for Social Science version 25 (SPSS Inc., Chicago, Illinois, USA). Differences between groups were considered significant if  $p < 0.05$ .

## Results

In this study, we defined participants' sleep problems by their subjective responses of item 16 of the BDI-II according to their current one-week situation. The hypersomnia and insomnia groups were categorized by a score greater than one in item "16 a" (I sleep somewhat more than usual) or a score greater than one in item "16 b" (I sleep somewhat less

than usual), respectively. Because these two are mutually contradictory with each other, none of our samples suffered both hypersomnia and insomnia at the same time in this study.

A total of 135 dominantly male samples of active service military personnel recruited in this study admitted their current subjective sleep condition as insomnia (28.15%) or hypersomnia (24.44%) or none (47.41%). Table 1 lists the sociodemographic data, self-administered current suicidal ideation, and experiences of calling for helps among samples with different sleep problems. Table 2 describes the results of comparisons in outcomes of sleep "(with the tools of PSQI and ISI), QOL, anxiety (BAI-II), depression (BDI-II), BSRS-5, and irritability (ARI) among groups. Using logistic regression models, the comparison effects (beta) of psychological factors on sleep outcomes with adjusting effects of age and sex in hypersomnia and insomnia groups are described in Table 3.

## Discussion

In this study (Table 1), military personnel with subjective insomnia (28.15%) were more prevalent than those with hypersomnia (24.44%). There was no significant difference between genders, educational levels, or marital status among groups. In suicidal ideation derived from the individuals' responses for the sixth item in BSRS-5, significantly more percentage (33.33%) of the hypersomnia group revealed various levels of suicidal ideation compared to that of the insomnia group (7.89%) and the control group (12.5%,  $p = 0.001$ , Table 1). Our findings support those of the abovementioned meta-analysis study in 2019 [3]. The authors of that article [3] reported that hypersomnia is associated with lifetime suicidal attempt, poor outcome in acute depression, and bipolarity [2].

Compared to control group, both insomnia and hypersomnia groups (Table 2) showed to be significantly higher in the severity magnitudes of anxiety, depression, and irritability ( $p < 0.05$ ), but not the social impairment result from irritability. As mentioned above, the presence of insomnia can have impacts on both psychological and physical QOL and suicidality [1, 5]. But this study is the first study showing that the presence of hypersomnia was also associated with adversities such as insomnia among military personnel.

After adjusting for the effects of age and sex, some associations mentioned above vanished (Table 3). In the insomnia group, a positive association with depression remained. In the hypersomnia group, both symptoms of anxiety and depression remained (model 2 in Table 3). There are many reasons to explain the association between hypersomnia and anxiety, for example, bipolar disorder, substance use, and some other secondary causes [29]. A strong association was noted between hypersomnia and irritability, which was not observed in the insomnia group (model 3 in Table 3). The strong association between hypersomnia and irritability highly implicates the comorbidity of major depression [2] and the alternative possibility of mixed feature of bipolarity as (hypo) manic switches [2]. But we suggest that those assumptions warrant to be clarified through further longitudinal investigations.

**Table 1.** The sociodemographic data and self-administered current situations of suicidal ideation and experiences of calling for help among samples with different sleep problems

	Control, <i>n</i> (%)	Insomnia, <i>n</i> (%)	Hypersomnia, <i>n</i> (%)
N	64 (47.41)	38 (28.15)	33 (24.44)
Sex (male)	53 (82.81)	27 (71.05)	30 (90.91)
Age (range)	18.83-39.92	19.17-39.50	20.00-40.92
Age (years), mean $\pm$ SD	25.93 $\pm$ 5.81	27.78 $\pm$ 5.56	27.95 $\pm$ 5.39
Education			
Junior high-school or lower	0	2 (5.26)	0
Senior high school or occupational school	25 (39.06)	8 (21.05)	10 (30.30)
College, university, or higher	38 (59.38)	28 (73.68)	22 (66.67)
Marriage			
Single	46 (71.88)	26 (68.42)	24 (72.73)
Married	15 (23.44)	6 (15.79)	9 (27.27)
Others	2 (3.13)	6 (15.79)	0 (0)
Suicide ideation (according to BSRS-5) <sup>†</sup> , ***			
Mild	1 (1.56)	1 (2.63)	7 (21.21)
Moderate	0	1 (2.63)	3 (9.09)
Severe	0	1 (2.63)	1 (3.03)
Psychologist consulting ever	4 (6.25)	5 (13.16)	1 (3.03)
Psychiatry visiting ever	4 (6.25)	1 (2.63)	2 (6.06)
Calling for any crisis intervention ever (1985 hotline)	0	0	1 (3.03)
Calling for suicide aid hotline ever (0800395995)	0	0	0

\*\*\* $p < 0.001$ , using Chi-square test or Fisher's exact test or ANOVA when appropriate;

<sup>†</sup>The suicidal ideation is derived from the participants' responses for the sixth item in BSRS as one as none, two as mild, three as moderate, and four as severe suicidal ideation levels.

SD, standard deviation; BSRS, Brief Symptoms Rating Scale; ANOVA, analysis of variance

**Table 2.** The comparisons of outcomes of sleep, quality of life, anxiety, depression, Brief Symptoms Rating Scale-5, and emotion dysregulation among samples with current different sleep disturbances

	Control (C)	Insomnia (I)	Hypersomnia (H)	Statistics (ANOVA) ( <i>F</i> , <i>p</i> )
<i>n</i>	64	38	33	
PSQI disturbance***	4.38 $\pm$ 3.83	8.82 $\pm$ 4.54	8.40 $\pm$ 4.54	15.00, < 0.001
PSQI dissatisfaction***	0.71 $\pm$ 0.68	1.67 $\pm$ 0.80	1.07 $\pm$ 0.62	18.74, < 0.001
ISI (total)***	8.61 $\pm$ 3.88	14.30 $\pm$ 4.33	12.30 $\pm$ 5.90	16.96, < 0.001
ISI hard to falling sleep***	0.26 $\pm$ 0.56	1.19 $\pm$ 1.08	0.81 $\pm$ 1.04	12.47, < 0.001
ISI length of sleeping***	0.42 $\pm$ 0.72	1.72 $\pm$ 1.11	1.15 $\pm$ 1.10	19.78, < 0.001
ISI early awaking**	0.57 $\pm$ 0.82	1.32 $\pm$ 1.14	1.22 $\pm$ 1.28	6.54, < 0.01
ISI dissatisfaction***	2.29 $\pm$ 0.92	3.47 $\pm$ 0.84	2.85 $\pm$ 0.91	17.77, < 0.001
QOL (total)**	89.79 $\pm$ 14.59	79.86 $\pm$ 16.4	79.50 $\pm$ 12.23	7.95, 0.001
QOL physical***	23.08 $\pm$ 4.22	19.62 $\pm$ 3.99	19.87 $\pm$ 3.42	11.75, < 0.001
QOL psychological**	19.38 $\pm$ 3.39	17.32 $\pm$ 4.33	17.30 $\pm$ 4.05	4.83, < 0.01
QOL social*	15.67 $\pm$ 2.92	14.16 $\pm$ 3.72	14.53 $\pm$ 2.74	3.12, < 0.05
QOL environmental **	31.63 $\pm$ 5.59	28.91 $\pm$ 5.68	28.20 $\pm$ 4.23	5.54, < 0.01
Anxiety***	23.64 $\pm$ 4.08	29.57 $\pm$ 8.29	33.04 $\pm$ 11.37	18.17, < 0.001
Depression***	2.92 $\pm$ 4.69	11.80 $\pm$ 8.68	12.21 $\pm$ 9.25	26.48, < 0.001
BSRS total score***	1.45 $\pm$ 2.45	5.03 $\pm$ 4.46	4.88 $\pm$ 4.02	16.65, < 0.001
ARI irritability**	6.90 $\pm$ 1.71	8.00 $\pm$ 2.96	8.55 $\pm$ 2.53	5.73, < 0.01
ARI impairment	1.32 $\pm$ 0.65	1.57 $\pm$ 0.73	1.52 $\pm$ 0.51	1.78, NS

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ , using the ANOVA.

The anxiety scores were derived from BAI-II.

The depression scores were derived from BDI-II.

ARI, Affect Reactivity Index; PSQI, Pittsburgh Sleep Quality Index; ISI, Insomnia Severity Index; QOL, WHOQOL-Brief; NS, nonsignificance; ANOVA, analysis of variance; BAI-II, Beck's Anxiety Inventory, Second Edition; BDI-I, Beck's Depression Inventory, Second Edition

**Table 3.** Comparison effects (beta) of psychological outcomes with adjusting effects of age and sex in logistic regression models

	Model 1		Model 2		Model 3		Model 4	
	Insomnia	Hypersomnia	Insomnia	Hypersomnia	Insomnia	Hypersomnia	Insomnia	Hypersomnia
Sex	-0.75 ± 0.5	0.50 ± 0.71	-0.61 ± 0.68	2.64 ± 1.50	-0.98 ± 0.56	0.58 ± 0.88	-0.87 ± 0.59	0.66 ± 0.83
Age	0.06 ± 0.04	0.06 ± 0.04	0.14 ± 0.05**	0.09 ± 0.05	0.07 ± 0.04	0.09 ± 0.05*	0.11 ± 0.05*	0.09 ± 0.05*
Anxiety			0.01 ± 0.07	0.14 ± 0.07*				
Depression			0.27 ± 0.08***	0.17 ± 0.07*				
ARI (irritability)					0.20 ± 0.13	0.47 ± 0.15**		
ARI (impairment)					0.21 ± 0.39	-0.22 ± 0.49		
QOL physical							-0.34 ± 0.11**	-0.27 ± 0.11*
QOL psychological							-0.02 ± 0.12	0.01 ± 0.11
QOL social							0.12 ± 0.16	0.11 ± 0.14
QOL environmental							0.02 ± 0.08	-0.05 ± 0.09

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ , using ANOVA.

Model 1, adjusting for sex, age;

Model 2, adjusting for sex, age, anxiety, and depression;

Model 3, adjusting for sex, age, irritability, and impairment due to irritability;

Model 4, adjusting for sex, age, and four items of QOL. ANOVA, analysis of variance;

QOL, quality of life

Among the four different subtypes of QOL of samples, only the physical QOL was significantly associated with insomnia and hypersomnia (model 4 in Table 3) after adjusting for the effects of sex and age. But psychological QOL did not reach the significant threshold in other subtypes of QOL. In our opinion, that finding might result from a specific stressful environment of our active service personnel in the military.

Less than 10% of the hypersomnia group and about 15% of the insomnia group had ever asked for psychological or clinical help before the study and none of them had called a crisis intervention or suicide hotline before (Table 1) in spite of the higher prevalence of suicidality and psychological sufferings. We suggest that this finding may result from the specific military culture in either Taiwan or other countries. According to Eugenia Weiss and Jose E. Coll's research [30], US military service personnel tend to underreport their mental health symptoms. Those with symptoms are reluctant to seek out mental health services and if they do engage in treatment, they prematurely drop out of services. They may either worry about loss of promotion, medical discharge, or stigma in the troop [30]. Therefore, relevant education and management programs are needed for the availability and compliance of military health providers.

### Study limitations

The readers are cautioned not to overinterpret the study findings because of the following four major limitations of this study.

- Our dominantly male sample and cross-section study design prohibit our results from generalization to other populations and long-term effects without further examination. It is also noteworthy that the age of the participants in this study positively associated with both insomnia and hypersomnia even adjusting for the effects of other factors in models 2, 3

(hypersomnia only), and 4 of Table 3. The psychological and physical changes with age among military personnel might be a critical consideration and warrant further investigations with chronological study designs.

- The one-item subjective outcome measurements of insomnia and hypersomnia lump up all possible etiologies together. Much valuable information might be lost, namely, comorbid psychological or physical problems, side effects of medicine, substance use, or adverse stressful environment.
- In this study, we used an irritability inventory, ARI, originally designed for child and adolescent population.
- The arbitrary regression models selected in this study were based on the clinical experiences of authors. That might be also limited by researchers' bias. Therefore, more precise instruments, further regression models, and clustering methods are warranted for further study with a larger sample size and further detailed information about physical condition and substance use.

### Study summary

This study revealed the higher prevalence of insomnia and a greater adversity of hypersomnia among military personnel in Taiwan. In particular, individuals with hypersomnia were also associated with greater levels of irritability. Only < 10% of the hypersomnia group and about 15% of the insomnia group have asked for psychological or clinical help previously. Further relevant psycho-neurological mechanisms and clinic implications warrant future studies with larger sample size and chronologic study designs. Relevant education and management programs are emphasized here for the mental health of military personnel, especially for those with sleep problems.

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## Conflicts of Interest

The authors declare no conflicts of interest in writing this report.

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