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Polyconsumption of Legal and Illegal Substances in The Elderly: Comparison Between Medellin and Pereira*

[English version]

Policonsumo de sustancias legales e ilegales en la persona mayor: comparativo entre Medellín y Pereira

O policonsumo de substâncias legais e ilegais em idosos: uma comparação entre Medellín e Pereira

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Abstract

Objective: To compare the poly-consumption of legal and illegal substances among elderly residents in the cities of Medellin and Pereira (Colombia). **Methodology:** Quantitative, cross-sectional study, with analytical scope, which explored the demographic, social and health characteristics associated with poly-drug use, defined as the concurrent use of two or more legal and/or illegal substances. A total of 1005 adults, randomly selected from their neighborhoods and homes, were surveyed through probability sampling in each city. Descriptive statistics and binomial regression analysis were used in the analysis, with measures of association, hypothesis testing and 95% confidence intervals. **Results:** The use of polypharmaceuticals was recorded in 66% of the elderly, with a higher frequency in Pereira ($p<0.05$). The associated demographic factors were: older than 70 years; in social: high self-esteem and perceived discrimination and health-related: experiencing pain, illness and poor sleep quality. The final model accounted for 20% of the variability observed in the use of polydrugs.

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Conclusions: No differences were found by city, but age, illness, and pain appear to be closely related to higher substance use; therefore, social engagement strategies and activities that promote distraction, energy expenditure, inclusion, and self-esteem are needed.

Keywords: Polypharmacy; Substance-related disorders; Aging; Health; Social support (obtained from MeSH Thesaurus).

Resumen

Objetivo: comparar el policonsumo de sustancias legales e ilegales entre personas mayores residentes en las ciudades de Medellín y Pereira (Colombia). **Metodología:** estudio cuantitativo, transversal, con alcance analítico. Se exploraron las características demográficas, sociales y de salud asociadas al policonsumo, definido como el uso concurrente de dos o más sustancias legales y/o ilegales. Se encuestó a 1005 adultos, seleccionados al azar de sus barrios y hogares, a través de un muestreo probabilístico en cada ciudad. En el análisis se utilizaron estadísticas descriptivas y análisis de regresión binomial, con medidas de asociación, pruebas de hipótesis e intervalos de confianza del 95%. **Resultados**: el 66% de las personas mayores registraron policonsumo, con mayor frecuencia en Pereira (p<0,05). Los factores demográficos asociados fueron: mayores de 70 años; en social: alta autoestima y discriminación percibida; y relacionados con la salud: experimentar dolor, enfermedad y mala calidad del sueño. El modelo final representó el 20% de la variabilidad observada en el policonsumo. **Conclusiones**: no se encontraron diferencias por ciudad, pero la edad, la enfermedad y el dolor parecen estar estrechamente relacionados con un mayor consumo de sustancias; por lo tanto, se requieren estrategias y actividades de participación social que promuevan la distracción, el gasto de energía, la inclusión y la autoestima.

Palabras clave: polifarmacia; trastornos relacionados con sustancias; envejecimiento; salud; apoyo social (obtenido del tesauro DeCS).

Resumo

Objetivo: Comparar o policonsumo de substâncias legais e ilegais entre idosos que vivem nas cidades de Medellín e Pereira (Colômbia). **Metodologia**: Estudo quantitativo, transversal, com escopo analítico, que explorou as características demográficas, sociais e de saúde associadas ao policonsumo de drogas, definido como o uso simultâneo de duas ou mais substâncias legais e/ou ilegais. Foram pesquisados 1005 adultos, selecionados

aleatoriamente em seus bairros e domicílios, por meio de amostragem probabilística em cada cidade. Estatísticas descritivas e análise de regressão binomial foram usadas na análise, com medidas de associação, testes de hipóteses e intervalos de confiança de 95%. **Resultados:** 66% dos idosos relataram uso de múltiplas drogas, com maior frequência em Pereira ($p<0,05$). Os fatores demográficos associados foram: idade superior a 70 anos; sociais: autoestima elevada e discriminação percebida; e relacionados à saúde: dor, doença e qualidade de sono ruim. O modelo final foi responsável por 20% da variabilidade observada no uso de múltiplas drogas. **Conclusões:** Não foram encontradas diferenças por cidade, mas a idade, a doença e a dor parecem estar intimamente relacionadas ao aumento do uso de substâncias; portanto, são necessárias estratégias de engajamento social e atividades que promovam a distração, o gasto de energia, a inclusão e a autoestima.

Palavras-chave: Polifarmácia; Transtornos relacionados a substâncias; Envelhecimento; Saúde; Apoio social (extraído do tesauro MeSH).

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Introduction

The United Nations Office on Drugs and Crime (UNODC) highlights that the post-2019 global pandemic era saw a surge in the misuse of drugs among older adults, including the inappropriate use of analgesics such as opioids and benzodiazepines (De Joncheere & Del Campo, 2021), and the abuse of substances like alcohol, marijuana, and nicotine(Castro JA et al., 20115) (SAMHSA, 2024). According to the European Union Drugs Agency, poly-drug use has been defined as the use of more than one drug or type of drug per person, which may involve the use of multiple substances, either at the same time (concurrent use) or sequentially over a specified time (concurrent use); within this set of drugs are the substance legal and illegal drugs; alcohol, tobacco, psychoactive substances, medicines, some tablets or powders containing more than one substance, are examples of these drugs (European Monitoring Centre for Drugs and Drug Addiction, 2021). For Connor and collaborators (Connor et al., 2014), poly-drug use in general is carried out with the aim of achieving new effects (not achievable with the use of each substance separately), enhancing the desired effects or attenuating the undesired effects of substance use(Connor et al., 2014).

It has been documented that, after the Covid-19 pandemic, there was evidence of an increase in the inappropriate administration of drugs such as analgesics (opioids) and benzodiazepines in the elderly (De Joncheere & Del Campo, 2021) and of substance abuse such as: alcohol, marijuana and nicotine, among others (Substance Abuse and Mental Health Services Administration & Center for Behavioral Health Statistics and Quality, 2020) whose excessive consumption easily leads to poly-drug use.

Older adults have been increasing the frequency of drug use disorders because physiological, emotional, social changes and the appearance of multi-morbidity, some of them typical of age, are triggers for this consumption. This population generally metabolizes substances more slowly and their brains may be more sensitive to drugs (National Institute on Drug Abuse - NIDA, 2020). One of the most frequent situations that has been reported and that is related to morbimortality is, in addition to polyconsumption, the polypharmacy, defined as the consumption of three or more drugs a day and simultaneously (Hernández et al., 2018); this, is classified, according to the amount of daily medication intake as minor polyconsumption when there are four or fewer medications(-Sanchez-Rodriguez et al., 2019), major polyconsumption when there are five or more medications or supplements per day (Qato et al., 2008) and excessive polypharmacy when there are more than 10 (Jyrkkä et al., 2009).

Polypharmacy puts the elderly at high risk due to potential drug interactions, adverse reactions, prescription cascade, non-adherence to treatments, inadequate

prescription (Castro et al., 2015) and even accidental use of medications. This, in combination with other types of substances, also generates poly-drug use, which leads to worsening health conditions (National Institute on Drug Abuse - NIDA, 2020). The use, abuse or accidental use of legal and illegal substances has several consequences, such as: suicidal behavior (Schepis et al., 2019) and other mental health problems (Center for Substance Abuse Prevention, Substance Abuse and Mental Health Services Administration, 2019), brain damage (Colliver et al., 2006), cardiopulmonary diseases, alterations in mood, coordination and reaction among others (National Institute on Drug Abuse, 2023). During the recent COVID pandemic, this consumption seems to have increased and with it, the negative consequences on health; those over 65 years of age or older, are at greater risk due to a weakened immune system or other chronic health conditions (National Heart, Lung, and Blood Institute, 2022), making them more susceptible to the development of epidemics and pandemics, such as COVID-19.

Coronaviruses (CoV) constitute a large family of viruses responsible for numerous conditions, including the Middle East Respiratory Syndrome (MERS-CoV) and the Severe Acute Respiratory Syndrome (SARS-CoV-2). COVID-19, or 2019-nCoV, represents a novel strain of coronavirus (PAHO, 2023b). The risk of severe outcomes from this virus, including hospitalization, need for intensive care, mechanical ventilation, or death, escalates with age, particularly beyond the age of 50 (CDC, 2023; Bartleson et al., 2021).

One of the main effects was pulmonary. Among the pulmonary diseases that frequently affect the elderly is pneumonia; an acute respiratory infection that increases with age and is caused by bacteria (Streptococcus pneumoniae or pneumococcus), viruses (influenza virus, rhinovirus and SARS-CoV-2) and fungi (Pneumocystis jirovecii).

In response to the pneumonia outbreak caused by the SARS-CoV-2 virus (the coronavirus responsible for the COVID-19 pandemic), governments declared health emergencies, necessitating enhanced social distancing measures, especially among the elderly. Social isolation, defined as the objective state of limited social relationships or contact, contrasts with loneliness, which is the subjective experience of feeling isolated (National Academies of Sciences, Engineering and Medicine, 2020). This enforced isolation has led to altered patterns in drug consumption among adults, notably an increase in late-onset consumption, where individuals begin or escalate their usage at older ages, increasing their risk of respiratory, liver, degenerative, metabolic disorders, mental health issues, and susceptibility to accidents and falls (De Joncheere & Del Campo, 2021).

Substances, encompassing a range of natural or synthetic compounds, impact the nervous system by altering functions that regulate thoughts, emotions, and behavior. These can be categorized into recreational use (e.g., alcohol and

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tobacco), pharmacological use (e.g., tranquilizers and opiate analgesics), and general use (e.g., industrial solvents) (Pan American Health Organization, 2023a). In Colombia, the definition of drugs or psychoactive substances, aligned with the World Health Organization (WHO), describes them as any substance that, once introduced into the body through any route of administration, alters the central nervous system's functioning and has the potential for creating psychological, physical, or combined dependence. These substances are capable of modifying an individual's consciousness, mood, or thought processes and are classified based on legal status, origin, and effects (Minjusticia, 2023):

- By legal status, substances are delineated as illicit or illegal (prohibited by law, such as heroin, cocaine, marijuana, etc.) and licit or legal (not subject to sanctions under Colombian law).

- Origin categorizes substances as natural (existing in the environment without manipulation) and synthetic (manufactured in laboratories).

- Based on effects on the central nervous system, classifications include stimulants (enhancing psychic activity and other organs), depressants or psycholeptics (reducing bodily functions and psychic activity), and hallucinogens (altering senses and states of consciousness).

For this study, the classification was selected based on its legal status (Barreto et al., 2014), given that the consumption of medications and pharmaceutical preparations falls under this category.

The phenomenon of population aging, a result of the epidemiological transition (Cardona et al., 2021), signifies a shift in disease and mortality patterns, characterized by a rise in chronic conditions and medication use (both prescribed and self-medicated). The advent of new symptoms often leads to the consumption of additional medications, contributing to the prevalence of polypharmacy (Gutiérrez-Valencia et al, 2019). It is noted that a third of all prescribed medications are intended for individuals over 65 years of age, with nearly 75% engaging in the use of non-prescribed drugs or medications lacking clinical justification for their conditions (Shorr et al, 2007; Hayes et al., 2007; Casas-Vásquez et al., 2016).

Dependency on pharmaceutical substances is well-documented, with some substances consumed for pain relief or discomfort, while others are used for their psychoactive effects, potentially leading to addiction, diseases, and adverse events (Sim et al., 2004; Ruíz-Jasso et al., 2022). Moreover, alcohol consumption

has been observed to negatively impact basic or instrumental activities of daily living (ABIVD) (Mendoza-Meléndez et al., 2015), and in some cases, high levels of consumption may mitigate the adverse effects of drugs (NIDA, 2023).

The consumption of psychoactive substances has predominantly been explored within the younger demographic. However, the elderly have been significantly impacted by social isolation, loneliness, and the fear of contagion during the COVID-19 pandemic, influencing their mood and potentially leading to the misuse of both legal and illegal substances. Consequently, this study aimed to assess the prevalence of polydrug use among the elderly in Medellín and Pereira, Colombia, and explore its association with personal and social characteristics.

Methodology

This quantitative, observational study employed a cross-sectional design with an analytical perspective. The target population comprised 1,005 individuals aged 60 and above, residing in the urban areas of Medellín and Pereira. Participants were selected from April to August 2021 using probabilistic techniques, specifically two-stage cluster sampling. Eligibility criteria included urban residency in the mentioned cities, satisfactory cognitive function, and consent to participate voluntarily, evidenced by signing an informed consent form in the presence of two witnesses. Data collection was conducted at participants' residences, adhering to current biosafety standards due to national restrictions on social mobility prompted by the COVID-19 pandemic.

Experts administered surveys to investigate the consumption of nine psychoactive substances: tobacco, alcoholic beverages, cannabis, cocaine, amphetamines, inhalants, tranquilizers, hallucinogens, and opiates, in addition to the use of pharmaceuticals, both prescribed and self-medicated. From these data, a new variable, "polyconsumption," was defined to denote the use of two or more substances, legal or illegal. Additional variables assessed included personal (demographic, physical health, mental health) and social (family, economic) factors, gauged via self-report. Analysis involved estimating the prevalence of polyconsumption and its correlation with the personal and social variables examined. Initial crude prevalence ratios were calculated, followed by binomial logistic regression to refine the model, including only variables with a statistical significance of p<0.05 in preliminary analyses. The final model (logistic function) was obtained from the following equation:

Probability of polyconsumption$=1/1+e^{-}($ $\beta o+\beta 1X1+ \beta 2x2... \beta kXk)$.

The coefficients included correspond to the estimates (through the maximum likelihood method) for the variables and their categories of interest that were associated with polyconsumption in the final model (p-values < 0.05). The chi-square test was used to test the overall significance of the model and to estimate the total variance explained by the variables included.

The study received approval from the CES University Institutional Ethics Committee, documented in the minutes of May 23, 2019 (minutes No. 134). The manuscript does not contain associated data nor is it deposited in any repository; you can access it with the authorization of the investigators

Results

This investigation encompassed 1.005 elderly individuals residing in the urban locales of Medellín and Pereira, Colombia, in 2021. Participants' ages spanned from 60 to 105 years, with a median age of 67 years and an interquartile range of 63 to 73 years. Notably, polydrug use was more prevalent among the younger segment of this cohort (60 to 74 years old). Male participants exhibited a higher incidence of polydrug use, with significant variances observed between the two cities (p=0.001). The overall polyconsumption rate of legal and illegal substances within this elderly demographic was 66%; specifically, 54.2% in Medellín and 77.6% in Pereira, indicating substantial statistical disparities between the locations (p<0.001).

In Medellín, 61% of single individuals reported multiple substance use, compared to 81.3% in Pereira. The analysis revealed city-based differences in polydrug use concerning various factors, except for sex, age, and suicidal behavior. The distribution of substance users was 40.9% in Medellín and 59.1% in Pereira. Table 1 delineates the percentage distribution of the elderly by polydrug use, alongside personal, social, and health-related attributes, with the p-value indicating city-specific differences in polydrug use across these characteristics.

Regarding social determinants, 65.1% of participants citing low social support engaged in polydrug use. This figure rose to 76% among those feeling discriminated against and 66% for individuals reporting abuse. Health-wise, polydrug consumption was reported by 85% of those perceiving their health quality as poor, 86% with multimorbidity, 76% with a COVID-19 history, 91% falling ill in the four months preceding the study, 89% experiencing pain, 81% with poor sleep quality, and 68% at risk of suicidal behavior. Except for multimorbidity, COVID-19 history, and sleep quality, Pereira's elderly population showed higher frequencies of these conditions.

Furthermore, higher self-esteem correlated with increased polydrug use, particularly in Medellín. Detailed frequencies are provided in Table 1.

Table 1. *Percentage distribution of older people by personal, social and health characteristics, according to polyconsumption of legal and illegal substances, by city. Colombia: SABAM Project, 2021.*

| Individual and social charac-teristics | All | | City | | | | p value |
| | | | Medellín | | Pereira | | |
	Yes (n=663) (66,0%)	No (n=342) (34,0%)	Yes (n=271) (54,2%)	No (n=229) (45,8%)	Yes (n=392) (77,6%)	No (n=113) (22,4%)	
Gender							0,217
Female	347 (64,3)	193 (35,7)	162 (53,8)	139 (42,6)	185 (77,4)	54 (22,6)	
Male	316 (68,0)	149 (32,0)	109 (54,8)	90 (45,2)	207 (77,8)	59 (22,2)	
Age group (years)							0,158
Young (60-74)	521 (64,7)	284 (35,3)	225 (53,1)	199 (46,9)	296 (77,7)	85 (22,3)	
Older (75-89)	134 (71,7)	53 (28,3)	43 (63,2)	25 (36,8)	91 (76,5)	28 (23,5)	
Long live (90-99)	8 (66,7)	4 (33,3)	3 (42,9)	4 (57,1)	5 (100,0)	0 (0,0)	
Marital Status							<0,001
Single	203 (73,6)	73 (26,4)	68 (61,8)	42 (38,2)	135 (81,3)	31 (18,7)	
Married/common-law	265 (66,9)	131 (33,1)	120 (55,8)	95 (44,2)	145 (80,1)	36 (19,9)	
Separate/divorced	93 (58,5)	66 (41,5)	33 (41,3)	47 (58,8)	33 (41,3)	47 (58,8)	
Widower	102 (58,6)	72 (41,4)	50 (52,6)	45 (47,4)	60 (75,9)	19 (24,1)	
Perceived social support (MOS Scale							<0,001
Lower support	125 (65,1)	67 (34,9)	78 (57,49)	58 (46,2)	47 (83,9)	9 (16,1)	
High support	538 (66,2)	275 (33,8)	193 (53,0)	171 (47,0)	345 (76,8)	104 (23,2)	
Discrimination							<0,001
Discrimination	294 (76,2)	92 (23,8)	72 (61,0)	46 (39,0)	222 (82,8)	46 (17,2)	
Not discrimi-nate	369 (59,6)	250 (40,4)	199 (52,1)	183 (47,9)	170 (71,7)	67 (28,3)	
Self-esteem							<0,001
Low-moderate	174 (52,1)	160 (47,9)	38 (25,0)	114 (75,0)	136 (74,7)	46 (25,3)	
High	489 (72,9)	182 (27,1)	233 (67,0)	115 (33,0)	256 (79,3)	67 (20,7)	
Abuse (Geriatric Abuse scale)							<0,001
Any abuse	447 (66,4)	226 (33,6)	223 (58,3)	167 (41,8)	214 (78,4)	59 (21,6)	
Not abuse	216 (65,1)	116 (34,9)	38 (38,0)	62 (62,0)	178 (76,7)	54 (23,3)	
Perceived Health							<0,001

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Individual and social charac-teristics	All		Medellín		Pereira		p value
	Yes (n=663) (66,0%)	No (n=342) (34,0%)	Yes (n=271) (54,2%)	No (n=229) (45,8%)	Yes (n=392) (77,6%)	No (n=113) (22,4%)	
Bad	23 (85,2)	4 (14,8)	4 (66,7)	2 (33,3)	19 (90,5)	2 (9,5)	
Regular	306 (74,5)	105 (25,5)	78 (53,4)	68 (46,6)	228 (86,0)	37 (14,0)	
Good	218 (58,9)	152 (41,1)	145 (56,0)	114 (44,0)	73 (65,8)	38 (34,2)	
Very good	66 (55,5)	53 (44,5)	25 (45,5)	30 (54,5)	41 (64,1)	23 (35,9)	
Excellent	50 (64,1)	28 (35,9)	19 (55,9)	15 (44,1)	31 (70,5)	13 (29,5)	
Multimorbidity							<0,001
Yes	205 (86,9)	31 (13,1)	38 (88,4)	5 (11,6)	167 (86,5)	26 (13,5)	
No	458 (59,6)	311 (40,4)	233 (51,0)	224 (49,0)	225 (72,1)	87 (27,9)	
COVID-19							<0,001
Yes	19 (76,0)	6 (24%)	12 (80,0)	3 (20,0)	7 (70,0)	3 (30,0)	
No	644 (65,7)	336 (34,3)	259 (53,4)	226 (46,6)	385 (77,8)	110 (22,0)	
Any Disease (last 4 months)							<0,001
Yes	194 (91,1)	19 (8,9)	70 (87,5)	19 (12,5)	124 (93,2)	9 (6,8)	
No	469 (59,2)	323 (40,8)	201 (47,9)	219 (52,1)	268 (72,0)	104 (28,0)	
Pain (last 6 months)							<0,001
Yes	156 (89,7)	18 (10,3)	67 (84,8)	12 (15,2)	89 (97,3)	6 (6,3)	
No	507 (61,0)	324 (39,0)	204 (48,5)	217 (51,5)	303 (73,9)	107 (26,1)	
Sleep quality							<0,001
Bad	170 (81,3)	39 (18,7)	74 (85,1)	13 (14,9)	96 (78,7)	26 (21,3)	
Good	493 (61,9)	303 (38,1)	197 (47,7)	216 (52,3)	296 (77,3)	87 (22,7)	
Self-Injurious Behavior							0,059
Some risk	413 (68,3)	192 (31,7)	150 (55,6)	120 (44,4)	263 (78,5)	72 (21,5)	
Low risk	250 (62,5)	150 (37,5)	121 (52,6)	109 (47,4)	129 (75,9)	41 (24,1)	

Table 2 outlines the percentage distribution of elderly individuals based on their polyconsumption of legal and illegal substances. Among the substances, tobacco and alcoholic beverages emerged as the most frequently consumed. Notably, the consumption of alcoholic beverages showcased significant inter-city differences, with a higher prevalence in Medellín (16.2%). The combined use of alcoholic beverages and tobacco was most commonly reported by older adults, with percentages ranging between 13.7% and 15.1%. Additionally, cannabis and tranquilizers, including sleeping pills, were used by six older individuals, while cocaine, amphetamines, inhalants, hallucinogens, and opiates were each reported by five individuals.

Table 2. *Percentage distribution of older people according to polyconsumption of legal and illegal substances, by city. Colombia: SABAM Project, 2021.*

Legal and illegal substances	All n=1005		City Medellín n = 500		Pereira n = 505		P value
	n	%	n	%	n	%	
Tobacco (cigarettes)							
Yes	152	15,1	83	16,6	69	13,7	0,194
No	853	84,9	417	83,4	436	86,3	
Alcoholic beverages							
Yes	138	13,7	81	16,2	57	11,3	0,024
No	867	86,3	419	83,8	448	88,7	
Cannabis							
Yes	6	0,6	1	0,2	5	1,0	0,104
No	999	99,4	499	99,8	500	99,0	
Cocaine							
Yes	5	0,5	1	0,2	4	0,8	0,182
No	1000	99,5	499	99,8	501	99,2	
Amphetamines /other type of stimulants							
Yes	5	0,5	1	0,2	4	0,8	0,182
No	1000	99,5	499	99,8	501	99,2	
Inhalants							
Yes	5	0,5	1	0,2	4	0,8	0,182
No	1000	99,5	499	99,8	501	99,2	
Tranquilizing Agents (Sleeping pills)							
Yes	6	0,6	3	0,6	3	0,6	0,990
No	999	99,4	497	99,4	502	99,4	
Hallucinogens							
Yes	5	0,5	1	0,2	4	0,8	0,182
No	1000	99,5	499	99,8	501	99,2	
Opioid							
Yes	5	0,5	1	0,2	4	0,8	0,182
No	1000	99,5	499	99,8	501	99,2	

Table 3 delves into the demographic, social, and health-related conditions associated with polydrug use among the elderly, dissected by the total study population and segmented by city. Across the board, demographic, social, and health factors play a pivotal role. Age, particularly being 70 years or older, increases the likelihood of polydrug use by 14%. Socially, experiencing discrimination amplifies this probability by 28%, whereas possessing low self-esteem diminishes it by 29%. Health-wise, recent illness, enduring pain, and poor sleep quality escalate the probability of polydrug use by 54%, 47%, and 31%, respectively.

In Medellín, the factors linked to polydrug use encompass age (PR=1.28), experiencing mistreatment (PR=1.53), and several health conditions: a history of Covid (PR=1.50), illness within the last four months (PR=1.83), presence of pain (PR=1.75), and poor sleep quality (PR=1.78). Conversely, in Pereira, perceived discrimination (PR=1.15) and health issues related to illness and pain (PR=1.29 and PR=1.27, respectively) are significant factors.

Table 3. *Demographic, social and health conditions of older people associated with polyconsumption of legal and illegal substances. Colombia: SABAM Project, 2021.*

Characteristics	City								
	All			Medellín			Pereira		
	PR	IC95%	P value	PR	IC 95%	P value	PR	IC 95%	P value
Gender									
Female	1,00	Reference			Reference		1,00	Reference	
Male	1,06	0,96 - 1,16	0,217	1,02	0,86 - 1,20	0,834	1,01	0,91 - 1,10	0,911
Age group (years)									
Young (< 70)	1,00	Reference			Reference		1,00	Reference	
Older (≥ 70)	1,14	1,05 - 1,25	0,003	1,28	1,10 - 1,50	0,003	1,00	0,91 - 1,10	0,961
Marital Status									
Married	1,00	Reference			Reference		1,00	Reference	
Single	1,02	0,93 - 1,12	0,609	0,94	0,80 - 1,12	0,529	0,95	0,86 - 1,05	0,316
Social support									
Perceived social support (MOS Scale)									
Good support	1,00	Reference			Reference		1,00	Reference	
Low Support	0,98	0,87 - 110	0,770	1,08	0,90 - 1,29	0,387	1,09	0,96 - 1,24	0,230

Characteristics	City								
	All			Medellín			Pereira		
	PR	IC95%	P value	PR	IC 95%	P value	PR	IC 95%	P value
Discrimination									
Not discrimination	1,00	Reference			Reference		1,00	Reference	
Discrimination	1,28	1,17 - 1,39	<0,001	1,17	0,98 - 1,39	0,089	1,15	1,05 - 1,27	0,003
Abuse									
-Not abuse	1,00	Reference			Reference		1,00	Reference	
Any abuse	1,02	0,92 - 1,12	0,66	1,53	1,18 - 2,00	<0,001	1,02	0,93 - 1,12	0,655
Self-steem									
Low-moderate	1,00	Reference			Reference		1,00	Reference	
High	0,71	0,63 - 0,80	<0,001	0,37	0,28 - 0,49	<0,001	0,94	0,85 - 1,04	0,241
Covid-19									
No	1,00	Reference			Reference		1,00	Reference	
Yes	1,16	0,92 - 1,45	0,284	1,50	1,15 - 1,96	0,042	0,90	0,59 - 1,35	0,559
Disease (last 4 months)									
No	1,00	Reference			Reference		1,00	Reference	
Yes	1,54	1,43 - 1,65	<0,001	1,83	1,61 - 2,08	<0,001	1,29	1,20 - 1,40	<0,001
Pain									
No	1,00	Reference			Reference		1,00	Reference	
Yes	1,47	1,36 - 1,58	<0,001	1,75	1,53 - 2,00	<0,001	1,27	1,17 - 1,37	<0,001
Self-Injurious Behavior									
Not risk	1,00	Reference			Reference		1,00	Reference	
Some risk	1,09	0,99 - 1,20	0,059	1,06	0,89 - 1,24	0,510	1,03	0,93 - 1,15	0,504
Sleep quality									
Good	1,00	Reference			Reference		1,00	Reference	
Bad	1,31	1,21 - 1,43	<0,001	1,78	1,56 - 2,04	<0,001	1,02	0,91 - 1,13	0,746

PR: Prevalence Ratio; CI 95%: Confidence Interval

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The refined model, adjusted for significant variables identified in bivariate analyses, indicates an enhanced predictive capacity for the entire population. Specifically, low or moderate self-esteem, in contrast to high self-esteem, significantly reduces the odds of polyconsumption by 52%. The final model was estimated from the equation for binary logistic regression with the logit function:

Logit(polyconsumption)=

$$\frac{1}{1+e^{-(\beta_0+0.314\cdot Edad+0.410\cdot Discriminationn+1.096\cdot Pain-0.733\cdot Selfsteem+1.388\cdot Illness+0.499\cdot SleepQuality)}}$$

This model accounts for 20% of the variability in polydrug use among the elderly in both cities. Detailed associations of these factors with polydrug use among older adults in these Colombian cities are meticulously documented in Table 4.

Table 4. *Final model of factors associated with polyconsumption of legal and illegal substances in older adults from two cities in Colombia: SABAM Project, 2021.*

Characteristics	p value	PRa	CI 95%	
			Lower Limit	Upper Limit
Age				
≥70 vs < 70 years	0,035	1,37	1,02	1,84
Discrimination				
Yes vs No	0,008	1,51	1,11	2,07
Pain				
Yes vs No	< 0,001	2,99	1,75	5,12
Self-steem				
Moderate-Low vs High	<0,001	0,48	0,35	0,64
Disease (last 4 months)				
Yes – No	< 0,001	3,99	2,38	6,70
Sleep Quality				
Bad quality vs Good quality	0,016	1,65	1,09	2,49

PRa: Prevalence Ration adjusted. CI: Confidence Interval

Discussion

This investigation revealed that the prevalence of polydrug use, defined as the concurrent consumption of legal and illegal substances, among adults aged 60 and above in two Colombian cities, varies significantly, ranging from 54.2% in Medellín to 77.6% in Pereira. The study identified several factors associated with an increased likelihood of polydrug use, encompassing demographic elements (age over 70), social aspects (perception of discrimination), and health-related issues (experiencing pain, poor sleep quality, and illness).

Considering the time of the pandemic when these data were collected and the consequences (loneliness, increased depression) that isolation by COVID generated, mainly among this population, the construct of polydrug use was based on self-reported consumption of legal (medications, tobacco, alcohol) and illegal substances (psychoactive substances) by the elderly. However, the literature predominantly focuses on medication use and polypharmacy, aimed at managing chronic conditions prevalent in this demographic (Castro-Rodríguez et al., 2015; Hayes et al., 2007; NIDA, 2023; SAMHSA, 2019;), often associated with pain and sleep disturbances, as observed in our findings. Alcohol emerged as the most commonly consumed substance (Keyes, 2023; Sim et al., 2004; Wolde, 2023), with recent studies also exploring the use of cannabis, primarily for its therapeutic benefits rather than recreational purposes (Barreto et al., 2014; Pinelo, 2022). Yet, recreational use of psychoactive substances has been largely understudied in older populations, with existing research primarily targeting adolescents and young adults, excluding those aged 65 and older.

This study's insights are crucial for policymakers and healthcare professionals serving this age group, documenting several interrelated factors that exacerbate the risks associated with polydrug use. The consumption of one substance can lead to the consumption of others, generating interactions between drugs or substances that aggravate the health condition by blocking the effect or generating other undesirable effects (Fatemeh et al., 2021). Understanding the full clinical history of these individuals is essential to mitigate adverse effects and manage their care more effectively. Notably, older adults exhibit particular vulnerabilities to substances like alcohol due to physiological aging, increased chronic disease burden, and medication use (GBD, 2015; Han et al., 2017). Moreover, the intersection of substance abuse with mental and behavioral disorders in the elderly is well-documented, presenting treatment challenges and often stemming from underlying chronic conditions.

A cross-sectional examination of the clinical profiles of drug users admitted to intensive care units highlighted a 31.2% prevalence of psychiatric comorbidities, with depression, anxiety, and bipolar affective disorder being predominant (Pereira

et al., 2020). Psychological and psychiatric literature suggests that the abusive consumption of alcohol and drugs can exacerbate or result from mental health issues (Afonso et al., 2022). Although our study did not find direct associations with depressive symptoms, such conditions can disrupt sleep patterns, primarily causing insomnia, which may prompt increased use of substances to facilitate sleep (Jiang et al., 2022).

Documented evidence suggests that in the later stages of life, drug use often correlates with the prescription of analgesics, predominantly benzodiazepines —frequently in excessive quantities— and polypharmacy, defined as the concurrent use of five or more medications daily, which poses a risk of addiction (De Joncheere & Del Campo, 2021). Such prescription practices increase the likelihood of drug interactions significantly; a regimen comprising five medications carries a 50% chance of a clinically significant interaction, escalating to a certainty of interaction when the number reaches seven, with 20% of these cases potentially resulting in severe adverse reactions (Homero, 2012).

Given the physiological and functional alterations inherent to aging, older individuals are notably more susceptible to developing respiratory, liver, degenerative, and chronic diseases, including mental health disorders, falls, and traffic accidents. These conditions are exacerbated by the adverse effects of medication and drug consumption (De Joncheere & Del Campo, 2021). A population-based study in Brazil highlighted the rate of hospitalization due to substance use among the elderly (aged 50 and above) across both genders, standing at 16.53 (17.01 ± 16.06) per hundred thousand individuals for those aged 60 to 69 years (Afonso et al., 2022). Furthermore, the Department of Information Technology of the Unified Health System (DATASUS) in Brazil estimated that 17% of individuals aged 50 or older are afflicted with addiction to either legal or illegal substances.

The interplay between the consumption of alcohol and psychoactive substances with various diseases, psychiatric disorders, and cardiovascular and sexual dysfunctions has been established (Afonso et al., 2022). Consequently, these health issues contribute to a cascade of socio-economic challenges, including economic strain, unemployment, homelessness, social isolation, and loneliness. These factors not only result from substance use but also act as catalysts for increased consumption, irrespective of the substance's legality.

The demographic expansion of older populations globally poses significant challenges for achieving active aging processes. Within this context, polydrug use emerges as a critical public health issue, hindering these objectives. Predictions as early as 2008 anticipated a doubling in the number of older individuals with substance use disorders—from an annual average of 2.8 million during 2002-2006 to 5.7 million by 2020 (38). The National Survey on Drug Use and Health (NSDUH) (Han et al., 2010) further revealed that illicit drug use among those

aged 50 to 59 climbed from 5.1% in 2002 to 9.4% in 2007, noting that 90% of this cohort initiated substance use before turning 30. Although our study did not examine the onset age for substance use, it is noteworthy that in the United States, the demand for substance abuse treatment among individuals aged 50 and older was projected to increase from 1.7 million in 2000 to 4.4 million in 2020 (Gfroerer et al., 2003).

Alcohol stands as the predominant psychoactive substance consumed by the elderly (Han et al., 2017; Han et al., 2018), also being the most common among those seeking treatment for substance abuse (Han et al., 2017). Alcohol use is linked to functional decline and elevated mortality risk (Jyrkkä et al., 2009; GBD, 2015), with 3% of global mortality attributable to its consumption. In our study, alcohol and tobacco usage rates were 13.7% and 15.1%, respectively, with the latter representing the highest level of reported use. Notably, both substances saw higher consumption rates in Medellín, though only the differences in alcohol consumption reached statistical significance.

Globally, and particularly within the U.S., there has been a marked increase in excessive alcohol use and alcohol disorders among older adults (De Joncheere, 2021). This uptrend is more pronounced among women, individuals who consume other substances like cannabis, and those in relatively good health during adulthood, i.e., without multimorbidities. Over the past two decades, a significant increase in alcohol consumption, excessive drinking, and reported alcohol use disorders among the elderly has been documented (Keyes, 2023). Among individuals aged 60 or older, alcohol consumption patterns vary, with 7% drinking daily, 8% up to four times a week, 10% up to three times a month, 8% up to once a month, and 68% either never drinking or doing so less than once a year (Afonso et al., 2022).

The National Survey on Drug Use and Health (NSDUH) reported a 19.2% relative increase in excessive alcohol consumption from 2005 to 2014, with a significant linear trend (p<0.001) observed from the period 2005/2006 to 2013/2014. Factors such as being Hispanic, male, and concurrent tobacco or illicit drug use were linked to heavy alcohol consumption. Binge drinkers were also found to have higher instances of tobacco and illegal drug use. Among older adults with multimorbidity, factors including higher income (adjusted OR=1.44, p<0.05), tobacco use in the last month (adjusted OR=2.55, p<0.001), and a substance use disorder due to illegal drugs (adjusted OR=1.80, p<0.05) were associated with an increased likelihood of excessive alcohol consumption (Han et al., 2018; Lindgren et al., 2017; Marengoni et al., 2011). The complexity of managing patients with addictions, particularly regarding polypharmacy, is further complicated by behaviors such as alcohol misuse, illicit drug use, and prioritizing spending on non-health related activities over medication (Homero, 2012).

In examining psychoactive substance use, the NSDUH evaluated the link between marijuana use, dependence, and the non-medical use of prescription opioids among 75,949 adults over 50 years of age from 2002 to 2014. Approximately 3.8% of older adults reported past-year marijuana use, which was notably higher (25%-37%) among individuals dependent on non-medical opioids compared to those without such dependence (3.5%-3.7%). Past-year marijuana use significantly increased the odds of reporting opioid dependence (AOR 9.6, 95% CI=5.8-15.7) and non-medical opioid use (AOR 6.4, 95% CI=5.2-7.8), with heroin identified as the most commonly used non-medical opioid (Ramadan et al., 2021).

Our study reveals that older individuals with low or moderate self-esteem are 52% less likely to engage in polydrug use compared to those with high self-esteem, a finding that diverges from existing empirical evidence. This discrepancy suggests that substance use may provide temporary feelings of well-being or perceived improvements in self-esteem. Significant correlations have been observed between social functioning, duration of substance use, and self-esteem, indicating lower levels of self-esteem and social functioning among those with substance abuse (Ersöğütçü & Karakaş, 2016). Conversely, a study in Spain involving 515 older adults found that 43.3% had low self-esteem, with physical activity positively impacting drug consumption reduction, self-esteem enhancement, and decreased dependency risk (Moral-García et al., 2020). While our research did not directly link polydrug use with physical inactivity, it supports the notion that physical activity correlates with better health outcomes and self-perception, potentially mitigating substance use. A study in China highlighted that self-esteem and emotional well-being could mediate the relationship between perceived social support and loneliness among individuals with substance abuse disorders (Xia & Yang, 2019).

Our study identified a notable correlation between reported discrimination and an increased probability of polydrug use by 51%. The majority of research linking discrimination to substance use primarily focuses on racial discrimination. For instance, the most recent National Survey of American Life, which surveyed African American and Afro-Caribbean adults (with a younger average population age of 41.5 ± 0.5 years), found that perceived discrimination was linked to a higher likelihood of using multiple psychoactive substances, especially illegal ones. Specifically, individuals were 2.35 and 3.10 times more likely to use cocaine and other illegal drugs, respectively, and reported a 38% increased probability of elevated alcohol consumption (Mattingly et al., 2020).

The significance of family and familial support in the aging process is well-established, with strong family bonds (emphasizing quality over quantity) being crucial for enhancing the social well-being of older adults. Stressful situations, including family dysfunction, are suspected to contribute to the deterioration

and cognitive and behavioral changes in this demographic (Gallardo-Peralta et al., 2022; Silva et al., 2023). Although our study did not find a direct association between low social support and polydrug use, among those reporting a lack of support, the frequency of polydrug use was over 60%. A study of 2,098 IAAM-DF users in Mexico revealed that 81.4% perceived low social support, and 82.2% described their family environment as dysfunctional. Tobacco use was linked to perceptions of health and family support, while the use of any substance (illegal or prescribed) was associated with the onset of chronic-degenerative diseases and mental disorders, highlighting the influence of alcohol, tobacco, and other drugs on the health and well-being of older adults in Mexico City (Riquelme et al., 2005).

A narrative review, albeit focused on the general population, investigated the consumption of legal and illegal psychoactive substances, identifying family dynamics such as a negative family atmosphere, conflicts, poor communication, and substance use within the family as factors that elevate the risk of substance use. Conversely, members of highly cohesive families are less likely to engage in substance use behaviors (Barreto et al., 2014). Although the bulk of evidence pertains to adolescents, it has been recognized for over two decades that polydrug use can stem from disruptive family environments (Collins et al., 1998).

The Covid-19 pandemic has exacerbated feelings of loneliness, isolation, and sadness among older adults, subsequently identified as risk factors for increased substance use. A study conducted in Mexico with 380 older participants (50.26% women, average age 66.79 ± 5.81 years) revealed that 31.05% had consumed alcohol, 22.63% tobacco, 16.05% non-prescription tranquilizers, and 7.89% marijuana in the month preceding the survey, with a 2.6% consumption rate for other illegal drugs. Notably, consumption rates were slightly higher among women and single individuals. The study also found associations between symptoms of mild to severe depression and all surveyed drugs, excluding tobacco and opiates, underscoring the necessity of addressing drug use and associated mood disorders among the elderly (Pinelo et al., 2022).

The efficacy of treatment for older adults significantly depends on the strength of their social support networks. Despite substantial efforts in diagnosing and treating the elderly, failures often occur in recognizing patients' financial capacities, understanding treatment indications, and overcoming challenges like geographic isolation or the absence of close support in case of complications, all of which critically affect interventions targeting this demographic (Homero, 2012).

Sleep quality is pivotal for maintaining optimal physical and mental health and ensuring the functionality of daily activities, especially for older adults (Sella et al., 2022). Poor sleep quality was found to increase the likelihood of polydrug

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use by 65% in our study. Research from the University of Florida indicated that 29% of seniors utilize cannabis for sleep disorders (Kaufmann et al., 2023), while a study in Ethiopia associated lifetime alcohol, nicotine, inhalants (23), and cannabis use with poor sleep quality and even suicidal ideation (Hayes et al., 2007).

Healthcare professionals have identified poor sleep health as a consistent factor in the initiation and exacerbation of substance use disorders, treatment discontinuation, and relapse. Improving sleep health emerges as a modifiable factor with the potential to diminish the occurrence and severity of these disorders (Spadola et al., 2023).

Continued substance use can lead to dependency, disability, and chronic health issues, with the adverse outcomes of drug dependency—such as illnesses, disabilities, and deaths—being disproportionately prevalent in low- and middle-income countries. Limited access to healthcare in these regions further exacerbates the risk of losing functional independence, a crucial component of elderly well-being, quality of life, and active aging (Marcoa-Pardo et al., 2023).

Limitations of the study. One limitation is the presumption that substance use initiation occurs exclusively during aging, potentially directing interventions towards a later life stage, despite evidence indicating early onset. Significant correlations have been observed between self-esteem and the age of substance use initiation (p=0.001) (Ersöğütçü & Karakaş, 2016). However, due to the cross-sectional nature of this study, we focused on the current prevalence of polydrug use among older adults, irrespective of onset age, a factor recommended for exploration in future research.

The societal acceptance of substance use among older adults poses another limitation. Many may hesitate to report their consumption due to potential stigma from families, communities, and healthcare providers, particularly those with chronic comorbidities impacting their health and quality of life. Thus, the reliance on self-reported data could lead to underestimations, although this method aligns with similar studies, few of which include hospital records.

Conclusions

The short- and long-term harms associated with psychoactive substance use are influenced by various factors, including substance type, consumption method, individual characteristics, and the social context of use. This study contributes to understanding a relatively underexplored phenomenon within both the national and regional contexts and among an increasingly relevant age group. Future longitudinal research is essential for a deeper comprehension and to address the

variance observed in our final model. Some characteristics shown by evidence such as age of onset, pandemic context, overuse or misuse of medications, drug interaction effects, the type of substances combined and in general, the practices of older adults (and perhaps in their closest support network) around the subject, could be considered in future lines of research mainly if it is considered that behaviors can be a source of intervention strategies to reverse the impact of "bad practices" on the health and quality of life of the elderly (Heshmatifar et al., 2021). Nevertheless, this investigation identifies modifiable factors potentially reducing substance consumption among the elderly in the studied cities. Factors such as age, illness, and pain appear to be closely linked with increased consumption of legal and illegal substances. Older adults seeking improved quality of life may be more open to substances that alleviate pain and enhance sleep quality. Yet, this approach may not yield lasting benefits and could detrimentally impact long-term health. Recommended strategies include enhancing social networks and activities that foster distraction, energy expenditure, inclusion, and self-esteem. Simple social participation strategies may have a combined effect on the social and health factors associated with polydrug use identified in this study.

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