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Nurses' smoking, alcohol and substance use behaviors intertwined with resilience patterns

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Abstract

Background and Aims: Some nurses turn to non-adaptive behaviors including smoking, alcohol and substance use. This study aimed to assess nurses' smoking, alcohol and substance use behaviors along with their intertwined resilience patterns.

Method: Design. This was a cross-sectional correlational descriptive study where data were collected from 1000 hospital-based nurses.

Analysis. Chi-square analysis was used to test the association between substance use and nurses' gender and type of healthcare sector. Student t-test examined the impact of resilience levels on substance use.

Measurements. The outcome variable was substance use assessed by the ASSIST (McNeely J et al, 2016). Variables of gender, type of hospital and other socio-demographic variables were assessed by self-reported questionnaire. Resilience was measured by the Connor-Davidson resilience Scale (10-items) (Connor M & Davidson R,2003).

Results: The highest rates of substance use among nurses was found in caffeinated drinks followed by smoking, hypnotics, alcohol, opioids, then others. The percentage of illicit drug use scored the least in cocaine (6.1%), then hallucinating agents (7%), cannabis (7.1%), stimulants (7.3%), inhaled substances (7.6%), and the highest score was for opioids (8%). Those rates where significantly reduced to 1.2, 1.5, 1.8, 1.3, 1.5, 1.6 % respectively, when regularity of consumption was taken in consideration. Gender played a role where males scored significant associations in favor of smoking, alcohol, cannabis and hypnotics over their female partners. Substance non-users scored higher in resilience mean scores than substance users.

Conclusions: Traumatic experiences induce protective mechanisms to help nurses endure emotional pain. Some of those mechanisms include patterns of smoking, alcohol and forms of substance use. So, health care authorities should take nurses' psychological well-being seriously and act proactively in building supportive and rehabilitative programs.

Keywords: nurses, smoking, alcohol, substance use, resilience.

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INTRODUCTION

Nurses are cornerstones and foundation pillars of healthcare systems all over the world and their care burdens were high and peaked especially after COVID-19 (Kohei F. et al.,2021, Koontalay A. et al., 2021, Zerbini G. et al., 2020). Nurses' work and life stressors were correlated with unfavorable psychological effects which involved anxiety, fear, grief, helplessness, anger, spiritual distress, depression, compassion fatigue and burnout (Diogo J. et al.,2021). Those traumatic feelings gave rise to some protective mechanisms to help nurses endure the associated emotional pain. Some mechanisms were adaptive; for example, seeking emotional support, talking to a friend, playing sports, positive self-talk, and seeking professional help (Sehularo A. et al., 2021, Sierakowska M & Doroszkiewicz H,2022). Yet, other coping resorts were maladaptive and were expressed in the form of oversleeping, TV addiction, mobile addiction, game addiction, and starting to use or increasing the frequency of use of some substances (Alnazly E & Hjazeen A, 2021).

Substance use is a problem that is combated and prohibited by laws, religion, and social norms (Wogen J & Restrepo T, 2020). Substance, by definition, is any psychoactive compound with the potential to cause social and health problems that may extend to addiction (McLellan T, 2017). Some substances may be legal, e.g., tobacco, coffee, power drinks, alcohol, and prescribed controlled drugs used for medical purposes. However, other substances are illegal, e.g., cannabinoids (marijuana, hashish); opioids (heroin, morphine); stimulants (amphetamine, methamphetamine); cocaine, inhaled substances (paint thinners, glue), and hallucinogens (LSD, mushroom, Ecstasy) (Rockville D, 2013).

Nurses may seek smoking, alcohol or other substance use in moderation or excess, in response to cognitive failures and emotionally marginalizing experiences (Arble E et al,2023). Nurses' use of substances comes with negative consequences; not just for nurses themselves, but also for their families, the community and the safety and quality of care provided for patients (Macaspac G, 2022). It is not an easy job to track nurses' substance use patterns because of the fear of public substance use disclosure that could put nurses' licenses, employment and ability to earn a living in critical danger (Griffith S et al.,2021). Therefore, being a sensitive and stigmatic topic; nurses' substance use behaviors must be studied delicately, systematically and in a contextual framework (Foli J et al., 2020).

The resilience model is a positive transactional dynamic framework where an adaptation process is stressed and can help explain substance use behavior (Labrague J & de Los Santos, A, 2021). There are many definitions of resilience. First, it is the developmental capacity to bounce back from adversity, conflict, and failure. Second, it is a stable trajectory of healthy functioning after a highly adverse event. Third, it is a dynamic system that can help people adapt to variable situations successfully (Bonanno A.,2004; Masten S.,2014; Luthans F.,2002). In that sense, the resilience model assumes that resilient people will not seek less adaptive ways to solve their problems and face emotional trauma (Zhang J et al.,2022). On the contrary, those who are less resilient may turn to less adaptive techniques to manage their stressors (Arimon-Pagès E et al.,2022, Delgado C et al., 2017). Such techniques include forms of substance use that extend to misuse or addiction (Zimmerman A,2013).

Smoking, alcohol and drug use data in the nursing population in Jordan are critically lacking. Accordingly, this study is a pioneer

in the field and it can be used for comparison purposes in the future. Navigating through nurses' substance use maps and their interactions with their intertwined integrative resilience patterns generated data sets that help interpret the phenomenon and capture the roots of the problem. Thereafter, it may be possible to actively build psycho-social rehabilitation and support programs that mitigate negative consequences, heal emotional wounds, lend a hand to those who are in desperate need of help, and provide healthy alternatives for coping with the psychological trauma. Such alternatives for substance use are less costly to personal lives, professional identities, and health care systems. Hereby, the major purpose of this study was to assess nurses' smoking, alcohol and substance use behaviors and their intertwined resilience patterns.

METHODS

Study design

This was a cross-sectional correlational descriptive study based on self-reported questionnaires and surveys. This design was adopted because the major intention of the researchers was to collect data from many nurses about their smoking, alcohol, substance use, and resilience patterns, without influencing the surveyed variables or trying to identify the underlying causes of the prevailing patterns. Accordingly, there was no cause and effect to test, nor confounding variables to control or treat.

Study Sample

Convenient sampling ended with a total of 1000 hospital-based nurses. The sample size was a good fit maximum number based on 10% of the Jordanian nursing population. The confidence interval was 95%, the z value was 1.96, and the margin of error was set at +/-3 % of the population size that exceeds 5000 persons (There were 45,205 nurses and midwives registered in Jordan Nurses and Midwives Council (JNMC)) (JNMC,2024). Data collection time extended from December 2021 to December 2022, and the attrition rate was 16.67%.

Data was collected from nurses who agreed to participate and signed the consent form. The only inclusion criteria was to be an active bedside nurse at the time of assessment and to consent voluntarily to participate. The exclusion criteria were set to a minimum due to the sensitivity of the surveyed topic and the reasonable probability that some nurses would refuse to take part in this study secondary to fear of exposure. Regardless, the response rate was sufficient, but extended time and massive efforts were exerted to reach the target sample size. Nurses were chosen from all accessible clinics and units.

Setting

The surveys were distributed by trained researcher assistants in major clinical settings located in Amman, the capital of Jordan. The location of the included hospitals was central and accessible. Cooperation and facilitation were provided by the hospitals' nursing management to ease the accessibility and reachability for potential participants and enhance retention rates.

The clinical settings included were a major academic hospital, three large private hospitals, and two central public hospitals. The reason behind choosing variable settings was to enrich data, enhance generalizability, and provide a space for conducting scientific comparisons. All the selected institutions provide quality care for a high percentage of clients with variable medical and surgical conditions, receive a high number of outpatient visits and inpatient admissions.

Measures

The consenting participants were asked to fill

out a survey, which was structured into three sections. Section one included demographic variables of the health sector, gender, academic degree, and marital status (Table 1).

Table 1: Sample Characteristics (N = 1000).

Variable	N (%)
Sector	
Governmental	600 (60)
Private	150 (15)
Educational	250 (25)
Gender	
Male	457 (45.7)
Female	543 (54.3)
Educational level	
Diploma	142 (14.2)
Bachelor	794 (79.4)
Higher education	64 (6.4)
Marital status	
Married	635 (63.5)
Single	311 (31.1)
Separated	54 (5.4)

Section two was a table (Table 2) derived from the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST). ASSIST is a scale developed by the World Health Organization (WHO). It is rated (0,2,3,4,6), which describes the substance use frequency within the past three months. Zero means no use, 2 means once or twice within the past three months, 3 means monthly use that is 1 to 3 times every month for the past three months, 4 means weekly use that is 1 to 4 times per week for the past three months, and 6 means daily or almost daily use for the past three months (McNeely J et al, 2016). Consent to use the substance types' table was formally granted by WHO via formal email.

Table 2: ASSIST derived table*

Q	In the past three months, how often have you used these substances?	0	2	3	4	6
a	Tobacco products (cigarettes, chewing tobacco, cigars, shisha, etc.)					
b	Alcoholic beverages (beer, wine, spirits, etc.)					
c	Cannabis (marijuana, pot, grass, hash, etc.)					
d	Cocaine (coke, crack, etc.)					
e	Amphetamine-type stimulants (speed, meth, ecstasy, etc.)					
f	Inhalants (nitrous, glue, petrol, paint thinner, etc.)					
g	Sedatives or sleeping pills (diazepam, alprazolam, Bromazepam, alprazolam, lorazepam, etc.)					
h	Hallucinogens (LSD, acid, mushrooms, trips, ketamine, etc.)					
i	Opioids (heroin, morphine, methadone, buprenorphine, codeine, etc.)					
j	Other – specify coffee, coffee beverages, power drinks, etc.)					

The Categorized substances in the ASSIST-derived table were smoking (all types); alcohol; cannabinoids (marijuana, hashish); cocaine, stimulants (Captagon, an addictive amphetamine); methamphetamine (speed); 3,4-methylenedioxy-methamphetamine

(ecstasy); crystal methamphetamine (crystal meth); inhalants (paint thinners, glue, lighter fluid); hypnotics/sedatives (bromazepam, diazepam, alprazolam, lorazepam); hallucinogens (ketamine, mushroom, psychedelic drugs); lysergic acid diethylamide (LSD); opioids (heroin, pethidine, fentanyl, morphine); and the 10th category of substances was caffeinated beverages e.g. coffee, power drinks, and similar products (McNeely J et al, 2016).

Section three in the survey was a resilience score measured by the Arabic-validated version of the Connor-Davidson Resilience Scale (CD-RISC-10). The CD-RISC-10 is a one-dimensional self-reported scale consisting of 10 items measuring resilience. Respondents rate items on a 5-point Likert scale, ranging from 0 (not true at all) to 4 (true nearly all the time). Each item has a minimum score of 0 and a maximum score of 4. Total scores for the CD-RISC-10 range from a minimum of zero to a maximum of 40. Total scores are calculated by summing all 10 items. A higher score indicates higher resilience. None of the items were reverse-scored. The Arabic version of the CD-RISC-10 instrument is valid and reliable. Consent to use the CD-RISC-10 scale was granted (Connor M & Davidson R, 2003).

Analysis

Data were initially checked for legibility and completeness by a professional research assistant. Data were coded based on their level of measurement, cleaned, and screened for errors and missing data. No outliers were detected. Descriptive statistics of frequencies, percentages, means, and standard deviations were used to describe the study variables. The chi-square test was applied to examine the association between substance use and nurses' gender and type of healthcare sector. Students' t-test was applied to examine the impact of resilience level on nurses' reported substance use.

RESULTS

Sample Characteristics

A total of 1000 nurses participated in this study, of whom 54.3% were females; 60% were from governmental hospitals, 79.4% had bachelor's degrees in nursing; 63.5% were married (Table 1). The age range of nurses was (20-58) years.

Percentage of Substance Use Among Nurses

The highest percentage of substance use among nurses was for caffeinated drinks (71.8%), followed by smoking (48.4%) and hypnotics/sedatives (16.7%). The lowest percentage of substance use was for cocaine (6.1%) (Table 3).

Table 3: Percentage of Substance Use Among Nurses (N= 1000).

Substance Group	No	Yes
Smoking	516 (51.6%)	484 (48.4%)
Alcohol	914 (91.4%)	86 (8.6%)
Cannabis	929 (92.9%)	71 (7.1%)
Cocaine	939 (93.9%)	61 (6.1%)
Stimulants	927 (92.7%)	73 (7.3%)
Inhaled substances	924 (92.4%)	76 (7.6%)
Hypnotics /sedatives	833 (83.3%)	167 (16.7%)
Hallucinogens	930 (93)	70 (7%)
Opioids	920 (92%)	80 (8%)
Caffeinated beverages	282 (28.2%)	718 (71.8%)

Correction split tables were also provided to categorize nurses who smoke, drink alcohol, or use substances into two groups (supplementary file 2). The first group was irregular users, which included nurses who used any of the listed substances only once or twice within the past three months, summed up to those who used the same substance 1 to 3 times every month for the past three months (They may be described as occasional users). The second group was the regular users; it included nurses who used substances regularly. It was defined as nurses who used the same substance 1 to 4 times per week for the past three months, summed up to those who used the substance daily or almost daily used the substance for the past three months. The rationale for the re-categorization split procedure was to minimize any misleading overestimation of the substance use behaviors among nurses that may unintentionally cause *problem oversizing* in the targeted sample or population. It is important to mention that the same data management approach was used by the Ministry of Health (MOH) in Jordan in the National Stepwise Survey (STEPs) for Non-communicable Diseases Risk Factors 2019 (MOH,2019).

The split tables cut the percentage of caffeinated beverages users from 71.8% to 48.7%, the opium users from 8% to 1.6%, the hallucinogenic users from 7% to 1.5%, the hypnotic/sedative users from 16.7% to 3.8%, the inhalant users from 7.6% to 1.5%, the stimulant users from 7.3% to 1.3%, the cannabis users from 6.1% to 1.8%, cocaine users from 7.1% to 1.2%, alcohol users from 8.6% to 1.3%, and smokers from 48.4% to 31.4%. Thus, user percentages were close to the general regional Middle East population user statistics, at least in the majority of the surveyed substances, as stated by the United Nations (UNODC,2017).

Associations Between Nurses' Gender and Substance Use

Significant associations were found between substance use and gender in favor of males in smoking (X^2 (1)= 76.4, $p < .001$) (63.5% male; 35.7% female), alcohol use (X^2 (1)= 9.62, p= .002) (11.6% males; 6.1% females), cannabinoids (X^2 (1)= 5.58, p = .018) (9.2% males; 5.3% females) and hypnotic use (X^2 (1) = 14.9, $p < .001$) (21.7% males; 12.5% females) (Table 4).

Table 4: Associations Between Nurses' Gender and Substance Use (N = 1000).

Substance Group	Male	Female	Chi-square	P value
Smoking	290 (63.5%)	194 (35.7%)	76.40	.000***
Alcohol	53 (11.6)	33 (6.1)	9.62	.002**
Cannabis	42 (9.2)	29 (5.3))	5.58	.018*
Cocaine	34 (7.4)	27 (5)	2.64	.10
Stimulants	38 (8.3)	35 (6.4)	1.28	.26
Inhaled Substances	39 (8.5)	76 (7.6)	1.05	.31
Hypnotics /sedatives	99 (21.7)	68 (12.5)	14.90	.000***
Hallucinogens	39 (8.5)	31 (5.7)	3.04	.08
Opioids	44 (9.6)	36 (6.6)	3.03	.08
Caffeinated beverages	338 (74)	380 (70)	1.94	.16

*test is significant at .05 (tow tailed). **test is significant at .01(tow tailed).
*** test is significant at .001(tow tailed).

Associations Between Nurses' Health Sectors and Substance Use

Significant association was found between nurses who work in private hospitals and substance use as follows: alcohol (X^2 (1) = 29.19, p < .001) (20% private, 6.7% public, and 6.4% educational), cannabis (X^2 (1) = 32.15, p < .001) (18% private, 6 % educational, 4.8% public), cocaine (X^2 (1) = 36.48, p < .001) (16.7% private, 5% public, 2.4 % educational), stimulants (X^2 (1) = 27.18, p < .001) (18 % private, 6.3% public, and 3.2% educational), inhaled substances (X^2 (1) = 33.79, p < .001) (18.7 % private, 6.7% public, and 3.2% educational), hypnotics (X^2 (1) = 6.86, p = .03) (24 % private, 15.7% public, and 14.8% educational), hallucinating agents (X^2 (1) = 33.96, p < .001) (18 % private, 5.7% public, and 3.6% educational), and Opioids (X^2 (1) = 33.57, p < .001) (19.3 % private, 7% public, and 3.6% educational) (Table 5).

Table 5: Associations Between Health Care Sectors and Substance Use (N = 1000).

Substance Group	Public	Private	Educational	Chi-square	P value
Smoking	300 (50)	75 (50)	109 (43.6)	3.08	.22
Alcohol	40 (6.7)	30 (20)	16 (6.4)	29.19	.000***
Cannabis	29 (4.8)	27 (18)	15 (6)	32.15	.000***
Cocaine	30 (5)	25 (16.7)	6 (2.4)	36.48	.000***
Stimulants	38 (6.3)	27 (18)	8 (3.2)	27.18	.000***
Inhaled substances	40 (6.7)	28 (18.7)	8 (3.2)	33.79	.000***
Hypnotics/sedatives	94 (15.7)	36 (24)	37 (14.8)	6.86	.03*
Hallucinogens	34 (5.7)	27 (18)	9 (3.6)	33.96	.000***
Opioids	42 (7)	29 (19.3)	9 (3.6)	33.57	.000***
Caffeinated beverages	426 (71)	112 (74.7)	180 (72)	.80	.67

*test is significant at .05 (two tailed). *** test is significant at .001(two tailed).

Differences in Nurses' Resilience between Substance Users and Non-users

Significant differences in nurses' resilience scores between users and non-users of substances were found in alcohol (t (998) = 2.27, p = .023), cannabis (t (998) = 2.65, p = .008), cocaine (t (998) = 2.82, p = .005), stimulants (t (998) = 2.98, p = .003), hypnotics (t (998) = 3.51, p = .001), hallucinating agents (hallucinogens) (t (998) = 2.69, p = .007) and opioids (t (998) = 2.36, p = .019). As shown in Table 6, non-users scored higher in resilience mean scores for all substance types than substance users.

Table 6: Differences in Resilience between Substance Users and Non-Users

Substance Group	No	Yes	T value	P value
Smoking	23.4 (8.4)	23.4 (8.1)	.185	.85
Alcohol	23.6 (8.3)	21.5 (7.3)	2.27	.023*
Cannabis	23.6 (8.3)	20.9 (7.5)	2.65	.008**
Cocaine	23.6 (8.2)	20.5 (7.7)	2.82	.005**
Stimulants	23.6 (8.2)	20.6 (7.8)	2.98	.003**
Inhaled substances	23.5 (8.2)	21.8 (8.4)	1.81	.07
Hypnotics/sedatives	23.8 (8.4)	21.6 (6.9)	3.51	.001**
Hallucinogens	23.6 (8.2)	20.9 (8.2)	2.69	.007**
Opioids	23.6 (8.3)	21.3 (7.8)	2.36	.019*
Caffeinated beverages	23.7 (9.3)	23.3 (7.8)	.622	.53

*test is significant at .05 (tow tailed). **test is significant at .01(tow tailed).

Multiple Substance Use Frequency

Finally, a multiple-substance use frequency table was formulated to give better insights into nurses' use maps and patterns, conveying the number of substances used regardless of use frequency. There were 199 participants who didn't take any of the listed 10 substances within the past three months. The majority of participants who fell within the 1 and 2 substance categories were coffee users, tobacco users, or consumers of both substances. Category 3 mainly included smokers, coffee drinkers, and hypnotic users. In category 3, the cumulative percentage reached 91.1%. The remaining 89 participants distributed themselves unevenly in categories 4-10. There may be some potential substance abusers within this last category, but this falls outside the scope, aim, and methodology of this study (Table 7).

Table 7: Multiple Substance Use Frequencies

Number of used substances		Frequency	Valid Percent	Cumulative Percent
Valid	0.00	199	19.9	19.9
	1.00	324	32.4	52.3
	2.00	296	29.6	81.9
	3.00	92	9.2	91.1
	4.00	13	1.3	92.4
	5.00	7	.7	93.1
	6.00	10	1.0	94.1
	7.00	6	.6	94.7
	8.00	8	.8	95.5
	9.00	11	1.1	96.6
	10.00	34	3.4	100.0
	Total	1000	100.0	

DISCUSSION

Percentage of Substance Use Among Nurses

Nurses constitute one portion of Jordanian society. They share the same daily socio-economic burdens, which have aggravated in a critical trend since the COVID-19 outbreak (Abu Hammad S et al., 2020). Coupled life-economy burdens are added with taxes to the expensive pill of the complex nature of the nursing profession, which is already overloaded by a variety of stressors (Kishi H et al.,2022). High workloads, time pressure, lack of task control, role ambiguity, inadequate staffing levels, low income, lack of managerial support, and workplace violence have been identified as nursing-specific workplace stressors (Otto K et al, 2019).

In response, some nurses turned or turned more to smoking behaviors as a maladaptive coping mechanism (Kowalczuk K et al.,2022). Our study showed an average nurse's smoking rate of 49.6% (63.5% in males, and 35.7% in females). In comparison, a general population study reported very close percentages by stating that the highest prevalence of cigarette smoking was among urban Jordanians (51.1%), followed by non-camp refugees (46.7%) (Alkouri O et al., 2022). In fact, an increasing prevalence of smoking in Jordan was noted earlier in a study in 2014 with an overall 32.3% of the respondents reported being current smokers

(54.9% in adult males and 8.3% in adult females). That same study recommended that reducing the rate of smoking in Jordan must be a strategic national priority (Jaghbir M et al, 2014). Our study confirmed that our smoking rates are among the highest in the world, they are high among nurses, especially after COVID-19, they are higher than the rates of the general population for both sexes, and the smoking balance is in favor of male nurses over their female partners, which indicates a gender-based gap.

Alcohol is a psychoactive central nervous system depressant substance with dependence-producing properties. Its harmful use causes a high disease burden; in addition to the degrading social, moral, and economic consequences (WHO, 2022). Alcohol consumption causes many disabilities and can lead to death early in life. For example, in young adults aged 20-39 years, approximately 13.5% of total deaths are attributable to alcohol (WHO, 2018). Jordan is an Arab country with a majority of Muslims, where alcohol consumption is banned by religion (Kalema D et al, 2016). However, there are some followers of other religions and some visiting tourists whose religious beliefs allow drinking alcohol in moderation (Al-Ansari B, Day A, et al,2016). Despite the moral ideals, we can admit that some followers of Islam drink alcohol, discreetly and sometimes, in excess (Al-Ansari B, Thow M. et al, 2016).

When it comes to nurses and their alcohol consumption rates, a study published in 2018 found that 23 out of 282 (8%) nurses reported alcohol use, but the amount and frequency of consumption were not determined, which could be considered a limitation (Jarrad R et al., 2018). In comparison, our study found 86/1000 (8.6%) nurses reporting alcohol use, which is basically a comparable percentage, regardless of regularity in consumption. When looking at the Jordan National Stepwise Survey (STEPs) for Non-communicable Diseases Risk Factors 2019, it showed that alcohol consumption was generally low in Jordan, as reported by 2.6% of males and 0.1% of females to have consumed alcohol during the past 30 days (MOH,2019). Their average percentage of alcohol consumption for both sexes was 1.35%, which is comparable to nurses' alcohol regular users (1.3%) found in this study.

In a qualitative study of 42 Australian nurses, several participants revealed their increased alcohol consumption due to the stressful work environment. In particular, workplace factors such as overtime, scarce resources, missed breaks, and heightened workload were all described as driving stressors for alcohol consumption (Searby A. et al., 2022). A Californian thesis explored the incidence of substance use among nurses during the latent pandemic and concluded that alcohol was the most prevailing substance used by nurses, followed by tobacco and marijuana (Macaspac G & Harris P, 2023).

Finally, we looked at nurses' use rates of other substances. For example, a Michigan nurse survey reported an increase in substance use in general (32%), while 2.6% of respondents reported an increase in marijuana use (Arble E et al., 2023). The prevalence estimates of the "Nurse Work Life and Wellness Study" reported that the year 2021 witnessed nurses' illicit drug use (e.g., cocaine, hallucinogens, marijuana, synthetic cannabinoids, methamphetamines, opioids of 5.7%); prescription-type drug misuse was 9.9%; energy drink use was 23.7% in nurses younger than 45 years, 18% of nurses screened positive for substance use problems,

with one-third of those screening positive for substance use disorder (Trinkoff A et al, 2022).

In Jordan, the percentage of illicit drug use among nurses scored the least in cocaine (6.1%), then hallucinating agents (7%), cannabis (7.1%), stimulants (7.3%), inhaled substances (7.6%), and the highest score was for opioids (8%). So, it could be speculated that nurses in Jordan exceeded the estimated illicit drug prevalence use rates found in the "Wellness Study". But it is imperative to highlight that our study was not a prevalence study nor used random sampling. So, it is not quite accurate to generalize our findings to the general nursing population in Jordan with extreme confidence. Percentages could easily be reduced in geographically peripheral and remote health care settings in the country. Different methodologies, sampling techniques, measurement tools, and surveyed substance use durations (1 year, 6 months, 3 months, last 30 days) will potentially yield variable use percentages. It is expected that when the survey duration is reduced, the use rates will be dramatically reduced.

Returning to Jarrad R et al. (2018), to compare use rates for the rest of the listed substances, we can identify that sleeping pills nurses' use percentage was 16% compared to 16.7% in this study. While caffeinated beverages scored 69% compared to 71.8% in the current study. Rates were comparable regardless of the frequency and use regularity.

Associations Between Nurses' Gender and Substance Use

Researchers found considerable evidence proving that the use of alcohol to cope with occupational stress may be an increasing problem in the nursing profession (Rathburn J,2022). Simultaneously, they offered care to study alcohol use gender-based differences among nurses (Machado A., et al, 2016). A study by Junqueira et al. (2018) confirmed that female nurses presented a low odds ratio of alcohol beverage binge consumption and using marijuana at medium/high-risk levels in comparison with male nurses. Another study stated that male nurses who were single, did not consume low doses of alcoholic beverages, used tobacco, avoided consuming beverages with caffeine, and avoided noisy environments showed higher chances of consuming alcohol at a problematic level (Junqueira B, et al, 2016). Similar studies, though not abundant, supported our finding that male gender in nurses is associated more with alcohol use than female gender.

Smoking is a global health problem, and nurses are one slice of the consumers' map (Duaso J., et al.,2017). A Croatian study reported that nurses who smoked stated more frequently that they should not be role models of smoking cessation (Čivljak M, et al,2023). When it comes to nurses' gender-based differences in smoking; a study in Cyprus showed that being male, younger than 34 years old, unmarried, and with a family history of smoking was associated with an increased likelihood of being a current smoker (Zinonos S., et al 2016). Looking at the gender-based differences in the general population; smoking prevalence is much higher among adult men than adult women worldwide. One out of three men smokes, and only one in 16 women smokes (Wadhwa D, 2019). The majority of reviewed evidence supported our finding that male gender in nurses was associated with higher smoking behavior.

Dr. Rainbow of Arizona State University suggested that despite the prior studies, which found that nurses have similar rates of cannabis use as the general population, the impact of the COVID-19 pandemic on

nurses' use patterns is currently unknown. His study is still in process, but its findings are very promising and will provide valuable information about how male and female nurses are currently using cannabis, the potential impact of use on patient care, and how to inform the development of cannabis use regulations (Gelt J, 2021). Shifting to gender-based differences in the use of cannabis, a large sample survey (n=2374) brought to light that men are using cannabis more frequently and in higher quantities than women. Men were more likely to report using blunts, vaporizers, and concentrates, while women were more likely to report using pipes and oral administration (Cuttler C., et al., 2016). So, tentatively, it could be said that available literature is supportive of our finding that the use of cannabis is more prevalent in male nurses.

Regarding the use of sleeping pills among nurses, a Norwegian large-scale study reported 7.5% and 4.6% of nurses using prescribed and over-the-counter sleeping pills, respectively. Factors associated with sleeping pills use were short sleep duration, sleep problems, and psychological conditions (Forthun I., et al., 2022). Another study documented 17.7% of the included registered nurses using sleeping pills, which is close to our finding (16.7%) (Rocha P& Martino D,2009). The American College of Chest Physicians surveyed 1,165 nurses, and sleeping aids were used by 26% of the sample. The most commonly used sleep aid was melatonin (42%), then antihistamines (36%), non-benzodiazepine prescriptions (9%), prescription antidepressants (6%), and prescription benzodiazepines (3%) (Christian F. et al.,2019). There was no difference in the distribution of the use of sleep medications between genders, which does not quite match our study finding; this could be explained by cultural differences (Jeon M, 2021).

On the stimulation of substance use, the American College of Chest Physicians survey reported that medications were used by 12.7% of nurses to help them stay awake. Caffeinated beverages were the most commonly used stimulants (89.7%) compared to 71.8% in our study. Also, surveyed nurses reported the use of prescription amphetamines. Nevertheless, there was no difference in the distribution of stimulants between male versus female nurses, which is consistent with our findings (Christian F. et al.,2019).

Associations Between Nurses' Health Sectors and Substance Use

The healthcare services in Jordan are provided by private and public sectors; therefore, it is essential to explore the adaptation of both parties to the dynamically changing and fluctuating health and economic climates (Maciukaite-Zviniene S, Valys T,2022; Bel G et al., 2021). This paper pointed a finger towards institutional resilience in the health sector and its effects on the employees' resilience behaviors. It could be assumed here, and left for further research testing in the future, that the public sector was more resilient than its private partner. The ability to expand resources, financial expenditure, and staff mobilization was probably more adaptable (Abuzaineh N et al., 2018). Therefore, public employees were possibly less stressed and more resilient than their counterparts in the private sector. This issue was directly reflected in the substance use patterns described by our study (Ghergina S et al., 2022).

Differences in Nurses' Resilience between Substance Users and Non-users

Nurses suffer job-related stress, which has negative effects on resilience patterns, that is, their ability to manage life and work demands

under diversity and hardship (Kim Y& Chang O,2022). Problems that negatively affect nurses' resilience have serious consequences, such as decreased nursing professionalism, poor quality of care, increased social and financial losses, decreased job satisfaction, increased turnover, and substance use (Khamisa N et al, 2015). Resilience allows nurses to overcome stressful situations and adapt positively, resulting in the maintenance of their psychological well-being and mental health (Cusack L et al, 2016). Resilience is emerging as an important concept for reducing the psychological burden of the nursing profession. Timely studies of resilience can ameliorate nurses' negative job consequences caused by relevant traumatic experiences. One targeted consequence of those is substance use (Gao T et al.,2017).

Jarrad et al. (2018) explained substance use using the resilience model. They stated that there are several coping styles by which a caregiver responds to stressful situations. The negative coping styles include avoidance-oriented coping (replacement behaviors to substitute the problem), which results in caregiver self-destructive behaviors of substance use. The resilience model assumes that resilient people will not use less adaptive ways to solve their problems (Labrague J. & de Los Santos, A.,2021; Zhang J. et al., 2022). On the contrary, those who are less resilient may turn to less adaptive ways to manage their stressors, including forms of substance use that may extend to misuse or addiction. So, our study finding that non-users scored higher in resilience mean scores, for all substance types, than substance users could be comprehended and explained by the resilience model (Arimon-Pagès E. et al., 2022; Delgado C et al., 2017).

Conclusion

The COVID-19 years were extremely lean and came with burdens imposed on health and nursing professional bodies. Those entities were already struggling from huge legacies of stress-inducing variables such as heavy workloads, increasing case complexities, introduction of new technologies, lack of managerial support, and insufficient reward and psychological rehabilitation/consultation systems. So, it was understandable that some health professionals fell into the trap of becoming less resilient in the face of adversities, and that some of them would be seized or seized more in the substance use maze.

Recommendations

We would recommend further research in the area of nurses' substance use and resilience patterns. A qualitative approach and/or mixed methodology is strongly advised in this regard to enrich future findings and formulate a more adequate understanding. Prevalence studies, national surveys, and randomization techniques are highly encouraged to enhance the accuracy of conclusions and the generalizability of the findings. More specific descriptions of the use patterns should be integrated in future surveys, such as definite use frequencies, amounts, doses, trade names of substances, medically prescribed versus non-prescribed uses, possible substance use driving motives, and categorizing motives into recreational, stress-induced, or other.

Screening efforts should be integrated into research methodologies to identify nurses with substance use disorders or addiction. Eventually, healthcare systems are encouraged to adopt resilience-enhancing programs, and strong consultation and rehabilitation services to help their employees manage stress, emotional pain,

and psychological trauma, build more adaptive coping skills, and discourage maladaptive behaviors of smoking, alcohol, and substance use.

Limitations

This study adopted convenient sampling because of the stigma and exposure fear possibilities of the researched substance use topic, despite the anonymity and confidentiality strict measures. Random sampling would be of added value in the future to enhance generalizability. Substance use was measured utilizing a self-reported questionnaire, which may have contributed to downsizing the exact substance use percentages of illegal illicit drugs, regardless of regularity of use. It is well reported that females may feel more intimidated to expose such data due to legal and cultural factors. Alternative methodologies are encouraged to approximate exact substance use percentages.

Author contributions

RJ, EH, NM, AM, and DJ, contributed to the research questions and studied conceptual design. RJ supervised, applied, and enhanced the whole research process. NM conducted data management and analysis. EH drafted the methods, results, and discussion sections. AM facilitated the data collection and edited the manuscript, and DJ reviewed the literature and edited the Introduction. The research is approved in its current format by all authors.

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Data accessibility statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Declarations

Ethics approval and consent to participate

This study received ethical approvals from the following parties: the Ministry of Health in Jordan, the private and academic hospitals' ethical boards, the Deanship of Scientific Research at The University of Jordan, and the ethical committee in the School of Nursing at The University of Jordan. The informed consent form was signed by approving nurses after a full explanation of their participation rights, the purpose, and the methods of the study. Besides, we declare that this study is based on questionnaires and did not include any human-animal or tissue-based trials.

Competing interests

Hereby, the authors confirm that there are no competing interests of any kind.

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سلوكيات الممرضين المرتبطة بتعاطي الدخان والكحول والمواد والعقاقير متمازجة مع أنماط المرونة التكيفية لديهم

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الملخص

خلفية البحث النظرية وأهدافه: يتجه بعض الممرضين في مواجهة الضغوطات لسلوكيات غير تكيفية مثل التدخين وشرب الكحول وتعاطي المواد والعقاقير. سعت هذه الدراسة لتقييم سلوك الممرضين المتعلق بالتدخين والكحول والعقاقير، وتقييم أنماط المرونة المزاوجة لها.

المنهجية البحثية: تعد هذه دراسة وصفية مسحية ارتباطية. حيث تم جمع البيانات من 1000 ممرض عاملين في رعاية المرضى في المستشفيات.

التحليل : استخدم تحليل مربع كاي لاختبار العلاقة بين تعاطي العقاقير وجنس الممرضين ونوع القطاع الصحي. استخدم فحص الطالب تي لتحديد تأثير مستوى المرونة على تعاطي العقاقير.

أدوات القياس: المتغير الناتج كان هو تعاطي المواد والعقاقير مقاسا بأداة تقييم تعاطي الدخان والكحول والمواد المعتمدة من منظمة الصحة العالمية . قيس متغير الجندر ونوع المستشفى والمتغيرات الاجتماعية الديموغرافية من خلال استبيان يُعبأ ذاتيا. قيست المرونة بمقياس 10بنود).(كونور دافيدسون

النتائج: وُجد أن المعدل الأعلى لتعاطي المواد والعقاقير لدى الممرضين هو شرب الكافيين، يليه التدخين ثم المنومات، الكحول، الأفيونات ثم غيرها من المواد. وكانت نسبة تعاطي المخدرات أقلها في الكوكايين (6.1%)، ثم المهلوسات (7%) ,القنب (7.1%), المنشطات (7.3), المواد المستنشقة (7.6%) و الدرجات الأعلى للأفيونات (8%).ومن الجدير بالذكر أن معدلات تعاطي هذه المواد انخفضت بشكل ملحوظ إلى 1.2 ,1.5 , 1.8 , 1.3, 1.5, 1.6%على التوالي، عند الأخذ بعين الاعتبار الانتظام من عدمه في الاستهلاك. عموما لعب الجندر دورا هاما، حيث سجل الممرضون الذكور ارتباطا واضحا مع تعاطي التدخين والكحول والقنب والمنومات على نظرائهم من الممرضات الإناث. ولقد سجل غير متعاطي المواد والعقاقير درجات أعلى في متوسط درجات المرونة مقارنة بمتعاطي المواد مما يدعم المرجعية النظرية للدراسة.

الاستنتاجات: التجارب المؤلمة تحفز آليات الحماية لمساعدة الممرضين على تحمل الألم العاطفي. وتشمل بعض هذه الآليات أنماط التدخين وشرب الكحول وتعاطي المخدرات. لذلك يجب على سلطات الرعاية الصحية أن تأخذ السلامة النفسية للممرضين على محمل الجد وأن تتصرف بشكل استباقي في بناء برامج تأهيلية وداعمة.

الكلمات الدالة: الممرضون، التدخين، الكحول، تعاطي المخدرات، المرونة.