Original Article

A Study of Well-being in Drunken Driving Recidivists

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Abstract

Objectives: Drunk driving is related to accidents and poorer health, as well as causes a considerable economic cost. In this study, we intended to determine which sociodemographic factors can reduce health-related quality of life (QoL). **Methods:** We recruited 552 drunken driver recidivists and measured their alcohol use history and sociodemographic factors. We used the Alcohol Use Disorders Identification Test (AUDIT) and the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) criteria to evaluate severity of alcohol disorder. Psychological distress was measured using Beck Depression Inventory-II (BDI-II) and the status of well-being using the Short Form 12-Health Survey Questionnaire. We classified into several categories and analyzed with one-way analysis of variance or the Welch's test. Significant factors were further divided into subcategories for comparisons. **Results:** Alcohol use disorder according to DSM-5 criteria was found to be 34.2% mild, 16.7% moderate, and 44.7% severe in severity. The Depression Index according to BDI-II showed 70.5% in minimal, 13.2% mild, 10.5% moderate, and 5.8% severe depressed participants. In comparing subcategories according to the physical component summary (PCS), men who were older ($p < 0.05$), had fewer than 6 years of education ($p < 0.001$), unemployed ($p < 0.05$), homeless ($p < 0.05$), had monthly incomes below 15 thousand New Taiwan dollars ($p < 0.05$), and AUDIT scores ≥ 20 for severe depression ($p < 0.001$) had significantly lower QoL in PCS. In comparing subcategories according to the mental component summary (MCS), men who were unemployed ($p < 0.05$), homeless ($p < 0.01$), and AUDIT ≥ 20 for severe depression ($p < 0.001$) also had significantly lower QoL on MCS. **Conclusion:** Unemployment, homelessness, AUDIT scores ≥ 20, and higher BDI-II scores showed a reduction not only in PCS scores but also in MCS scores. Those findings could be used to determine the drunk drivers' behaviors and the well-being among those recidivists. Instead of incarceration or fining for drunk drivers, we need identification and referring them to treatment in those population, especially individuals with poor socioeconomic status, depression, and severe alcohol use disorder.

Key words: Mental component of summary, physical component summary, quality of life, the Alcohol Use Disorders Identification Test
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Introduction

Alcohol use is a leading risk factor for global disease burden. It causes substantial health loss, and contributes to many injuries through drunken driving [1]. Alcohol intoxication cause reduced cognitive and psychomotor abilities. Such impairment through alcohol increases the risk of a road traffic crash as well as the severity and related outcome of the injuries. The risk of traffic accident is increased when the driver consumes alcohol. Previous studies indicated that drunken driving can impair performance on motor tasks (i.e., tracking, tapping, reaction time, etc.) and cognitive processes (i.e., perception and judgment) [2-5]. Thus, laws against drunken driving are enforced by the police and adjudicated by the courts, playing a leading role in the effort to keep people from driving while drunk. According to Taiwanese law, drunk drivers with blood alcohol concentration (BAC) between 0.15 and 0.24 mg/L can be indicted for the crime of public endangerment. Individuals with a BAC over 0.25 mg/L commit the crime of public endangerment and can be sentenced to a two-year imprisonment. Many studies have focused on how drinking affects traffic safety, but few of them have studied how alcohol affect the health status among those population.

Drunk drivers are the victims of harms of alcohol and related to health consequences [1, 6]. Alcohol use disorder affects about 5% - 15% of people in Western and Eastern

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countries [7, 8]. But once alcohol use disorder has been developed, reduced psychomotor and cognitive abilities may not be aware because of physical tolerance causing a long-term neuroadaptation. Meanwhile, drinking leads to a wide range of social harms, and impairs the well-being among drinkers. Quality of life (QoL) is a concept that focuses on measuring a person's perception of well-being including physical, mental, emotional, and social functioning. It has become a generally accepted measurement of outcomes in clinical research about health and disease over the past 40 years [9, 10]. In an American study on 1,333 people from primary care settings, the investigators found that a person with binge drinking or frequent, high-quantity drinking has markedly lower QoL compared with one in a normal population [11]. A study in Edinburgh, the United Kingdom revealed similar results that alcohol-dependent patients have much poorer QoL than healthy control and that more substantial costly resources have been used [12]. Evidence indicated that the severity of alcohol use disorder can affect the level of QoL and social functioning [13, 14]. Moreover, patients with alcohol use disorder have QoL impairments moderated by the following demographics, such as the elderly [15-17], women [16-18], people who are less educated [15, 16], those who are unemployed [16], singles [19], as well as individuals with somatic comorbidity [17] and depression [20]. When it comes to drunken driving, offenses are related to factors of age, marital status, race/ethical status, and specific personality characteristics (such as sensation seeking, hostility, depression, and psychopathic deviance) [21, 22].

Few studies have investigated drunken driving recidivists from the health aspects and its relation with alcohol use disorder. Therefore, we in this study intended to study the characteristics of drunken driving recidivists from the aspect of well-being, and the influence of variables on the QoL.

Methods

Study subjects

This study was carried out during 2015 and 2016. In this study, we enrolled 844 male drunk-driving offenders who were referred through Tainan Detention Center. Three qualified psychiatrists did comprehensive diagnostic interviews on the study participants, to identify alcohol use disorder. We also obtained study participants' sociodemographic characteristics (age, years of education, employment status, monthly income, marital status, housing, and history of alcohol use (age at the first drink, duration of habitual drinking, harm and consequences, and number of drunk-driving offenses), and a copy of standardized questionnaire. The alcohol use disorders identification test (AUDIT) and *the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5)* criteria were used to evaluate the severity of alcohol use disorder. We measured well-being among participants with the Short Form 12 (SF12) Health Survey Questionnaire. The Chinese version of the Beck Depression Inventory-II (BDI-II) was used to measure psychological distress. We excluded 292 participants because they did not fill out the copies of questionnaire completely. This study protocol was approved by the Institutional Review Board of Jianan Psychiatric Center with the need to obtain signed informed consents from study participants.

Assessment tools

The alcohol use disorders identification test (AUDIT)

AUDIT is a ten-item questionnaire which was first developed by the WHO in 1989 and is to assess the quantity and frequency of alcohol intake (questions 1 and 2), times of binge drinking (question 3), symptoms of dependence (questions 4–6), and alcohol-related problems (questions 7–10). Each question is scored from 0 to 4 yielding a total maximum score of 40. AUDIT has been proven to be a reliable and valid screening instrument [23-29].

In this study, total AUDIT scores were divided into four groups: (a) scores 0–7, (b) scores 8–15, (c) scores 16–19, and (d) scores over 20. The cutoff points were based on the WHO recommendations.[30] Alcohol use disorder was also evaluated based on *DSM-5* criteria, and the severity was further divided into four subcategories: (a) none, defined as those who did not meet the criteria for alcohol use disorder; (b) minor, defined as those who presented with two to three of the eleven diagnostic criteria; (c) moderate, defined as those who presented of four to five of the 11 diagnostic criteria, or (d) severe, defined as those who presented with at least 6 of the 11 diagnostic criteria.

Beck Depression Inventory-II (BDI-II)

BDI-II is a self-reported questionnaire containing 21 statements derived from the BDI. The reliability and validity of the BDI-II for screening for depression in different populations is good with an internal consistency around 0.9; test-retest reliability ranged from 0.73 to 0.96 [31-34]. In the Chinese version, the internal consistency, reliability, and stability have also been shown to be strong [35]. The severity of depression was divided into four subcategories: (a) minimal or no depression, defined as total BDI-II scores ranging from 0 to 13; (b) mild depression, defined as scores ranging from 14 to 19; (c) moderate depression, defined as scores ranging from 20 to 28; and (d) severe depression, defined as scores ranging from 29 to 63.

The Short Form12 Health Survey Questionnaire (SF12)

Well-being among participants was measured using SF12. This questionnaire is a 12-item, self-administered questionnaire which has been derived from the SF36 Health Survey Questionnaire. Reliability and validity of the SF12 have been examined in several studies, and the results showed that it can be used in various populations [36, 37]. The SF12 consists of eight domains: (a) physical functioning (PF), (b) rôle physical (RP), (c) bodily pain (BP), (d) general health (GH), (e) energy/fatigue (VT), (f) social functioning (SF), (g) rôle emotional (RE), and (h) mental health (MH). Scores in each domain are ranged from 0 to100.

Two summary scores, the physical component summary (PCS) and the mental component summary (MCS), can be

extracted from the scores of these eight domains. The scales of PF, RP, BP, and GH are used to measure PCS, and the scales of VT, SF, RE, and MH were for MCS. Physical and mental regression weighted and a constant for both measures are used applying scoring algorithms. Both the PCS and MS are transformed to have a mean of 50 and a standard deviation of 10 in the general population [38].

Statistical analysis

All the sociodemographics and clinical variables except age at the first drink were regarded as potential predictors of PCS and MCS. Each potential predictor was rendered in nominal, ordinal, or ratio scales. Then, we compared the mean values of PCS and MCS and then compared between subcategories of potential predictors with one-way fixed analysis of variance (ANOVA) with a probability level of $p < 0.05$. The homogeneity of variances was also assessed with Levene's test. If the value of Levene's test was significant, then one-way ANOVA was replaced by the Welch's test. We further analyzed those demographics demonstrated to be significant with multiple comparison analysis with either Scheffe's method or the Dunnett's T3 test depending on whether the variances were homogeneous.

We used the Statistical Package for the Social Science software version 22.0 for Windows (SPSS, Inc., Chicago, Illinois, USA) to compute all the study data. The differences of the groups were considered significant if $p \leq 0.05$.

Results

In this study, we enrolled a total of 552 valid participants. Table 1 lists demographic and clinical characteristics of the study participants. Table 2 describes the analysis of PCS and MCS. Figure 1 (a-h) are subcategory comparisons of sociodemographic factors according to PCS scores and MCS scores.

Table 1. Characteristics of the study population

	n (%)
Age (years), mean ± SD	44.6 ± 10.2
Marital status	
Married	117 (21.2)
Single	250 (45.3)
Divorced	157 (28.4)
Separated	11 (2.0)
Widowed	7 (1.3)
Cohabited	10 (1.8)
Years of education (years)	
≦6	77 (13.9)
9	240 (43.5)
12	205 (37.1)
>12	30 (5.4)
Employment	
Unemployed	90 (16.3)
Employed	462 (83.7)
Monthly income (NT dollars)	
Below 15 thousand	200 (36.2)
15-30 thousand	240 (43.5)
30-45 thousand	79 (14.3)
More than 45 thousand	33 (6.0)
Housing	
Stable	93 (16.8)
Homeless	459 (83.2)
Total AUDIT score, mean ± SD	15.3 ± 8.0
0-7	88 (15.9)
8-15	217 (39.3)
16-19	84 (15.2)
≧20	163 (29.5)
Age of first time drinking (years), mean ± SD, years	19.4 ± 5.8
Alcohol use disorder (DSM-5)	
None	24 (4.3)
Mild	189 (34.2)
Moderate	92 (16.7)
Severe	247 (44.7)
Depression Index (BDI-II), mean ± SD	11.0 ± 9.8
Minimal	389 (70.5)
Mild	73 (13.2)
Moderate	58 (10.5)
Severe	32 (5.8)
SF-12 (mean ± SD)	
PCS	47.8 ± 9.3
MCS	48.2 ± 9.5

SD, standard deviation; PCS, physical component summary; MCS, mental component summary; SF-12, the Short Form-12 Health Survey Questionnaire; BDI-II, Beck Depression Inventory, version II; AUDIT, the Alcohol Use Disorders Identification Test; DSM-5, the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders

Discussion

In this study, both PCS and MCS scores (Table 2) were significantly lower in participants with severe alcohol disorders compared to mild or moderate severity ($p < 0.01$). Morgan et al. in 1999 evaluated a sample of 1,216 patients enrolled in the New European Alcoholism Treatment [16]. They found that patients with alcohol dependence are scored lower on all dimensions of the SF36 questionnaire, including both PCS and MCS scores. Similar results were found in another study directed by Volk et al. in 1996 in the US [11]. They enrolled 1,333 patients from primary care, and individuals who were defined as alcohol-dependent scored lower on the MCS compared with those with alcohol abuse and those with no disorder. Lahmek et al. in 2014 assessed 414 alcohol-dependent patients who were hospitalized for a period of three weeks [17]. Each dimension on the SF36 and the mean PCS and MCS scores are lower at baseline than those of a general reference population. In another study, McKenna et al. in 2013 interviewed 212 patients who had been treated at the Alcohol Problems Clinic in Edinburgh, UK where 85% of this population have been considered to be alcohol dependent and 74% of whom are male [12]. The results showed that these patients scored lower on all dimensions of the SF36 compared to the UK population norms. In a subgroup comparison between those with alcohol abuse and those with alcohol dependence, the former is scored higher on all dimensions of SF36 and has been higher subjective health status than did

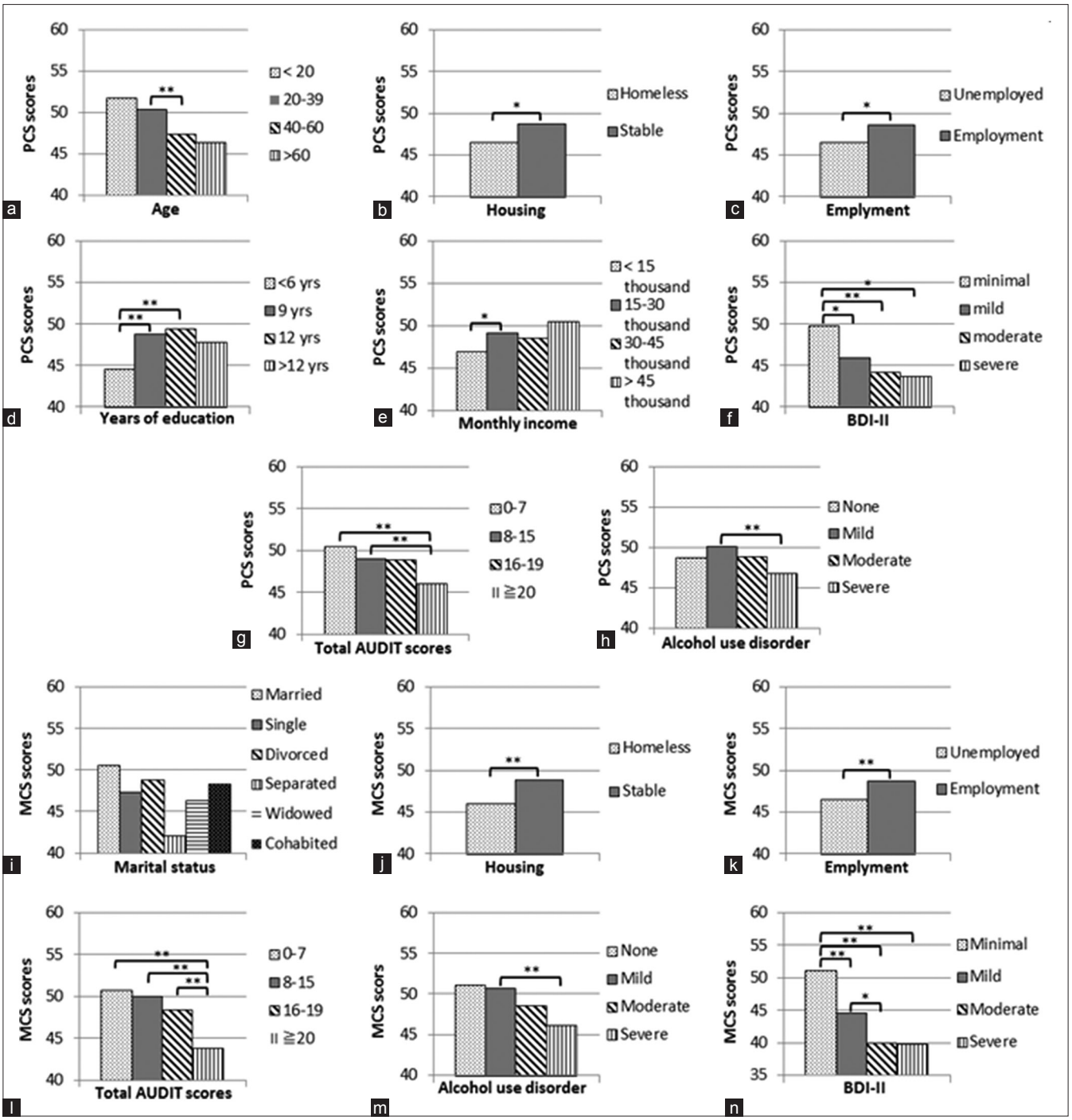

Figure 1. (a–h), Subcategories comparison of sociodemographic factors according to physical component summary scores. (i–n) Subcategories comparison of sociodemographic factors according to mental component summary scores. Each column represents the mean of physical component summary or mental component summary scores. *$p \leq 0.05$, **$p \leq 0.01$.

the latter, that is, in the subgroup of drunk-driving recidivisms with severe alcohol use disorder live a poor QoL and may need further help.

In our study, nearly 45% of this population (Table 1) was defined as having a severe alcohol disorder. This population had significant deficits not only in mental components but also in physical ones. The relationship between QoL and AUDIT scores was quite similar to that between QoL and DSM-5. The lowest PCS and MCS scores were observed in participants who were in Zone 4 (AUDIT scores ≥20), and they were significant lower than those in Zones 1, 2, and 3. Foxcroft et al. in 2014 revealed the similar results [39], suggesting that AUDIT can be used as a tool to identify patients who need further treatment among drunk-driving recidivism.

A number of sociodemographics and clinical variables in this study (Table 2) were found to have a significant association on

Table 2. According to physical component summary and mental component summary, using analysis of variance or Welch test

Variables	df	df2	*F*
PCS			
Age	3	4.926	6.051*
Marital status	5	-	1.113
Years of education	3	110.451	6.024**
Employment	1	-	5.563*
Monthly income	3	123.975	3.343*
Housing	1	-	5.731*
Total AUDIT score	3	-	6.983***
Alcohol use disorder (DSM-5)	3	96.322	6.084**
Depression index (BDI-II)	3	87.901	12.722***
MCS			
Age	3	-	0.258
Marital status	5	-	3.168**
Years of education	3	-	2.053
Employment	1	-	4.234*
Monthly income	3	-	1.324
Housing	1	-	7.333**
Total AUDIT score	3	232.327	15.886***
Alcohol use disorder (DSM-5)	3	99.404	9.975***
Depression index (BDI-II)	3	88.396	38.413***

*$p < 0.05$; **$p < 0.01$; ***$p < 0.01$ using ANOVA. Dash, df2 is not applicable in using ANOVA. PCS, physical component summary; MCS, mental component summary; BDI-II, Beck Depression Inventory, version II; AUDIT, the Alcohol Use Disorders Identification Test; DSM-5, the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders; df, degrees of freedom; ANOVA, analysis of variance

QoL because of drunk driving. Severity of depression ($p < 0.001$), unemployment ($p < 0.05$), homelessness ($p < 0.05$), monthly income below 15 thousand New Taiwan Dollars ($p < 0.05$), being elderly ($p < 0.05$), and poorer educational level ($p < 0.001$) were significantly associated with PCS scores. Severity of depression ($p < 0.001$), unemployment ($p < 0.05$), and homelessness ($p < 0.01$) were significantly associated with MCS scores (Table 2). Levola et al. [20] summarized the literature on QoL and depression in the context of alcohol dependence. Regardless of a diagnosis of major depressive disorder, symptoms of depression are associated with a reduction in QoL among alcohol-dependent patients [16]. Unemployment ($p < 0.05$ in PCS and MCS) and homelessness ($p < 0.05$ in PCS, $p < 0.01$ in MCS) were also considered to be significant important determinants in this study (Table 2) as they significantly affected both PCS and MCS scores. Morgan et al and colleagues [16]. found that alcohol-dependent patients who were currently unemployed have shown a reduction on all dimensions of the SF36. People with the combination of homelessness and alcohol use have also shown to have a higher prevalence of legal problems and poorer health [40].

These findings could determine not only the drunk driving behaviors itself but also the well-being among those drunk driving recidivists. Even though drunk driving may not be directly associated with alcohol use disorder, early identification and intervention have been suggested to be an effective preventive measure [41, 42]. According to the previous studies, offenses of drunk driving may be related to age, marital status, race/ethical status, and specific personality characteristics such as sensation seeking, hostility, depression, and psychopathic deviance [21, 22].

In the previous studies, low socioeconomic status, older age, little education, emotional loneliness, being single, and living alone are related to low QoL among alcohol abusing and alcohol-dependent populations [16, 17, 19]. Those sociodemographic findings by previous researchers correspond with our findings. In this study (Table 2), we identified that several sociodemographic variables which were significantly correlated with QoL among men who were in custody due to drunk driving. Variables such as unemployment ($p < 0.05$ in both PCS and MCS), homelessness ($p < 0.05$ on PCS and $p < 0.01$ in MCS), AUDIT scores ≥20 ($p < 0.001$ in both PCS and MCS), and higher BDI-II scores ($p < 0.001$ in both PCS and MCS) showed a significant reduction not only in PCS scores but also in MCS scores.

Figure 1 (A - H) further depict subcategories comparison of sociodemographic factors according to PCS scores. Figure 1 (I - N) further describe subcategories comparison of sociodemographic factors according to MCS scores.

These findings can determine the drunk driving behaviors itself and the well-being among those recidivists. Instead of incarceration or fines for drunk driving, further investigation, identification, and referring to treatment are necessary for these population, especially individuals have poor socioeconomic status, depression, and severe alcohol use disorder.

Study limitations

Our study investigates drunk driving recidivisms form the aspects of well-being and reveals the importance of identification and care delivery. There were few studies focus treatment need among these participants. The readers are warned not to overinterpret the study results because this study has three limitations:

- People enrolled in this project were all males. Therefore, our study findings cannot be used to interpret to female drunken drivers.
- Only those factors studied in our study were significantly associated with both PCS and MCS scores which were identified and emphasized. We could have overlooked other important demographic and clinical characteristics.
- Our research was a cross-sectional study which did not focus on treatment, medical interventions, or improvement in QoL.

Further analysis and follow-up are warranted in the future study, for which treatment or care should be provided and whether the well-being interacts with drunken-driving behavior.

Summary

Unemployment, homelessness, AUDIT scores ≥ 20, and higher BDIII scores showed a significant reduction both in physical and mental component on QoL. Those findings

could determine not only the drunk-driving behaviors itself but also the well-being among those recidivists. Instead of incarceration or finings for drunk driving, further investigation, identification, and refer to treatment are necessary for these population, especially individuals have poor socioeconomic status, depression, and severe alcohol use disorder.

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Conflicts of Interest

There are no conflicts of interest.

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