

# Sleep disorders, affect, substance use and widespread pain: a factor analytic study

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Studies have shown that sleep quality has several dimensions, and is associated with numerous clinical and demographic variables (Kelly, Blake, Power, O’Keeffe, & Fullen, 2011). Sleep quality is known to be associated with a number of variables. These include chronic pain (Abernethy, 2008; Harman et al., 2002; Kelly, et al., 2011), depression (Lepine & Briley, 2004; Von Korff & Simon, 1996), anxiety (Marcks, Weisberg, Edelen, & Keller, 2010), hypertension (Hildingh & Baigi, 2010) and other variables. The purpose of this study was to identify the interrelationships between various dimensions of sleep disorder, and known clinical predictors of insomnia.

## METHOD

In this study, 414 consecutive patients referred for psychological assessment for pain or injury were asked to rate their sleep quality using four dimensions: delayed onset (measured in minutes to fall asleep), difficulty staying asleep (measured in number of times waking over the sleep cycle), and insufficient sleep (measured as number of hours of sleep), and being exhausted but unable to sleep (measured by a Likert rating). Measures other variables of clinical interest were also obtained. These were measures of affect (depression, anxiety, anger), common legal substances (caffeinated coffee, other caffeinated drinks, alcohol, and tobacco), and a measure of widespread pain.

## RESULTS

A factor analytic method was used to explore the interrelationships between the variables noted above. Initially, a correlation matrix revealed that the four types of sleep disorder had weak to moderate intercorrelations, ranging from 1.0661 to 1.4471. A principle components analysis was then used to explore the underlying factor structure of the 12 variables. Using an eigenvalue > 1 criterion, 4 factors were extracted. Since it was assumed that the factors associated with insomnia would probably have significant intercorrelations, these four factors were rotated to an oblique solution using a Promax method. Items were assigned to factors if the item loading was  $\geq .40$ , and the results approximated simple structure. Factor one “affective distress” (eigenvalue=3.02) included depression, anxiety, and anger. Factor two “poor sleep quality” (eigenvalue=1.49) included insufficient sleep, difficulty staying asleep, exhausted but unable to sleep, and widespread pain. This is consistent with other recent research findings (Wilson, Eriksson, D’Eon, Mikail, & Emery, 2002). Factor three (eigenvalue=1.37) consisted of coffee and tobacco use, and factor four (eigenvalue=1.05) included delayed sleep onset, and use of alcohol and caffeinated noncoffee drinks. Thus, two different patterns of insomnia emerged, one where poor sleep quality was associated with widespread pain, and the other was delayed sleep onset was associated with alcohol and noncoffee caffeinated drinks.

## DISCUSSION

Two patterns of insomnia emerged from this study, one associated with pain, and the other with alcohol and noncoffee caffeinated drinks. Interestingly, caffeine in the forms of coffee use did not load on either sleep factor. Although a possible explanation for this was that coffee may be more commonly consumed in the morning, and noncoffee caffeinated drinks may be consumed later in the day, determining how different forms of caffeine affect sleep patterns will need to be studied further. Interestingly, in this study affective distress was less strongly associated with insomnia than was widespread pain or caffeine. However, as widespread pain has been found to be associated with depression, it is possible that patients with widespread pain and insomnia may not recognize their depression.

Overall, his study lends some support to the hypothesis that insomnia should not be viewed as a single condition, but rather one which may occur in differing forms. As each of these forms may tend to co-occur with different clinical correlates, each form of insomnia may suggest a distinct form of treatment. Further studies about the types of insomnia that occur in patients with chronic pain an injury is indicated, as is research on effective treatments for each.

TABLE 1		
Communalities		
	Initial	Extraction
Time to sleep onset	1.000	.558
Number times wake up each night	1.000	.375
Total hours of sleep	1.000	.528
Exhausted but unable to sleep	1.000	.661
Non coffee caffeinated drinks per day	1.000	.402
Drinks of coffee per day	1.000	.743
Alcoholic drinks per week	1.000	.339
Tobacco use per day*	1.000	.688
Depression	1.000	.791
Anxiety	1.000	.715
Hostility	1.000	.696
Pain complaints	1.000	.441
Extraction Method: Principal Component Analysis.		

TABLE 2			
Initial Eigenvalues			
Component	Total	% of Variance	Cumulative %
1	3.020	25.168	25.168
2	1.496	12.466	37.633
3	1.370	11.413	49.046
4	1.051	8.761	57.807
5	.995	8.295	66.102
6	.919	7.657	73.759
7	.799	6.655	80.414
8	.579	4.822	85.236

FIGURE 1: Eigenvalue Scree Plot

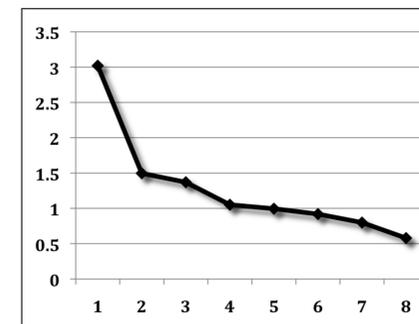


TABLE 3				
Component Correlation Matrix				
Component	1	2	3	4
1	1.000	.403	.050	.105
2	.403	1.000	.055	.312
3	.050	.055	1.000	.138
4	.105	.312	.138	1.000
Extraction Method: Principal Component Analysis.				
Rotation Method: Promax with Kaiser Normalization.				

TABLE 4				
Pattern Matrix <sup>a</sup>				
	Component			
	1	2	3	4
Time to Sleep Onset	.074	.205	-.020	<b>.640</b>
Total Times Woken Up	-.204	<b>.691</b>	-.069	-.134
Total Hours of Sleep	-.004	<b>-.612</b>	-.186	-.172
Exhausted but unable to sleep	.153	<b>.710</b>	-.032	.086
Non Coffee Caffeinated drinks per day	-.069	-.037	-.013	<b>.648</b>
Drinks of Coffee per Day	.121	-.116	<b>.847</b>	-.230
Alcoholic Drinks per Week	.051	-.303	-.064	<b>.609</b>
Packs/Cans of Tobacco per Day	-.134	.057	<b>.789</b>	.150
Depression	<b>.852</b>	.063	.064	.031
Anxiety	<b>.876</b>	-.076	-.057	-.071
Hostility	<b>.841</b>	-.038	-.011	.065
Pain Complaints	.103	<b>.639</b>	-.096	-.275
Extraction Method: Principal Component Analysis.				
Rotation Method: Promax with Kaiser Normalization.				
<i>a. Rotation converged in 5 iterations.</i>				