Factors Related to Simultaneous Cocaine and Alcohol Use for Clients in Treatment

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Introduction

Research shows that alcohol and cocaine are frequently used simultaneously; however, few field studies have been conducted on the patterns, functions and contexts of simultaneous cocaine and alcohol use. Simultaneous use is typically defined as using both substances within a three hour period of one another [1]. Several studies have shown that a large majority of treatment clients with cocaine problems also drink alcohol [2]. The health profiles of treatment clients concurrently dependent on cocaine and alcohol compared to those who are dependent on either cocaine alone or alcohol alone has recently been reported [3]. In this study, health consequences across four dimensions of physical, social, mental and economic health were similar for the concurrent and cocaine group, but both of these groups had significantly worse health profiles across all dimensions than those dependent on alcohol alone.

Little research exists that is designed to explain the reasons or situations involving simultaneous use of cocaine and alcohol. Experimental and biological studies have shown that alcohol, a depressant, and cocaine, a stimulant, when mixed together produce a new metabolite, coca ethylene that can result in pharmacological effects that differ from the effects of either drug alone [4]. Two studies found that subjects experienced and enjoyed more euphoria after the simultaneous use of cocaine and alcohol than after using either drug alone [5,6]. Recently, [7] reported that among the four dimensions for motivations developed by [8], simultaneous users reported enhancement, coping and social reasons as most important [4]. Three reasons or functions that may explain why alcohol use is common among cocaine users: 1) more intense feelings of a high beyond either drug alone (i.e., enhancement), 2) less intense feelings of alcohol inebriation, and 3) tempering the discomfort of coming down from cocaine. Cocaine abusers have reported that use of alcohol during a cocaine binge prolongs the euphoric properties of cocaine (the "high"), and increases the duration of effects [9]. Postulate motivations for simultaneous use include: enhancement, modifying the effect of either substance alone, and/or social reasons.

Cocaine might be used after drinking to offset some of the sedating effects of alcohol. Conversely, alcohol may be used after cocaine to diminish the acutely unpleasant physical and psychological effects of cocaine ingestion, primarily paranoia and agitation [4,9]. Drinking alcohol to ameliorate discomfort associated with tapering or ceasing cocaine use was common among 60% of cocaine treatment subjects (n=66) [10]. Furthermore, these authors found that subjects, who used alcohol to come down more frequently, had less overall cocaine use. The precise mechanism underlying the aforementioned effects is unknown; however, the pharmacological properties of cocaethylene, as described above, are one possible explanation [5].

Some research has been conducted on the effects associated with

the temporal ordering of cocaine and alcohol. Temporal order refers to whether cocaine or alcohol is used first when using simultaneously. Available evidence suggests that when cocaine is administered before alcohol, the increase in heart rate is less pronounced than when alcohol is administered first [11]. When alcohol is taken before cocaine, a greater subjective perception of cocaine intoxication is noted than when cocaine is taken before alcohol [12]. Administration of alcohol before cocaine results in higher levels of coca ethylene, which produces stronger behavioural effects than when cocaine is taken first [13]. The temporal order of use may be related to different reasons or functions of use. Temporal order of simultaneous use may also be influenced by exposure to peer groups and social settings where cocaine is available at a time when alcohol use has already begun i.e., opportunistic reasons [14].

There is limited knowledge of temporal ordering of use and its relationships between simultaneous use and dependence. Whether simultaneous users tend to drink alcohol before or after cocaine administration, as well as the situations related to the order of use, are unknown. Finally, the relationships between preferred order of cocaine and alcohol with dependence for alcohol or cocaine are unknown. The relationship between simultaneous use and alcohol or cocaine dependence lacks thorough investigation.

Objectives

1. What is the preferred temporal ordering of cocaine and alcohol for different situations?

2. What constructs (i.e. groups of items) best describe the different situations for temporal ordering of cocaine and alcohol?

3. How are different constructs for temporal ordering related to the severity of alcohol or cocaine dependence?

Materials and Methods

The research design

The research design is a cross-sectional study where clients in

treatment for cocaine or alcohol problems are asked to complete a self-administered questionnaire on their health profiles.

The sample

The sample was restricted to clients from 18 to 65 years of age in residential treatment for substance use problems with cocaine or alcohol, presenting with a primary problem of alcohol or cocaine and who agreed to participate in the study. We sought to obtain a stratified sample of 50% men and 50% women to permit maximum statistical power for the investigation of gender differences. A quota sample was taken to achieve the required numbers.

Data collection

The procedures involved approaching clients to complete a self-administered questionnaire. Clients initially completed a consent form and then anonymously completed the questionnaire. Subjects were given a $20 gift certificate as compensation for their participation. The study was approved by the ethics review board at the University of Victoria and the ethics boards of the treatment providers in situations where treatment was provided within a hospital context.

Measures

Measures include questions that were developed specifically for this study to better understand the temporal ordering of simultaneous alcohol and cocaine use. We first asked two questions "When you used both cocaine/crack and alcohol on the same occasion, how often did you ….. (1) start with alcohol before using cocaine/crack, and (2) start with cocaine/crack before using alcohol?" Respondents could report their frequency on a five point scale from never (0) to practically all the time (4). Next respondents were given a list of 16 situations where they might use both cocaine and alcohol. Examples of reasons included: to stay high longer, to mellow off, to drive a car, to be more social and to help deal with cocaine cravings. For each situation they were asked to report the frequency (i.e. 1- never, 2-rarely, or 3 - often) that they either used cocaine first and then alcohol or used alcohol first and then cocaine For measures of dependence on alcohol and cocaine problems, we used the Severity of Dependence Scale (SDS) for each substance, which measures the degree of dependence experienced by users of different types of drugs. The SDS assesses five items on a 4 point scale from 0 to 3 [15], producing a potential range from 0 to 15. In this research the scales for cocaine and alcohol dependence are analysed as continuous variables.

Demographic questions included sex and gender differences, socio-economic status and other characteristics.

Psychosocial constructs included the physical aggression sub-scale of the Aggression Questionnaire Buss and Perry 1992, the risk-taking/impulsivity scale [16], the perceived stress scale [17], the TCU Self-Rating Form (TCU/SRF) depression scale [18], a measure of sleep problems [19], and the anxiety scale [18]. In addition, we employed a subset of five items from the Paranoia scale of the Minnesota Multiphasic Personality Inventory Hathaway and McKinley 1943. This instrument was found by [20] to be a more general measure of paranoia; that is, people may respond positively to the measure without indicating a disordered mental state. Cronbach's alphas from this dataset have been previously reported (Macdonald et al. in press) as follows: impulsivity/risk-taking (alpha=.84), aggression (alpha=.91), anxiety (alpha=.81), depression (alpha=.74), sleep (alpha=.89), stress (alpha=.81) and paranoia (alpha=.85). For social indicators, a 6-item scale adapted from [21] was used to measure social support. Also employed was a

sexual compulsivity scale [22] adapted from a self-help guide for those with sexual addictions [23]. For these measures, Cronbach's alphas were: social support (alpha=.80) and sexual compulsion (alpha=.93). For economic indicators, a 7-item scale was used to measure financial problems (alpha=.67).

Results

All of the following analyses were restricted to clients who reported using both cocaine and alcohol within three hours of one another "at least sometimes" (n=340).

1. What is the preferred temporal ordering of cocaine and alcohol for different situations?

Our first analysis involved comparing the average frequency that subjects reported using alcohol then cocaine versus using cocaine then alcohol sees the measures section above. Using a paired samples t-test, respondents reported a significantly ($p<.001$) higher frequency of using alcohol then cocaine (mean=2.47) versus frequency of using cocaine then alcohol (mean=1.77). Table 1 presents the means for frequency of using either cocaine before alcohol or alcohol before cocaine in different situations. Simultaneous users indicated frequency of use as (1) never, (2) rarely or (3) often. In terms of absolute frequency, respondents indicated they were most likely to use alcohol and then cocaine to stay out or party longer (mean=2.39), to get higher (mean=2.25), to be more social (mean=2.23) or to stay high longer (mean=2.21).

The second analyses were paired t-tests comparing the frequency of using cocaine before alcohol or alcohol before cocaine in different situations. Results of the paired t-tests are provided in Table 1. Use of alcohol and then cocaine was significantly ($p<.05$) preferred for four types of situations: (1) to experience a longer high, (2) to experience a more intense high, (3) to drive a car, and (4) to stay up longer. Use of cocaine and then alcohol was significantly ($p<.05$) preferred: (1) to reduce the effects of withdrawal, (2) to help sleep, (3) to help deal with cocaine cravings, and (4) because of cravings for alcohol after cocaine. Other activities listed in Table 1 were statistically unrelated to the order of use.

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2. What constructs (i.e. groups of items) best describe the different situations for temporal ordering of cocaine and alcohol?

A factor analysis of valid responses was conducted to assess which items cluster or correlate well together. Both order 1 items (cocaine then alcohol) and order 2 items (alcohol then cocaine) were analyzed separately to develop scales. To create maximum separation between the factors, we chose a principal component analysis with Varimax rotation. The scree plot indicated a 2 factor solution to be appropriate. The two factor solution accounted for 53.7% of the variance in the correlation matrix before rotation among order 1 items, and 52.8% of the variance before rotation among order 2 items. Using a cut-off of .50

Take both alcohol and cocaine/crack…	Cocaine then alcohol	Alcohol then cocaine	N	P value
To stay high longer[a]	2.02	2.21	290	.017
To mellow off	2.07	1.90	291	.055
To reduce cravings for more cocaine	2.00	1.86	291	.069
To reduce withdrawal from cocaine[b]	2.13	1.80	284	<.001
Because I crave alcohol after using cocaine	1.91	1.77	287	.039
To reduce feelings of paranoia	1.88	1.75	288	.103
To drive a car	1.44	1.57	292	.018
To have sex	1.82	1.79	292	.665
To get higher	1.94	2.25	288	<.001
To be more social	2.11	2.23	291	.099
When thirsty	1.80	1.86	288	.420
To create an appetite to eat	1.51	1.44	288	.247
To party or stay out longer	2.11	2.39	286	<.001
To help deal with cocaine cravings	2.13	1.93	286	.007
To help sleep	1.98	1.65	282	<.001
To make sure I'm not too high or too low	1.98	1.98	290	.958

[a]Response options: (1) never, (2) rarely, or (3) often.
[b]Items in bold are statistically significant p < .05.
Table 1: Means and paired t-tests for frequency of use of either cocaine or alcohol first in different situations

for interpretable loadings, both order 1 and order 2 produced nearly identical groupings of items (Table 2).

As part of the factor analysis, we examined the items and drew conclusions as follows. Factor 1 reflects loadings from 8 items that deal with managing the side-effects of drug use, such as helping sleep, reducing withdrawal symptoms, and reducing feelings of paranoia. Factor 1 also has loadings from one item that reflects managing the high from cocaine (not getting too high or too low). This factor can be called "Managing Effects." Factor 2 reflects loadings from 5 items dealing with intensifying the effects of cocaine or alcohol (stay high longer) and enhancing effects in the context with other people (stay out longer, have sex). Factor 2 can be called "Enhancing Effects."

The item loadings were used to generate scales representing Managing and Enhancing effects, each with two orders, by adding the items together for nine-item and five-item scales, respectively. These scales were tested for internal reliability using data for order 1 (i.e. cocaine then alcohol) and order 2 (i.e. alcohol then cocaine) separately. Cronbach's alpha coefficients were good for the nine item Managing effects scales for both order 1 (alpha=.89) and order 2 (alpha=.89). Similarly, Cronbach's alpha coefficients were acceptable for the five item Enhancing effects scale for both order 1 (alpha=.82) and order 2 (alpha=.81). The lower alphas for enhancing effects likely reflects fewer scale items.

A Pearson r correlation matrix was conducted to assess the bivariate relationships among the new scales, along with the Alcohol Severity of Dependence Scale and the Cocaine Severity of Dependence Scale (Table 3). A significant negative Pearson r correlation was found between the two orders for the Managing effects scales (r=-.150, p<.05), and no relation between the two orders for the Enhancing effects scales (r=.020, n.s). The Managing effects and Enhancing effects scales for order 1 (alcohol then cocaine) were highly correlated (r=.510, p<.001) as were the Managing effects and Enhancing effects scales for order 2 (cocaine then alcohol, r=.528, p<.001).

3. How is temporal ordering related to the severity of alcohol or cocaine dependence?

In our first analysis, we conducted two Chi square analyses between (1) the frequency of cocaine use before alcohol and cocaine dependence (i.e. a score of 3 or more on the severity of cocaine dependence scale), and (2) the frequency of alcohol use before cocaine and alcohol dependence. Both analyses were significant (p<.001) with increased frequency being strongly associated with increased likelihood of dependence. Among the 56 subjects who reported practically always using cocaine before alcohol when using simultaneously, 98.2% (n=55) were dependent on cocaine, whereas only 73.9% were dependent who never used cocaine before alcohol. Among the 123 subjects who reported practically always using alcohol before cocaine when using simultaneously, 90.2% (n=111) were dependent on alcohol, whereas only 44.4% were dependent on alcohol who never used alcohol before cocaine.

The next sets of relationships examined were between the Managing effects and Enhancing effects scales with the Alcohol Severity of Dependence Scale and the Cocaine Severity of Dependence Scale, also shown in Table 3. The Managing effects 1 and Enhancing effects 1 scales were significantly (p<.001) related to severity of cocaine dependence; the Managing effects 2 and Enhancing effects 2 scales were each significantly (p<.001) related to alcohol dependence. Clearly, the temporal order of use is strongly related to alcohol or cocaine dependence. More frequent use of cocaine then alcohol is significantly related to cocaine dependence, whereas more frequent use of alcohol then cocaine is significantly related to alcohol dependence.

We conducted two multivariate regression analyses: one with the criterion variable of cocaine dependence and the other with the criterion variable of alcohol dependence. Predictor variables included the Managing effects scale, the Enhancing effects scale, the psychosocial scales described in the measures section of this manuscript, and demographic variables of age and sex. Only order 1 scales were included for predicting cocaine dependence and order 2 scales were included for predicting alcohol dependence, based on the strength of relationships found in the correlation analysis. Diagnostic tests for both analyses revealed no violations of the assumptions for regression. Table 4 shows that four variables contributed to a significant regression equation with cocaine dependence as the criterion variable R=0.372, F (11,247)=3.60, p<.001. Both increases in the Managing effects and Enhancing effects scales were significantly (p<.05) predictive of cocaine dependence severity. As well, increases in financial problems and sex

Take both alcohol and cocaine/crack…	Order 1, cocaine then alcohol		Order 2, alcohol then cocaine	
	1	**2**	**1**	**2**
To help sleep	.799[a]		.781	
To reduce withdrawal from cocaine	.794		.703	
To reduce feelings of paranoia	.782		.772	
To mellow off,	.768		.678	
To reduce cravings for more cocaine	.759		.741	
To help deal with cocaine cravings	.661	.424	.702	
To make sure I'm not too high or too low	.620	.392	.561	
To create an appetite to eat	.552		.656	
When thirsty	.516	.316	.619	
To get higher		.853		.827
To party or stay out longer		.778		.831
Crack to stay high longer		.739		.736
To be more social	.418	.616		.583
To have sex	.306	.583		.570
Because craving for alcohol after using cocaine	.450	.482	.517	
To drive a car		.471		.481

[a]Items in bold represent the scales used in this study.

Table 2: Factor loadings (loadings below 0.3 suppressed) rotated component matrix[a]

		Manage effects 1[*]	Enhance effects 1[*]	Manage effects 2[*]	Enhance effects 2[*]	Alcohol SDS Scale	Cocaine SDS Scale
Manage effects 1[a]	**Pearson** Correlation	1	.510	-.150	.055	-.008	.243
	Sig. (2-tailed)		<.001	.015	.366	.895	<.001
	N	287	279	264	268	277	284
Enhance effects 1[a]	Pearson Correlation	.510	1	.178	.020	-.033	.251
	Sig. (2-tailed)	<.001		.004	.744	.580	<.001
	N	279	297	268	276	285	292
Manage effects 2[b]	Pearson Correlation	-.150	.178	1	.528	.335	.025
	Sig. (2-tailed)	.015	.004		<.001	<.001	.680
	N	264	268	287	275	274	283
Enhance effects 2[b]	Pearson Correlation	.055	.020	.528	1	.431	-.131
	Sig. (2-tailed)	.366	.744	<.001		<.001	.027
	N	268	276	275	293	281	288
Alcohol SDS Scale	Pearson Correlation	-.008	-.033	.335	.431	1	-.148
	Sig. (2-tailed)	.895	.580	<.001	<.001		.007
	N	277	285	274	281	332	328
Cocaine SDS Scale	Pearson Correlation	.243	.251	.025	-.131	-.148	1
	Sig. (2-tailed)	<.001	<.00!	.680	.027	.007	
	N	284	292	283	288	328	340

[a]1 refers to scales with questions on cocaine and then alcohol
[b]2 refers to scales with questions on alcohol and then cocaine.

Table 3: Pearson correlation matrix of factor and dependence scales

of subject (specifically being male) contributed significantly ($p<.05$) to predicting increases in cocaine dependence. The same analyses were conducted with severity of alcohol dependence as the criterion variable (Table 5). Three variables significantly predicted the severity of alcohol dependence $R=.514$, F $(11,236)=7.70$, $p<.001$. Specifically, increases in Enhancing effects and stress were significantly ($p<.001$) related to increases in alcohol dependence, while increases in financial problems were significantly related to decreases in alcohol dependence.

In our final analyses, we replicated the above analyses with substitution of the two questions on average frequency subjects reported using cocaine then alcohol with the criterion variable of cocaine dependence or using alcohol then cocaine with the criterion variable of alcohol dependence. The frequency of order for simultaneous use was significant ($p<.001$) in both multivariate models indicating that order of use is highly predictive of severity of cocaine or alcohol dependence.

	Unstandardized Coefficients		Standardized Coefficients		
Model	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	3.771	2.238		1.685	.093
Manage effects 1[a]	.095	.048	.138	1.978	.049
Enhance effects 1[b]	.217	.086	.179	2.513	.013
Impulsive Scale	.053	.073	.051	.728	.467
Aggression Scale	-.001	.028	-.003	-.041	.967
Anxiety Scale	.015	.064	.019	.235	.814
Depression Scale	.070	.078	.069	.901	.368
Stress Scale	.020	.051	.029	.389	.698
Paranoid Scale	-.121	.063	-.144	-1.922	.056
Financial Problems					
Scale	.148	.057	.172	2.608	.010
Age	.025	.028	.058	.913	.362
Sex	-1.236	.502	-.152	-2.460	.015

[a]Items in bold are statistically significant $p < .05$.
[b]1 refers to scales with questions on cocaine and then alcohol

Table 4: Regression analysis on severity of cocaine dependence

	Unstandardized Coefficients		Standardized Coefficients		
Model	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	-4.927	2.487		-1.981	.049
Manage effects 2	.110	.059	.129	1.887	.060
Enhance effects 2[a]	**.507**	**.098**	**.340**	**5.202**	**<.001**
Impulsiveness Scale	-.027	.079	-.022	-.342	.732
Aggression Scale	-.020	.030	-.043	-.646	.519
Anxiety Scale	.103	.070	.113	1.476	.141
Depression Scale	-.040	.085	-.033	-.465	.642
Stress Scale[b]	**.122**	**.056**	**.149**	**2.184**	**.030**
Paranoid Scale	-.052	.069	-.053	-.747	.456
Financial Problems					
Scale	**-.150**	**.061**	**-.150**	**-2.458**	**.015**
Age	.016	.031	.031	.510	.611
Sex	.788	.549	.083	1.437	.152

[a]2 refers to scales with questions on alcohol and then cocaine
[b]Items in bold are statistically significant $p < .05$.

Table 5: Regression analysis on severity of alcohol dependence

Discussion

Some limitations of this study should be noted. First, only clients in treatment for substance abuse problems were included and therefore the findings may not generalize to recreational users. Also, data for this study was gathered by self-reports, which may have error. In particular, clients may not have accurately recalled some of the events reported in this paper. However, given that all participants have acknowledged problems with substance use, it is not likely they would underestimate their issues. Error is likely random, which is assessed through the statistical procedures used.

Our first finding showed that clients in treatment generally prefer the temporal order of alcohol then cocaine versus cocaine then alcohol. This finding is consistent with stronger behavioural effects produced by increased levels of coca ethylene when alcohol precedes cocaine rather than when cocaine precedes alcohol [13]. More research is needed to

assess whether this preference for alcohol before cocaine is common in recreational and casual users.

The results in Table 1 show some significant differences in the temporal order of using cocaine and alcohol for different situations. Generally, alcohol and then cocaine is preferred for three types of situations: (1) to experience a longer and more intense high, (2) to be more sociable, and (3) to increase alertness/reduce fatigue. The first reason is consistent with observations by [13] of greater behavioral effects when alcohol precedes cocaine. The second and third reasons may both be related to remedy the common effect of alcohol of increasing drowsiness, which can also reduce sociability and fatigue. This outcome appears purposeful.

Cocaine and then alcohol is preferred in the following situations: (1) to reduce the withdrawal effects from cocaine, (2) to reduce cravings for cocaine, (3) because cocaine causes cravings for alcohol,

and (4) to help with sleeping. These situations reflect motives related to managing the effects of cocaine. These results show that cocaine and alcohol are used in fundamentally different ways. Cocaine is used to achieve desired functions related to enhancing effects; whereas alcohol is used more to deal with the undesirable effects of cocaine (i.e. managing effects). The findings are consistent with [9] who identified enhancement, management and social functions for simultaneous use. Finally, there are many activities in which the order of use appears unrelated, which may simply be habitual in nature.

Our findings are consistent with [4] hypothesis that alcohol may be used to temper the discomfort of coming down from cocaine. Similarly, drinking alcohol to ameliorate discomfort associated with tapering or ceasing cocaine use was common among 60% of cocaine treatment subjects (n=66) [10]. The findings are also consistent with Magura and Rosenblum 2000 who found more frequent use of alcohol to come down was associated with decreased cocaine consumption. Cocaine abusers have reported that use of alcohol during a cocaine binge prolongs the euphoric properties of cocaine (the "high"), and increases the duration of effects [4]. Cocaine is used after drinking to offset some of the sedating effects of alcohol. Alcohol is used after cocaine to diminish the acutely unpleasant physical and psychological effects of cocaine ingestion, primarily paranoia and agitation [4,15].

A factor analysis was conducted to determine which items are related to one another and whether they could be combined to form scales. The reasons for simultaneous use appear to be anchored in the constructs of reducing undesirable side effects of combined use (Managing effects) or in relation to increasing desirable (Enhancing) effects. Our study showed that the temporal order that clients used in these situations was highly related to the severity of either alcohol or cocaine dependence. When used simultaneously, the overall use of cocaine before alcohol was significantly ($p<.001$) related to cocaine dependence; whereas more frequent use of alcohol before cocaine was significantly ($p<.001$) related to greater severity of alcohol dependence. These relationships may be mathematical arte facts, as increased dependency is related to increased likelihood of use in all types of situations. More research is needed to understand these relationships.

Significant bivariate positive relationships were found between (1) frequency of alcohol use before cocaine and alcohol dependence, and (2) frequency of cocaine use before alcohol and cocaine dependence.

Two multivariate regression analyses were conducted, one with severity of cocaine dependence and the other with severity of alcohol dependence as dependent variables. Both the Managing effects and Enhancing effects scales were significantly predictive of levels of cocaine dependence. Being male and having increased financial problems also contributed to prediction of higher levels of cocaine dependence [24]. In the case of alcohol dependence, however, higher scores for Enhancing Effects remains a predictor, along with increased stress and decreased financial problems. We can speculate that decreased financial problems might be related to substituting cheaper alcohol for cocaine. Cocaine prices have been estimated at about $70.00 per gram in Canada [25] and our prior study found those with cocaine dependence consumed an average of 16 grams per week (about $1120 per week), which is well beyond the financial means of an average Canadian [26-31]. However, the reason for the reversal of the effect of financial problems for cocaine versus alcohol dependence is unclear and should be followed up in future research [32-34]. These analyses demonstrate the importance of the reasons for simultaneous substance use in explaining alcohol dependence.

Conclusions

Treatment providers should be aware of these findings as therapists may have a tendency to emphasize issues related to cocaine dependence rather than alcohol dependence for clients who frequently use both substances simultaneously [35,36]. Results from this study demonstrate that when clients use cocaine and alcohol simultaneously, their preference of cocaine first or alcohol first is highly predictive of their respective dependence. Clients who reported that when they used alcohol before cocaine practically all the time, 90.2% (n=111) were dependent on alcohol; whereas clients who reported using cocaine before alcohol practically all the time, 98.2% (n=55) were dependent on cocaine [37]. This question could be used in clinical practice to identify which substance has more clinical relevance among simultaneous users.

Acknowledgements

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