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## Substance use associated with eating attitudes and behaviors, neglected health issues among Palestinian refugees

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### ABSTRACT

**Objective:** We aimed to investigate substance use and its association with eating attitudes and behaviors among male Palestinian refugees.

**Methods:** In a cross-sectional study, male Palestinian refugees ( $N = 566$ ) were recruited to fill out self-administrated questionnaire on eating attitudes and behaviors (EAT-26) and to give urine samples to test current illicit drug use.

**Results:** The response rate was 47.7%. Substance use was highly prevalent among participants (28.9%). The percentage of participants with eating disorders (ED) among substance users was as follows: Any illicit drug (30.8%), benzodiazepine (32.6%), methamphetamines (40.7%), amphetamine (39.3%), tetrahydrocannabinol (25.8%), barbiturates (20%), and alcohol (12.50%). Obese participants were at higher risk of having ED ( $OR = 2.344$ ,  $p < .05$ ) than underweight participants. Binge eaters were more likely to be tetrahydrocannabinol users ( $OR = 2.745$ ,  $p < .05$ ). Increased risk of self-induced vomiting behavior was associated with binge behavior ( $OR = 5.97$ ,  $p < .05$ ), laxative use ( $OR = 26.38$ ,  $p < .01$ ), barbiturates use ( $OR = 59.36$ ,  $p < .05$ ), waterpipe smoking ( $OR = 8.62$ ,  $p < .05$ ), vape smoking ( $OR = 10.37$ ,  $p < .05$ ), and inversely associated with age ( $OR = 0.832$ ,  $p < .001$ ).

**Conclusion:** Findings from this study demonstrated a substantially increased frequency of substance use among Palestinian refugees with ED and unhealthy weight control behaviors. This study highlighted new challenge for the health system to deal with new emerging health conditions among male refugees.

### ARTICLE HISTORY

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Palestinian refugees;  
marijuana; binge eating;  
purge eating; illicit drugs;  
waterpipe smoking

## Introduction

Recently, drug use and possession have become highly prevalent among Palestinians (Damiri et al., 2018; Massad et al., 2016). Illicit drug use is a significant health, psychological, and social problem among young adults in Palestine (Damiri, 2020; Damiri, Salahat, et al., 2018; Damiri et al., 2018, 2020, 2021). In addition, their use is associated with social disapproval and stigma (Alliance, 2014). Most arrestees were males, aged 18–29, and had initiated drug use in adolescence, making them at higher risk for the psychosocial complications of cannabis drug use (Damiri et al., 2018). There is also a clear link between early, frequent, and heavy teenage cannabis use and poor adult cognitive and psychiatric outcomes (Levine et al., 2017).

Like the rest of the world, cannabis was the most often used illicit drug in the West Bank, followed by cocaine, amphetamine-like substances (ALS), and opioids (Damiri et al., 2018; Massad et al., 2016; UNODC, 2010). The use of all these drugs appears to rise, especially in refugee camps (Damiri, 2020; Massad et al., 2016). Palestinian refugees have been internally displaced since 1948 and live in refugee camps in the West Bank and Gaza Strip (UNRWA, 2022). The United Nations Relief and Works Agency for Palestinian Refugees in the Near

East (UNRWA) operates these camps (UNRWA, 2022). Similar conditions exist in all these camps, including overcrowding, poor infrastructure, a lack of public space, and a lack of children's and youth-focused activities (DCI, 2017). As a result, Palestinian refugees experience obesity and related diseases and a higher chance of participating in risky behaviors like drinking alcohol, smoking cigarettes, and trying new drugs (Al-Amer et al., 2019; Damiri, 2020; El Kishawi et al., 2014; UNICEF, 2010). Therefore, the mental health and psychosocial well-being of Palestinian refugees living in these camps are particularly susceptible (UNRWA, 2017).

Eating disorders (ED) are serious mental health conditions that affect physical health, development, cognition, and psychosocial function and can go unnoticed for months or years (Mairs & Nicholls, 2016). They are characterized by disturbed eating behaviors associated with weight and shape concerns, disinterest in food, phobic avoidance, or avoidance due to sensory aspects of food (Mairs & Nicholls, 2016). Few studies have investigated eating disorders among drug users (Castro-Fornieles et al., 2010; Fortino et al., 2020; Ganson et al., 2021; Qeadan et al., 2023). A high co-occurrence rate between ED and substance use disorders was determined (Gregorowski et al., 2013; Munn-Chernoff & Baker, 2016). Early detection

and intervention can significantly improve outcomes (Rowe, 2017). Unfortunately, ED and their related complications are neglected health issues in Palestine (Badrasawi & Zidan, 2019), especially among males (Damiri et al., 2021). Moreover, due to the lack of awareness and societal stigma, ED among Palestinian males may go unrecognized and undertreated (Damiri et al., 2021). Males are less likely than females to seek psychological consultation, and this delay in diagnosis can result in devastating psychiatric morbidity, which can lead to life-threatening conditions (Freeman et al., 2017; Sweeting et al., 2015). Although Palestinian refugee camps were described as locations where alcohol and drug use occur at high rates (Damiri, 2020; Massad et al., 2016), no studies have examined ED among male Palestinian refugees and their association with drug use. We aimed to investigate these gaps in the literature. A comprehensive understanding of ED in a vulnerable refugee population may be necessary for the specific direction of prevention strategies. This study aimed to test the prevalence and the association between ED and drug use among male Palestinian refugees in the North of the West Bank in 2022 which may help health providers to develop several intervention programs that may contribute to decreasing the morbidity and mortality related to both ED and substance use.

## Materials and methods

### *Study design and setting, population, and sampling techniques*

A cross-sectional study was conducted from June to August 2022 at the Palestinian refugee camps in the North of the West Bank governorates. We aimed to cover all geographical and demographical categories of the Palestinian population in the North of the West Bank. Three governorates on the North of the West Bank have seven refugee camps. A proportional stratified sampling technique was used. First, four camps were chosen randomly. Then, a proportional sample size was calculated for each camp. A convenience sampling technique was then used to choose the included subjects. Subjects were excluded if they were with mental or neurodevelopmental disorders, had an intellectual disability, or had any major debilitating illness that severely limited their ability to communicate or to give informed consent.

### *Study tool, validity, and reliability*

A self-administered questionnaire to report the background information and variables related to general health and psychoactive substance use was described elsewhere (Damiri et al., 2018). A current substance user in this study is a participant who tested positive for at least one of the tested drugs in the urine or recognized himself as a user during the last year in the self-reported questionnaire (Administration, 2019). The I-Quit-Ordinary-Smoking (IQOS) smoking system is a type of tobacco product that utilizes a heat-not-burn mechanism to release nicotine, without the need for fire or smoke (Yaman et al., 2021). Multi-line Drug Screen Test Device is a preliminary urine screening test for 12 different prescribed

medications or illicit narcotics, including the following tested drugs, their detection limits in nanogram per milliliter, and detection periods in days were as follows: amphetamine [1000, 2–4], cocaine [300, 2–4], opiates [2000, 2–4], methamphetamine ([1000, 3–5], methylenedioxy-methamphetamine [500, 1–2], phencyclidine [25, 7–14], tetrahydrocannabinol (THC), or marijuana [50, 3–30], benzodiazepines [300, 3–7], methadone [300, 3–5], barbiturates [300, 4–7], propoxyphene [10, 1–2], and oxycodone [100, 2–4] (MONLAB, 2019). The eating attitudes and behavior (EAT-26) questionnaire is widely used to screen eating disorders. It consists of 26 questions for which scoring is done on a 6-points scale from always to never. The EAT-26 has been reproduced with permission. (Garner et al. 1982; Garner & Garfinkel, 1979; Garner et al., 2009). Arabic eating attitude and behaviors (EAT-26) questionnaire was used previously and described elsewhere (Damiri et al., 2021). It is highly sensitive (100%) and specific (81.2%) for the early detection of eating disorders (Al-Subaie et al., 1996). The risk of developing an eating disorder if EAT-26 score is 20 or more. Dieting scale items were questions 1, 6, 7, 10, 11, 12, 14, 16, 17, 22, 23, 24, and 26. Bulimia and food preoccupation scale items were questions 3, 4, 9, 18, 21, and 25. Oral control subscale items were questions 2, 5, 8, 13, 15, 19, and 20. Four behavioral questions (BQ), behaviors from 1 to 4 were also included, and scoring is done on a 6-point scale from daily to never. The behavioral questions were included in determining if the participant should seek an evaluation from a trained mental health professional. The percentages of participants who scored at least one score in any four behaviors were calculated as overall behaviors variables.

### *Analysis*

All analyses were performed using International Business Machines Statistical Package for Social Sciences (IBM SPSS) Statistics for Mac, version 21 (IBM Corp., Armonk, NY, USA). Binary logistic regression models were used to evaluate the relative risk by generating the odds ratios (OR) and 95% confidence intervals (CI) for risk factors. The interaction between illicit drugs was tested. Finally, <0.05 was used as the significance level.

### *Ethical consideration, privacy and confidentiality*

The study was carried out following the ethical standards, Declarations of Helsinki. Approval (Ref. Med. Jan.2022) was obtained from Institutional Review Board “IRB” at An-Najah National University (ANNU) in Palestine. Confidentiality and privacy were highly assured for all the participants. Illicit drug use is bound by a religious, social, and cultural stigma in Palestine. Individuals with drug addictions are often socially marginalized, and further stigmatization and social harm might result from participating in substance use studies which limit their participation. In addition, individuals with ED are stigmatized in Palestinian culture. Therefore, to protect participants and assure participants’ privacy and confidentiality, subjects were recruited through media and flyers to participate in a study that aims to investigate risk factors associated with eating habits and the health status of refugees. It was not mentioned in the flyers or the media that illicit drugs would be

tested. Subjects were then provided with all the information they needed to make a voluntary and informed decision before conducting the study.

## Results

**Table 1** displays the background information of the participants. Male refugees ( $N = 566$ ) were recruited; 282 refused to participate, 284 answered the questionnaire, 11 refused to give urine samples, and three questionnaires were excluded as they had incomplete EAT-26 answers. The final sample size was 270 participants with a median age of 26.7, ranging from 15 to 51 years. Most of the participants were singles (59.6%), workers (83.0%), and with low educational levels (79.6%). Obesity was highly prevalent (52.6% in total; 21.3% were obese, and 31% were overweight).

**Table 2** displays self-reported and urine test results for substance use. The prevalence of self-reported current substance use was as follows: Cigarette smoking (63.3%), water-pipe smoking (31.6%), vape smoking (6.7%), IQOS smoking (3.4%), energy drink use (61.7%), coffee intake (91.1%), tea intake (82.5%), chocolate intake (87.3%), and alcohol intake (8.9%) (**Table 2: A**). The percentage of participants who tested positive for at least one drug in their urine samples was 28.9%. The most prevalent drug was benzodiazepines (15.9%),

followed by THC (11.5%), amphetamine (10.4%), methamphetamines (10.0%), barbiturates (1.9%), phencyclidine (0.4%). Other drugs, including methadone, cocaine, opioids, propoxyphene, methylenedioxy-methamphetamine, and oxycodone, were tested negative (**Table 2: B**).

**Table 3** displays the frequencies of eating disorders items based on EAT-26 score and behavioral questions. The prevalence of ED based on EAT-26 was 27.0%. For dieting scale items, 23.7% of the participants were terrified of being overweight, 35.2% were preoccupied with being fat, 33.7% with the desire to be thinner, and 14.4% felt extremely guilty after eating. For bulimia and food-preoccupied scale items, 18.1% have gone on eating binges with a lack of control, 4.8% had purge activities, and 7.8% had the impulse to vomit after meals. For behavior questions [BQ], 22.7% went into binge eating [BQ1], 7.1% went into purge vomiting activity [BQ2], 5.6% used laxatives, diet pills or diuretics (water pills) with the intention of weight control [BQ3], and 10.0% had done heavy exercise with the intention of weight control [BQ4].

**Table 4** displays the prevalence of EAT-26 and eating behaviors based on illicit and licit substance use and other factors. The percentage of participants with EAT-26 based on illicit drug used was as follows: Any illicit drug (30.8%), benzodiazepines (32.6%), methamphetamines (40.7%), amphetamine (39.3%), THC (25.8%), and barbiturates (20%). The highest percentage of EAT-26 was among cigarette smokers (28.2%) and the lowest among alcohol users (12.5%). ED was more prevalent among overweight and obese (66.3%) than normal and underweight categories (46.0%), and among participants with purge behavior; self-induced vomiting (68.4%), followed by laxatives usage (60.0%), exercising (48.1%), and binge eating behavior (42.6%).

**Table 5** displays the adjusted binary logistic regression results for the association between ED results based on EAT-26 and substance use. The results revealed that ED based on EAT-26 was not associated with illicit substance use, including tetrahydrocannabinol, amphetamine, methamphetamine, benzodiazepines, and barbiturates ( $p > .5$  was not significant (NS)). Obese participants were at higher risk of developing ED ( $OR = 2.344$ ,  $p < .05$ ) than underweight participants. No other association between ED and illicit, and licit substance use was determined (NS).

**Table 6** presents the results of the adjusted binary regression model for the association between binge behavior one [BQ1] "Gone on eating binges where you feel that you may not

**Table 1.** Background information.

Variable	Category	n(%)
Age in years	Adolescent ( $\leq 19$ )	61(22.8)
	Young adults (20–39)	156(58.4)
	Late adults ( $\geq 40$ )	50(18.7)
Educational status	Secondary or less	215(79.6)
	University or higher	55(20.4)
Marital Status	Single	161(59.6)
	Married or others	109(40.4)
Work	Student	13(4.8)
	Without job	33(12.2)
	Has a job	224(83.0)
Location of the camp	Tulkarm	97(35.9)
	Nablus	108(40)
	Jenin	65(24.1)
Chronic Diseases	Yes	30(11.5)
	No	232(88.5)
Use of medication	Yes	28(10.4)
	No	240(89.6)
Body mass index	Underweight	8(3.0)
	Normal	119(44.4)
	Overweight	83(31.0)
	Obese	58(21.6)

**Table 2.** Substance use results based on [A] self-reported substances and [B] urine test.

A: Self-reported substances			B: Illicit drugs tested positive in urine samples	
Type of used substances	Current user n(%)	Former user n(%)	Type of positive tested illicit drugs	Positive n(%)
Cigarettes	171(63.3)	10(3.7)	Benzodiazepines	43(15.9)
Waterpipe	85(31.6)	22(8.2)	Tetrahydrocannabinol	31(11.5)
Vape	18(6.7)	19(7.1)	Amphetamine	28(10.4)
Iqos	9(3.4)	12(4.5)	Methamphetamines	27(10.0)
Energy drinks	166(61.7)	16(5.9)	Barbiturates	5 (1.9)
Coffee	245(91.1)	4(1.5)	Phencyclidine	1(0.4)
Tea	222(82.5)	9(3.3)	One drug	46(17.0)
Chocolate	234(87.3)	8(3.0)	Two drugs	15 (5.6)
Alcohol	24(8.9)	24(8.9)	Three drugs	9 (3.3)
Illicit drugs	9(2.5)	11(4.5)	Four drugs	8 (3.0)
			At least one positive drug	78(28.9)

**Table 3.** Frequencies of each eating disorders questions based on EAT-26 score and behavioral questions.

Question number	Question	Never	Yes
<b>Dieting scale items</b>		n(%)	n(%)
1	Am terrified about being overweight.	206(76.3)	64(23.7)
6	Aware of the calorie content of foods that I eat.	239(88.5)	31(11.5)
7	Particularly avoid food with a high carbohydrate content (i.e., bread, rice, potatoes, etc.)	240(88.9)	30(11.1)
10	Feel extremely guilty after eating.	231(85.6)	39(14.4)
11	Am preoccupied with a desire to be thinner.	179(66.3)	91(33.7)
12	Think about burning up calories when I exercise.	181(67.0)	89(33.0)
14	Am preoccupied with the thought of having fat on my body.	175(64.8)	95(35.2)
16	Avoid foods with sugar in them.	211(78.1)	59(21.9)
17	Eat diet foods.	246(91.1)	24(8.9)
22	Feel uncomfortable after eating sweets.	194(71.9)	76(28.1)
23	Engage in dieting behavior.	212(78.5)	58(21.5)
24	Like my stomach to be empty.	189(70)	81(30.0)
26	Enjoy trying new rich foods.	229(84.8)	41(15.2)
<b>Bulimia and food preoccupation scale items</b>			
3	Find myself preoccupied with food.	239(88.5)	31(11.5)
4	Have gone on eating binges where I feel that I may not be able to stop.	221(81.9)	49(18.1)
9	Vomit after I have eaten.	257(95.2)	13(4.8)
18	Feel that food controls my life.	229(84.8)	41(15.2)
21	Give too much time and thought to food.	234(86.7)	36(13.3)
25	Have the impulse to vomit after meals.	249(92.2)	21(7.8)
<b>Oral control subscale items</b>			
2	Avoid eating when I am hungry.	213(78.9)	57(21.1)
5	Cut my food into small pieces.	128(47.4)	142(52.6)
8	Feel that others would prefer if I ate more.	180(66.7)	90(33.3)
13	Other people think that I am too thin.	195(72.2)	75(27.8)
15	Take longer than others to eat my meals.	191(70.7)	79(29.3)
19	Display self-control around food.	97(35.9)	173(64.1)
20	Feel that others pressure me to eat.	194(71.9)	76(28.1)
<b>Behavior questions [BQ]</b>			
BQ1	Gone on eating binges where you feel that you may not be able to stop?	208(77.3)	61(22.7)
BQ2	Ever made yourself sick (vomited) to control your weight or shape?	250(92.9)	19(7.1)
BQ3	Ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape?	254(94.4)	15(5.6)
BQ4	Exercised more than 60 minutes a day to lose or to control your weight?	242(90)	27(10)
Overall behaviors	should seek an evaluation from a trained mental health professional	166(61.7)	103(38.3)
EAT-26	Scored at 20 or more	197(73.0)	73(27.0)

Abbreviations: Behavior question 1: Gone on eating binges where you feel that you may not be able to stop. Behavior question 2: Gone Ever made yourself sick (vomited) to control your weight or shape, Behavior question 3: Ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape, Behavior question 4: Exercised more than 60 minutes a day to lose or to control your weight. kg/m<sup>2</sup>: Kilogram per square meter.

be able to stop,” and illicit and licit substance use. THC users were more likely to report binge eating behavior (OR = 2.745,  $p < .05$ ) than peers without reported THC use. No association between binge behavior and other illicit substance use; benzodiazepines, barbiturates, and methamphetamines was determined (NS) and with licit substance use, including cigarette, waterpipe, vape, energy drinks, chocolate, and alcohol (NS). Moreover, no association was determined between binge behavior and other behaviors including purge vomiting activity [BQ2], using laxatives, diet pills or diuretics (water pills) with the intention of weight control [BQ3], and doing heavy exercise with the intention of weight control [BQ4] (NS). No interaction between illicit drugs was observed.

Table 7 presents the results of the adjusted binary logistic regression model for the association between self-induced vomiting to control weight and shape behavior [BQ2] and illicit substance use. Barbiturates’ users were more likely to report self-induced vomiting behavior to control weight and shape than peers without reported barbiturate use (OR = 59.357,  $p < .05$ ). Moreover, self-induced vomiting behavior to control weight and shape was more likely to be waterpipe smokers (OR = 8.622,  $p < .05$ ), energy drink users (OR = 11.275,  $p < .05$ ), and vape smokers (OR = 10.373,  $p < .05$ ). Among other behaviors, refugees who reported self-induced vomiting behavior to control weight and shape were more

likely to report binge eating behavior (OR = 5.971,  $p < .05$ ), and using laxatives, diet pills or diuretics to control weight or shape behavior (OR = 26.381,  $p < .01$ ) than their peers who did not report purge behavior [BQ2]. In addition, age was reversibly associated self-induced vomiting behavior (OR = 0.832,  $p < .001$ ).

## Discussion

Our findings support previous research that found links between screened ED and substance use (Ganson et al., 2021; Qeadan et al.; Udo & Grilo, 2019). However, to the authors’ best knowledge, this is the first study to describe and examine the association between substance use and ED among a vulnerable group, Palestine refugees, in the West Bank. All previous studies concluded that illicit drug use is a growing problem among the young Palestinian population, specifically refugees, making drug use an ever-rising problem. The increasing prevalence of illicit and licit substance use and ED among male Palestinians led to the initiation of this study (Damiri et al., 2020, 2021; Massad et al., 2016; Tucktuck et al., 2017). In agreement with these studies, the results of this study indicated that drug use was highly prevalent (28.9%) among Palestinian refugees in the North of the West Bank. Moreover, the results have demonstrated that the total

**Table 4.** Frequency of EAT-26 total score and eating behaviors based on licit and illicit substance use and other variables.

		EAT-26				
		Yes	Behavior question 1	Behavior question 2	Behavior question 3	Behavior question 4
	Factors	n(%)	n(%)	n(%)	n(%)	n(%)
Illicit drugs use (Yes)	Any illicit drug	24(30.8)	22(28.6)	9(11.7)	5(6.5)	10(13.0)
	Benzodiazepines	14(32.6)	12(28.6)	4(9.5)	3(7.1)	8(19.0)
	Tetrahydrocannabinol	8(25.8)	14(46.7)	4(13.3)	4(13.3)	4(13.3)
	Amphetamine	11(39.3)	7(25.9)	1(3.7)	1(3.7)	4(14.8)
	Methamphetamines	11(40.7)	9(33.3)	3(11.1)	1(3.7)	6(22.2)
	Barbiturates	1(20.0)	1(20.0)	1(20.0)	0(0.0)	0(0.0)
Licit substance use (Yes)	Cigarette smoking	48(28.2)	37(21.9)	15(8.9)	10(5.9)	17(10.1)
	Waterpipe smoking	22(26.5)	16(19.3)	9(10.8)	6(7.2)	9(10.8)
	Vape smoking	5(27.8)	6(33.3)	2(11.1)	1(5.6)	3(16.7)
	Iqos smoking	2(22.2)	3(33.3)	0(0.0)	1(11.1)	1(11.1)
	Energy drinks use	43(25.9)	39(23.5)	13(7.8)	10(6.0)	16(9.6)
	Coffee use	65(26.6)	55(22.5)	17(7.0)	15(6.1)	24(9.8)
	Tea use	57(26.0)	51(23.3)	15(6.8)	13(5.9)	20(9.1)
	Chocolate use	60(25.6)	52(22.2)	16(6.8)	13(5.6)	19(8.1)
	Alcohol use	3(12.5)	10(41.7)	1(4.2)	2(8.3)	3(12.5)
	Age	Adolescents ≤19 years	43(27.2)	34(21.7)	6(3.8)	7(4.5)
Adults >19 years		28(25.7)	27(24.8)	13(11.9)	8(7.3)	6(5.5)
Educational status	Secondary or less	59(27.4)	51(23.8)	18(8.4)	11(5.1)	23(10.7)
	University or higher	14(25.5)	10(18.2)	1(1.8)	4(7.3)	4(7.3)
Location of the camp	Nablus	26(24.1)	20(18.5)	7(6.5)	3(2.8)	10(9.3)
	Tulkarm	31(32.0)	30(31.3)	8(8.3)	5(5.2)	10(10.4)
	Jenin	16(24.6)	11(16.9)	4(6.2)	7(10.8)	7(10.8)
Marital Status	Single	41(25.5)	29(18.1)	6(3.8)	8(5.0)	17(10.6)
	Married or others	32(29.4)	32(29.4)	13(11.9)	7(6.4)	10(9.2)
Work	Student	3(23.1)	2(15.4)	0(0.0)	1(7.7)	4(30.8)
	Without job	8(24.2)	11(33.3)	0(0.0)	2(6.1)	3(9.1)
Body mass index	Has a job	62(27.7)	48(21.5)	19(8.5)	12(5.4)	20(9.0)
	Underweight	2(25.0)	1(12.5)	0(0.0)	1(12.5)	0(0.0)
	Normal	25(21.0)	23(19.5)	6(5.1)	3(2.5)	9(7.6)
	Overweight	25(30.1)	21(25.3)	9(10.8)	5(6.0)	9(10.8)
Eating behaviors (Yes)	Obese	21(36.2)	16(27.6)	4(6.9)	6(10.3)	9(15.5)
	Behavior question 1	26(42.6)				
	Behavior question 2	13(68.4)				
	Behavior question 3	9(60.0)				
	Behavior question 4	13(48.1)				

Abbreviations: Behavior question 1: Gone on eating binges where you feel that you may not be able to stop. Behavior question 2: Gone Ever made yourself sick (vomited) to control your weight or shape, Behavior question 3: Ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape, Behavior question 4: Exercised more than 60 minutes a day to lose or to control your weight. kg/m<sup>2</sup>: Kilogram per square meter.

**Table 5.** Adjusted binary logistic regression for the association between EAT-26 and substance use.

EAT-26 Yes*					
Covariate	Covariate Category	Reference Category	Odds Ratio	95% Confidence Interval	P-value
Tetrahydrocannabinol	Positive	Negative	0.759	0.232–2.478	NS
Amphetamine	Positive	Negative	1.128	0.281–4.517	NS
Methamphetamine	Positive	Negative	2.116	0.468–9.570	NS
Benzodiazepines	Positive	Negative	1.083	0.409–2.865	NS
Barbiturates	Positive	Negative	0.712	0.063–8.094	NS
Energy drinks use	Yes	No	0.873	0.417–1.825	NS
Cigarette use	Yes	No	1.484	0.754–2.921	NS
Waterpipe use	Yes	No	1.147	0.581–2.267	NS
Vape use	Yes	No	1.199	0.322–4.457	NS
Alcohol use	Yes	No	0.224	0.043–1.161	NS
Tea use	Yes	No	1.334	0.571–3.115	NS
Chocolate use	Yes	No	0.679	0.279–1.650	NS
Coffee use	Yes	No	1.045	0.358–3.049	NS
Body mass index in kg/m <sup>2</sup>	≥25	<25	2.344	1.168–4.703	<.05
Age in years			1.026	0.988–1.065	NS

\*The reference category is eating disorder based on EAT-26, is NO. Abbreviation: kg/m<sup>2</sup>: Kilogram per square meter.

prevalence of eating disorder attitudes and behaviors in Palestinian refugees was high based on the EAT-26 screening test (27%) and higher than Palestinian male (17.1%) and female (23.8%) university students (Damiri et al., 2021), indicating a serious concern about dieting and body weight or problematic eating behaviors. In addition, excess body weight

is a significant issue among these Palestinian refugees (Damiri et al., 2018) and is linked to increased ED among refugees in this study. Since no studies were conducted previously to detect this population at risk, the high ED prevalence in this study emphasizes the need for further studies to investigate the prevalence and the risk factors associated with increased risk of

**Table 6.** Adjusted binary logistic regression for the association between binge episode behaviors, behavior 1, and substance use.

Bing episodes, Behavior question 1 (Yes)*					
Covariate	Covariate Category	Reference Category	Odds Ratio	95% Confidence Interval	P-value
Behavior question 2	Yes	No	2.321	0.736–7.315	NS
Behavior question 3	Yes	No	0.808	0.212–3.076	NS
Behavior question 4	Yes	No	1.504	0.549–4.122	NS
Methamphetamine	Positive	Negative	1.232	0.391–3.880	NS
Benzodiazepines	Positive	Negative	1.233	0.471–3.234	NS
Tetrahydrocannabinol	Positive	Negative	2.745	1.072–7.033	<.05
Barbiturates	Positive	Negative	0.589	0.056–6.149	NS
Energy drinks	Yes	No	1.138	0.519–2.496	NS
Alcohol	Yes	No	1.997	0.695–5.740	NS
Cigarette	Yes	No	0.646	0.318–1.314	NS
Waterpipe	Yes	No	0.603	0.284–1.281	NS
Chocolate	Yes	No	0.772	0.297–2.006	NS
Vape	Yes	No	1.571	0.454–5.441	NS
Body mass index in kg/m <sup>2</sup>			1.000	0.998–1.003	NS
Age in years			0.985	0.952–1.020	NS

\*The reference category for Behavior question 1 is NO. Abbreviations: Behavior question 1: Gone on eating binges where you feel that you may not be able to stop. Behavior question 2: Gone Ever made yourself sick (vomited) to control your weight or shape, Behavior question 3: Ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape, Behavior question 4: Exercised more than 60 minutes a day to lose or to control your weight. kg/m<sup>2</sup>: Kilogram per square meter.

**Table 7.** Adjusted binary regression for the association between self-induce vomiting, behavior 2, and substance use.

Gone Ever made yourself sick (vomited) to control your weight or shape, Behavior 2 (Yes)*					
Covariate	Covariate Category	Reference Category	Odds Ratio	95% Confidence Interval	P-value
Behavior 1	Yes	No	5.971	1.244–28.651	<.05
Behavior 3	Yes	No	26.381	3.121–222.960	<.01
Behavior 4	Yes	No	0.968	0.059–15.983	NS
Methamphetamine	Positive	Negative	4.255	0.281–64.462	NS
Benzodiazepines	Positive	Negative	0.712	0.072–7.040	NS
Tetrahydrocannabinol	Positive	Negative	1.171	0.106–12.871	NS
Amphetamine	Positive	Negative	<0.001	<0.001	NS
Barbiturates	Positive	Negative	59.357	1.522–2314.701	<.05
Energy drinks	Yes	No	11.275	1.426–89.162	<.05
Alcohol	Yes	No	0.081	0.002–2.820	NS
Cigarette	Yes	No	3.313	0.672–16.330	NS
Waterpipe	Yes	No	8.622	1.559–47.676	<.05
Chocolate	Yes	No	7.831	0.362–169.458	NS
Vape	Yes	No	10.373	1.033–104.124	<.05
Body mass index in kg/m <sup>2</sup>			1.022	0.211–4.950	NS
Age in years			0.832	0.756–0.916	<.001

\*The reference category for Behavior 2 is NO. Abbreviations: Behavior question 1: Gone on eating binges where you feel that you may not be able to stop, Behavior question 3: Ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape, Behavior question 4: Exercised more than 60 minutes a day to lose or to control your weight.

ED in refugees. Moreover, 30.8% of the refugee drug users in this study were at higher risk of ED. Male patients suffering from ED or substance use often feel ashamed and isolated due to the negative stigma associated with these conditions. As a result, it is crucial to raise awareness and improve the detection of ED and related risk factors among male Palestinian refugees.

Individuals with ED who use substances have worse symptomatology and outcomes than those who only have ED (Gregorowski et al., 2013). The functional relation between ED and substance use disorders, which varies between and within ED subtypes, depends on the drug class (Gregorowski et al., 2013; Muhlheim, 2019). Individuals who suffer from eating disorders and display symptoms of binge eating and purging are at a higher risk of engaging in illegal drug use (Glasner-Edwards et al., 2011). Different studies have investigated the effect of THC on appetite, eating behavior, and body weight regulation (Fride et al., 2005; Kirkham, 2005; Mortimer et al., 2019). In agreement with these studies, Palestinian refugee binge eaters were more likely to be THC users than

their peers with no reported THC use. Almost half of the THC users were with binge behavior, and 25.8% were with ED.

Among eating-disordered people, stimulants may have a strong potential for use relative to other substances, given their anorexic effects. Research showed that those with eating disorders are more likely to use amphetamines (Glasner-Edwards et al., 2011; Herzog et al., 2006). It was also perceived that amphetamine and cocaine were the most commonly used drugs among patients with eating disorders, as they both have appetite-suppressant effects (Herzog et al., 2006; Root et al., 2010). The prevalence of ED among Palestinian refugee drug users in this study indicated that 40.7% of methamphetamines users and 39.3% of amphetamines users had ED based on EAT-26. Methamphetamine is commonly initiated among young drug users to lose weight (Sherman et al., 2008). It was suggested that amphetamine use had a higher correlation with the anorexia nervosa binge/purge subtype (ANBP) than with the anorexia nervosa restricting subtype (ANR) (Herzog et al., 2006; Nagata et al., 2002). In this study, Palestinian refugees with self-induced vomiting behavior to control weight

and shape were more likely to be barbiturates users and tobacco smokers. In the West Bank, methamphetamine has emerged as a new homemade liquid substance since 2016 with a street name called GG (Damiri et al., 2018). The key elements identified as contributing to methamphetamine use in refugee camps in the West Bank include the accessibility of drugs, the affordability of starting materials, and their availability (Damiri et al., 2018). Multiple studies have shown that mood disorders such as depression were considered a risk factor for the combination of eating disorders and drug use such as amphetamines (Krishnan, 2005; Stice et al., 2004). Consequently, programs aiming to reduce these disorders (e.g., depression) might reduce the rates of associated eating disorders (Bearman et al., 2003; Stice et al., 2004). However, they might not reduce the rates of drug use (Stice et al., 2004).

Bulimic behavior is characterized by binge eating associated with compensatory behaviors such as self-induced vomiting or the use of laxatives, diet pills, or diuretics (water pills) and is increasingly getting more common in young adolescents (de Souza et al., 2021; De Young et al., 2013). In agreement with these studies, a positive association between binge eating and purging behavior, self-induced vomiting, was determined among Palestinian refugees (de Souza et al., 2021; De Young et al., 2013). Self-induced vomiting influences the individual's guilt after a binge-eating episode, in which those who did not engage in self-induced vomiting experienced more of a decrease in their levels of guilt than individuals who engaged in self-induced vomiting (De Young et al., 2013). Moreover, adolescents' frequent smoking and illicit drug use were related to a higher chance of laxative misuse and self-induced vomiting (de Souza et al., 2021; Elran-Barak et al., 2017). The relationship between EDs and substance use has also been investigated in the context of nicotine and caffeine dependence. Waterpipe smoking was highlighted as a significant health problem in Palestinian male university students with ED which may require unique treatment and prevention strategies (Damiri et al., 2021). In addition, energy drink consumption was associated with concerns about personal appearance, weight loss attempts, and disordered eating behaviors (e.g., vomiting) (Jeffers et al., 2014; Poulos & Pasch, 2015). Consuming excessive amounts of caffeine-containing fluids may serve as a weight control method to mask hunger, aid in purging behavior, or increase energy levels (Hart et al., 2005). In line with these studies, waterpipe and vape smoking predicated the increased risk of self-induced vomiting among Palestine refugees.

Research on the connection between amphetamine usage and self-inflicted vomiting is scarce. However, research suggested that those engaging in extreme behaviors to lose weight, such as excessive exercise, self-induced vomiting, and laxative use, are at higher risk for illicit stimulant use, such as amphetamines and cocaine, due to their suppressive effect on appetite (Bruening et al., 2018). Self-induced vomiting could cause various deleterious effects on the gastrointestinal tract, such as gastroesophageal reflux disease which could lead to esophageal adenocarcinoma (Denholm & Jankowski, 2011; Mehler, 2011).

## Study limitations and strength

Self-reported substance use could underestimate the results. A selection bias is possible because of the refusal rate. Moreover, the urine test does not detect some substances used in the West Bank, like tricyclic antidepressants, tramadol, ketamine, and synthetic THC. In addition, the test used to examine urine has a limited time frame to detect substances. Therefore, a negative result may not necessarily indicate drug-free urine. Therefore, the frequency of substance use may be underestimated in this sample, limiting the findings' generalizability. Moreover, the test does not distinguish between drugs of use and certain medications. Despite these limitations, this first study focused on the Palestinians' eating disorders and substance use.

## Conclusion

This study highlighted a new challenge for the health system to deal with emerging health conditions among male refugees. Findings from this study demonstrate a substantially increased frequency of substance use among Palestinian refugees with ED and unhealthy weight control behaviors relative to those without a concomitant ED. In addition, excess body weight is a significant issue among Palestinian refugees and linked to increased ED among refugees. Raising public awareness could enhance knowledge and abilities and reduce the stigma associated with substance use and eating problems. Therefore, UNRWA should engage community members in mental health and psychosocial support (MHPSS) through prevention and awareness activities for both eating disorders and substance use to protect and promote these vulnerable groups' mental health and psychosocial well-being. Further research is warranted to investigate the association between eating disorders and substance use disorders. Strategies are required to reduce obesity among refugees, and future research needs to identify the most effective interventions for combatting obesity in Palestine.

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## Data availability statement

Most data generated or analyzed during this study are included in this manuscript. Other data supporting this study's findings and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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