ELSEVIER

Motivations to Control Drinking Behavior in Abstainers, Moderate, and Heavy Drinkers

MICHAEL TRIMMEL AND EVA KÖPKE

University of Vienna, Institute of Environmental Health, Department of Experimental Medical Psychology and Environmental Psychology, Kinderspitalgasse 15, A-1095 Vienna, Austria

TRIMMEL, M. AND E. KÖPKE. *Motivations to control drinking behavior in abstainers, moderate, and heavy drinkers.* PHARMACOL BIOCHEM BEHAV **66**(1) 169–174, 2000.—Motives and motivational concepts to control quantity (Q) and frequency (F) of alcohol consumption were investigated in 192 participants using a questionnaire of motives to control drinking (MCD-Q/F) developed earlier. The daily quantity of consumption was assessed by the "30 day by beverage questionnaire." Participants were grouped into heavy or moderate drinkers (limits: females 40, males 60 gram alcohol/day) and abstainers. Analyses of motives showed the importance of car driving, controlling appetite/desire, and prevention of impaired mental performance. The relative impact of motivational concepts were analyzed by cluster analysis of motives revealing three clusters: 1) emotional concepts/fear of addiction, 2) physiological sensations/interaction with concrete actual plans, 3) cognitive concepts (plans, self-control, no impairment/no desire). MANOVA of MCD-Q/F indicate highest scores for moderate drinkers and significant lower scores in heavy drinkers in controlling frequency of drinking (MCD-F). Group effect for emotional concepts failed significance, higher scores of physiological concepts were found in imbibers compared to abstainers, and scores of cognitive concepts were lower in heavy drinkers. Results indicate that for imbibers a reduced motivation to control frequency of drinking as well as low scores in cognitive concepts and a trend to high scores in emotional concepts are associated with heavy drinking.   © 2000 Elsevier Science Inc.

Alcohol drinking   Ethanol   Control motivations   Motives   Cognitive concepts
Expectations   Emotion   Desire   Physiological sensation   Sex   Questionnaire

IT is a well-known fact that drinking behavior varies with a number of psychological dimensions. Empirical evidence was reported for aspects of personality such as sensation seeking behavior (11,16), anxiety (1), expectancies, and perceived effects of alcohol (10,15). Furthermore, interactions with biological variables like sex/gender (3,4,9,16) and age (14) should also be taken into account, due to the mediating effects of underlying processes (2,8,12,22).

Investigations on motivational aspects may lead to strategies of intervention and education, and hence, help to prevent alcohol abuse. Current theories of human motivation emphasize cognitive concepts rather than mere biomedical or psychodynamic models (7,20). Recent investigations focused on locus of control (13,18) supporting the view that treatment philosophies—which modify the patients' perceptions of the controllability of drinking behavior—should go in a more internal direction. The present study focuses on single motives, expressed by individual statements, as well as motivational concepts (emotional, cognitive, and physiological) to control

drinking behavior, all dependent on the level of average alcohol consumption within 30 days previous to the study, and was controlled for sex. A distinction was made between controlling the amount and controlling the frequency of alcohol consumption. It was expected that these concepts would differ according to the levels of alcohol consumption and reflect appropriate vs. inappropriate motivational mechanisms to control drinking.

METHOD

Assessment of Alcohol Consumption

Quantity and frequency of alcohol consumption were assessed by the "30-day by beverage type questionnaire," as documented by Embree and Whitehead (6). This instrument has proved to produce the most accurate estimates of "true" level of consumption at an isolated U.S. military station in the mentioned article. However, as type and standard units of drinks vary by culture, the questionnaire was adapted to the common quantities and types of beverages in Austria. The

outcome of the questionnaire is the mean value of gram (g) alcohol per day, which is the average of mean g alcohol per glass of the beverages consumed within 30 days prior to testing. Mean g of alcohol was calculated for beer (13 g/0.33 l, 20 g/0.5 l), wine (12 g/0.125 l), liqueurs (3 g/glass of 20 ml), cocktails (50 g/glass), and schnapps (with <50% alcohol: 7 g/glass of 20 ml; with >50% alcohol: 11 g/glass of 20 ml).

Participants and Grouping by Alcohol Consumption

Data were collected from 192 participants living in and round Vienna, Austria, who were guaranteed anonymity. Tests were carried out in accordance with the recommendations guiding medical doctors in biomedical research involving human subjects, Declaration of Helsinki from The World Medical Association, as adopted by the 18th World Medical Assembly, Helsinki, Finland, 1964.

Due to missing data on alcohol consumption 12 participants were excluded from analysis and 4 participants by the reason of ordered alcohol consumption by the doctor. Six participants were excluded due to suspicious answers on control items 1) participants scoring "+++" on a six-point scale (don't agree --- -- - + ++ +++ agree fully) to "I wash my hands before drinking," or 2) imbibers answering "no" (on a yes or no scale) to all three following questions: Did you ever follow an invitation to drink? Did you ever experience the effect of alcohol? Does your mood change by drinking a few glasses of alcoholic beverage? Finally, data from 87 females and 83 males were analyzed. A limit of 40 g alcohol/day for females and 60 g alcohol/day for males, as proposed by the World Health Organisation (WHO) as a health risk limit (19), was used as a cutting score between heavy and moderate drinkers. Abstainers were defined by their self-ratings, indicating that they never drank, or had drunk only once within 3 months prior to testing.

Motives to Control Drinking Questionnaire (MCD)

Due to the lack of an appropriate instrument, we developed a questionnaire in a preliminary investigation. To generate items, 127 subjects were asked to answer two sets of questions: 1) If you are in a drinking situation, do you control the amount of alcohol by stopping after a certain quantity? If yes, please give us the reason(s). 2) Do you drink alcohol daily? If not, please state why you don't drink daily. All collected notes (except to be pregnant, which would cause a sex-related bias in the questionnaire) of distinct aspects were transformed to full sentences and used as statements which had to be answered by "yes" or "no." The full lists of the 33 items on "motives to control quantity of drinking" (MCD-Q) and the 32 items on "motives to control frequency of drinking" (MCD-F) are presented in the Tables 2 and 3.

Motivational Concepts

A contemporary perspective distinguishes between distinctive (but interactive) motivational systems, namely cognitive, emotional, and physiological (17) ones. Central to the physiological (P) perspective is the study of how the body gives rise to experience of pleasure and pain, and regulates its internal system. According to the cognitive (C) perspective, concepts of plans and goals are the important source of motivation. Emotions (E) are based on the mentioned concepts but represented by subjective feelings.

To build scores for the three motivational concepts (C, E, P), items of MCD (Q+F) were grouped in three clusters with typical items (C: Q# 3, E: Q# 6, P: Q# 12) as start points for a K-means cluster analysis. To evaluate the outcome of cluster analysis, an additional K-means cluster analysis, however, without starting points was computed and revealed exactly the same result. The assignment of items to the three clusters (C1, C2, and C3) is indicated in Tables 2 and 3. Item analysis showed acceptable Cronbach's alphas for items in clusters of MCD-Q (C1: 0.78, C2: 0.67, C3: 0.74; and for the whole questionnaire: 0.84), as well as for items in clusters of MCD-F (C1: 0.73, C2: 0.67, C3: 0.73; and for the whole questionnaire: 0.82). The average number of responses within each cluster for MCD-Q and for MCD-F was used as scores.

RESULTS

Age and Average Alcohol Consumption

Descriptive values for age and alcohol consumption are presented in Table 1. Two-way (sex × group) analysis of variance (ANOVA) revealed no significant difference for age. ANOVA of alcohol consumption (sex × group) revealed main effects for sex, $F(1, 164) = 6.24$, $p < 0.05$, alcohol group, $F(2, 164) = 76.96$, $p < 0.0001$, as well as an interaction of sex × alcohol group, $F(2, 164) = 3.65$, $p < 0.05$. The Tukey Honest-Significant-Difference Test (HSD) indicates a statistically significant higher consumption in heavy drinkers compared to moderate drinkers and abstainers as well as a higher consumption in male than female heavy drinkers.

Motives to Control Drinking

The list of items of the "motives to control drinking quantity" (MCD-Q) questionnaire, is presented in Table 2, and items of the "motives to control drinking frequency" (MCD-F) questionnaire is presented in Table 3. Both tables are ranked along the over-all frequency of agreements to each statement. Statistically significant ($p < 0.05$) differences in distribution revealed by chi-square tests are indicated, but should—due to multiple testing— be interpreted with caution.

The motives most often used to control quantity are "I'm driving" (particularly in abstinent and moderate drinking males), "I don't want to be drunk," and "I don't want my mental performance to be impaired," the latter showing no effect of sex or group. The motives most often used to control frequency are "I am not in the mood, have no appetite, or desire" (more often used in drinking vs. abstinent females and moderate vs. heavy drinking males), "I don't need alcohol," and "I don't drink when I am driving" (both apply less to heavy drinking males).

Sex differences of motives within group for controlling quantity appear mainly in abstainers (Q# 14, 18, 26, 16, 20, 3, 22), some in moderate drinkers (Q#, 3, 5, 4, 15, 11), and only

TABLE 1

DESCRIPTIVE VALUES FOR AGE AND AVERAGE ALCOHOL CONSUMPTION BY GROUP (ABSTAINERS, MODERATE DRINKERS, AND HEAVY DRINKERS) AND SEX

	Abstinent		Moderate		Heavy	
	Female	Male	Female	Male	Female	Male
Mean age (years)	44.6	32.9	40.4	41.9	32.6	37.5
Alcohol consumption (g/day)	0.6	0.5	10.5	24.4	115.5	183.8

TABLE 2

QUESTIONS (THIRD COLUMN) ON "MOTIVES TO CONTROL ALCOHOL QUANTITY (MCD-Q)" AND RESULTS IN PERCENTAGE OF FEMALES AND MALES ANSWERING WITH "YES" IS GIVEN FOR ABSTAINERS AS WELL AS MODERATE AND HEAVY DRINKERS

Q#	C#	I am abstinent/I control quantity of alcohol because ...	Abstinent		Moderate		Heavy	
			Female	Male	Female	Male	Female	Male
3	C3	I am driving.	37*	78*	47*	72*,m3	50	41m3
2	C3	I don't want to be drunken.	47	78	61	51	33	41
7	C3	I don't want my mental performance to be impaired.	32	44	58	51	67	29
9	C3	I don't want to have a hangover the next day.	26f1	44	67f1	49	50	35
8	C3	I don't want my physical performance to be impaired.	26	44	44	41	50	35
21	C2	I have to work the next day.	11f1, f2	22	44f1	44	67f2	47
33	C3	I don't want to lose track of things.	21f1	33	49f1	51m3	50	18m3
16	C3	I don't want to endanger my health.	26*	67*, m2	35	41	33	18m2
5	C3	I want to avoid unpleasant bodily sensations like dizziness, nausea, or headache.	26f1	56	54*, f1	31*	33	47
1	C3	I want to be sober.	53f2	78m1	44f3	31m1	0f2, f3	41
18	C2	I don't feel like drinking, because it's no fun anymore.	11*, f1, f2	44*	40f1	31	50f2	41
27	C1	Alcohol is rich in calories.	26	22m2	23	26m3	0	0m2, m3
12	C2	It doesn't taste good after a certain point.	0f1, f2	0m1, m2	40f1	33m1	67f2	59m2
32	C3	I want to grasp what's going on around me.	11f1, f2	22	42f1	33	50f2	29
24	C2	It's enough to be a bit drunk.	11f2	0m1, m2	33f3	46m1	100*, f2,f3	41*, m2
26	C1	I want others to think I am in control.	0*, f1	33*	30f1	26	17	18
19	C2	It's too expensive.	11	33	26	21	0	29
22	C1	I do sport.	5*	44*	12	23	0	18
14	C1	I don't want to do careless things, which I would later regret.	5*, f1	44*	30f1	23	0	24
4	C2	I stop drinking when I get tired.	0f1, f2	0m2	33*, f1	13*, m3	33f2	47m2, m3
29	C1	I have to be fit for my kid(s)/partner.	5	22	26	26	0	18
28	C2	I stop drinking after vomiting.	0f2	0	12	15	33f2	12
15	C1	I don't want to fundamentally change my condition.	0f2	11	16*	3*	33*, f2	0*
6	C1	I am afraid of alcohol addiction.	0	11	9	10	17	12
25	C1	I have had bad experiences with alcohol in the past.	0	0	5	8	17	24
30	C1	Of the pressure of the people around me.	0	0	7	10	0	18
20	C1	I would have a bad conscience.	0*	22*	9	5m3	0	24m3
13	C1	I don't want to be uninhibited.	0f1	11	23f1	8	0	18
31	C1	I can't sleep if I have drunk too much.	11	0	12	5	0	0
10	C1	I don't want to fall back into a harmful drinking behavior.	0	0	2	13	0	12
17	C1	I suffer from an acute/chronic illness.	5	0	2	5	0	6
11	C1	Alcohol makes me feel hot.	0	0	12*	0*	0	0
23	C1	My hobby doesn't allow it.	0	0	0	5	0	6

Sequence of questions is ordered by total frequency of agreement to statements; however, the position of items in the questionnaire is specified by item number (Q#). The assignment of items to three clusters (C1, C2, C3) is indicated in column C#.

Results of statistically significant ($p < 0.05$) effects of chi-square tests are indicated by: *for females vs. males; f1abstinent females vs. moderate females; f2abstinent vs. heavy females; f3moderate vs. heavy females; m1abstinent vs. moderate males; m2abstinent vs. heavy males; m3moderate vs. heavy males.

two in heavy drinkers (Q# 15, 24). Sex differences are also reflected by the mean percentage of agreement to all investigated motives for abstainers (males 12%, females 26%) contrary to moderate (males 28%, females 26%) and heavy drinkers (males 24%, females 28%). Group differences are reflected by lower mean scores for percentage of agreement with motives found in abstainers (19%) compared to moderate (27%) and heavy drinkers (26%).

A comparable pattern of sex effects was found for controlling frequency of drinking. Whereas abstainers showed sex differences in five motives (F# 1, 32, 15, 30, 17)—with higher scores for males on each item—there were two effects for moderates (F# 10, 26), but no sex effect for heavy drinkers. Sex differences are also reflected in the mean percentage of agreement to all investigated motives for abstainers (males 15%, females 25%) contrary to moderate (males 24%, females 25%), and heavy drinkers (males 19%, females 16%). However, group differences showed higher mean scores for percentage of agreement with motives in moderate drinkers (25%) compared to heavy drinkers (18%) and abstainers (20%).

Motivational Concepts

To investigate effects of sex and group on the overall motivation (the sum motives) as well as on motivational concepts (clusters of motives) to control quantity and frequency of drinking, a four-way MANOVA (sex × group × cluster × quantity vs. frequency) was computed for scores of motivation in each cluster. Results showed higher scores for quantity, $F(1, 163) = 5.79$, $p < 0.05$, than for frequency, a main effect for group, $F(2, 163) = 4.35$, $p < 0.05$, with higher scores

TABLE 3

QUESTIONS (THIRD COLUMN) ON "MOTIVES TO CONTROL DRINKING FREQUENCY (MCD-F)" AND RESULTS IN PERCENTAGE OF FEMALES AND MALES ANSWERING WITH "YES" IS GIVEN FOR ABSTAINERS AS WELL AS MODERATE AND HEAVY DRINKERS

F#	C#	(Ss not drinking daily.) On some days I don't drink alcohol, because ...	Abstinent		Moderate		Heavy	
			Female	Male	Female	Male	Female	Male
2	C3	I am not in the mood, have no appetite, or desire.	$53^{f1, f2}$	57	84^{f1}	85^{m3}	100^{f2}	59^{m3}
29	C3	I don't need alcohol.	47	78^{m2}	67	56^{m3}	50	$18^{m2, m3}$
5	C3	I don't drink when I am driving.	42	56^{m2}	51	54^{m3}	50	$12^{m2, m3}$
10	C3	I don't think of alcohol.	32	33	58*	33*	50	18
22	C2	I prefer the taste of other beverages.	21	56	42	28	33	24
4	C3	I don't drink alcohol on my own.	58	33	42	44^{m3}	17	6^{m3}
6	C3	I only drink at parties or with friends.	53^{f2}	33^{m2}	56^{f3}	49^{m3}	$0^{f2, f3}$	$0^{m2, m3}$
19	C3	Daily consumption of alcohol undermines body and mind.	21	22	33	46^{m3}	50	18^{m3}
18	C3	I don't want to run the risk of damaging my health.	21	56^{m2}	28	31	33	12^{m2}
1	C1	I don't like alcohol.	21*	$67^{*,m1,m2}$	19	15^{m1}	0	18^{m2}
25	C2	I don't drink, if I had too much alcohol the time before.	0^{f2}	11	14^{f3}	21	$50^{f2, f3}$	41
3	C1	I don't drink alcohol at home.	32	33	16	23	0	6
30	C1	I consciously prefer to stay sober.	$0^{*, f1}$	22*	19^{f1}	26	17	24
24	C2	I don't drink when I have to wake up early.	0^{f1}	11	21^{f1}	31	17	18
17	C2	I don't want to/can't spend so much money.	5*	33*	16	18	0	24
21	C2	I don't drink when I don't feel well.	5^{f1}	0	35^{f1}	23	33	24
31	C2	I don't drink, if I have something important on at work/school (meetings, homework, examination).	5^{f1}	$0^{m1, m2}$	33^{f1}	41^{m1}	0	41^{m2}
7	C1	I want to prevent habituation and hence addiction.	11	22	12	21	17	12
8	C1	I drink alcohol only with a good meal.	26	11	23	23	0	6
20	C1	Alcohol only intensifies my bad mood.	5	22	12	23	17	6
15	C2	I have no time.	$0^{*, f1}$	22*	$21^{*, f1}$	5*	17	18
27	C2	I don't drink if I have a hangover.	0	0^{m2}	14	15	17	35^{m2}
14	C1	Alcohol consumption is not compatible with my job or with my free time activity.	5	22	16	21	0	12
12	C1	Alcohol impairs my wellbeing.	11	33^{m1}	9	8^{m1}	0	12
9	C1	I only drink exquisite alcoholics.	21	22^{m2}	14	13	0	0^{m2}
32	C1	I would have a bad conscience.	0*	$22^{*, m1}$	2	0^{m1}	17	6
26	C1	It bothers my partner/parents/children.	0	0	5*	21*	0	18
16	C1	I don't drink when I am on a diet or want to loose weight.	0	0	16	26^{m3}	0	0^{m3}
13	C1	I take other drugs instead.	0	0	7	5	17	6
23	C1	I don't want to fall back into a problematic drinking behavior.	0	0	0	5	0	6
28	C1	I would embarrass myself.	0	11^{m1}	0^{f3}	0^{m1}	17^{f3}	0
11	C1	I shouldn't/I am not allowed to drink for health reasons.	0	11	2	3	0	12

Sequence of questions is ordered by total frequency of agreement to statements, however, the position of items in the questionnaire is specified by item number (F#). The assignment of items to three clusters (C1, C2, C3) is indicated in column C#.

Results of statistically significant ($p < 0.05$) effects of chi-square tests are indicated by: *for females vs. males; ^{f1}abstinent females vs. moderate females; ^{f2}abstinent vs. heavy females; ^{f3}moderate vs. heavy females; ^{m1}abstinent vs. moderate males; ^{m2}abstinent vs. heavy males; ^{m3}moderate vs. heavy males.

for moderate drinkers compared to abstainers (HSD: $p = 0.011$) and an interaction of quantity vs. frequency × group, $F(2, 163) = 3.51$, $p < 0.05$, indicating lower scores in frequency compared to quantity for heavy drinkers (HSD: $p < 0.01$). Mean values are presented in Fig. 1. Analysis revealed a main effect for clusters, $F(2, 326) = 116.21$, $p < 0.00001$, indicating significant differences of scores (C1 < C2 < C3, HSD: $p < .001$). Significant interaction of group × cluster, $F(4, 362) = 7.30$, $p < 0.00001$, indicate higher scores of C2 in moderate and heavy drinkers compared to abstainers, and lower scores of C3 in heavy drinkers compared to moderate drinkers and abstainers (HSD: $p < 0.05$). No statistical significant effects were observed in C1, but there was a statistical trend, indicating a higher score in heavy drinkers compared to abstainers (HSD: $p < 0.1$). Mean values are presented in Fig. 2.

DISCUSSION

Motives as expressed by scoring single statements and also motivational concepts of cognition, physiology, and emotion to control drinking were analyzed in moderate and heavy drinking persons as well as in abstainers. The descriptive analysis indicates that the investigated groups are not biased by age or sex. The amount of alcohol consumption in the groups investigated was higher in heavy drinkers compared to moderate drinkers and abstainers as well as higher in male than female heavy drinkers. But, taking into account that alcohol quantity affects females and males with a ratio of 60:40 (factor 1.5), as proposed by the WHO, the factor of 1.59 in this study indicates a comparable quantum of consumption in relation to the impact of alcohol across sex in heavy drinkers. Sex differences are more pronounced in our group of moder-
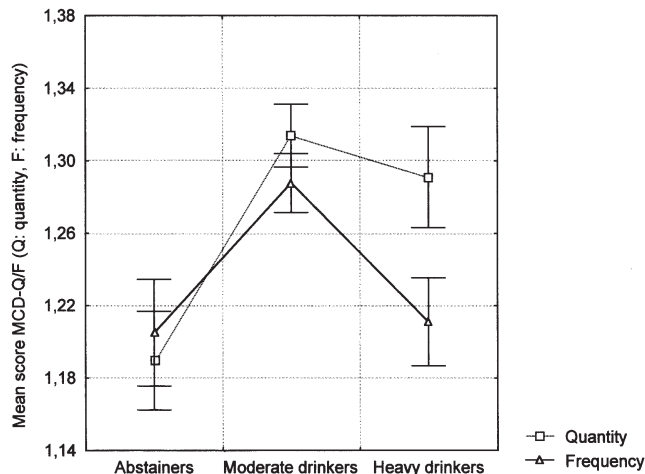
FIG. 1. Mean values (± SEM) for motivational concepts to control drinking quantity (MCD-Q) and drinking frequency (MCD-F) in abstainers as well as moderate and heavy drinkers. Note the lower scores for heavy drinkers compared to moderate ones in controlling frequency of consumption.
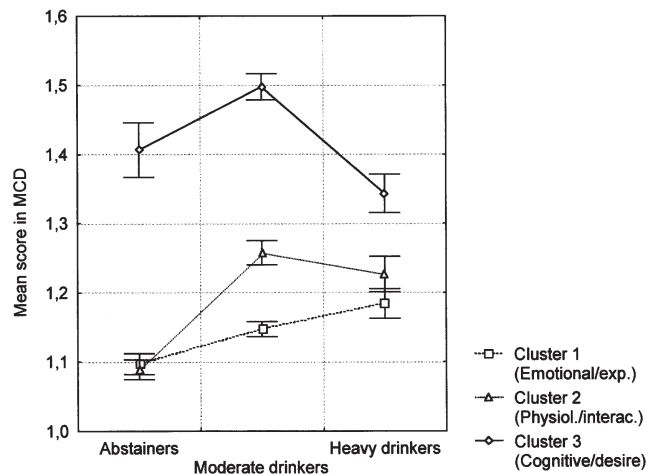

FIG. 2. Mean values (± SEM) of cluster 1 (emotional concepts/ experience with alcohol), cluster 2 (physiological/interactive concepts), cluster 3 (cognitive concepts/no desire) of motivations to control drinking (MCD) in abstainers as well as moderate and heavy drinkers.

ate drinkers, as indicated by a factor of 2.32 (24.4/10.5 g/day). However, such a relationship of 2.5 was also reported for the German population (5), indicating that the alcohol consumption in the groups investigated is of practical relevance.

Analyses of predominantly used motives indicate the importance of car driving, cognitions of controlling appetite/desire, and prevention of impaired mental performance as motives to control alcohol consumption. Motives for controlling quantity are stronger related to the impairing effects of alcohol, whereas motives to control frequency are stronger related to concepts of supporting health and preventing addiction.

Remarkable sex-related differences were found mainly in motives for abstainers. The male abstainers have more motives to control quantity as well as to control frequency to abstain than females, one could speculate that males feel the need to justify their abstinence to themselves and maybe also to others. Females, on the other hand, do not seem to feel the need to give reasons for not drinking. This sex-related effect is not simply mediated by chance, as one could expect that abstainers have "more reasons" not to drink and, therefore, there is a greater chance for observing differences in this group. In fact, the mean number of motives to control frequency for abstainers lies between the mean for moderate and the mean for heavy drinkers and the mean number of motives to control quantity shows the lowest score. Results indicate substantially different sex-related motives not to drink.

In analyzing "overall motivation" (as expressed in the mean scores of MCD-Q and MCD-F), results showed a higher MCD (over all) score in moderate drinkers as well as a reduced motivation to control frequency in heavy drinkers compared to moderate drinkers. This indicates that heavy consumption of alcohol is associated with a reduced motivation to control frequency, whereas motivation to control quantity in heavy drinkers is comparable to moderate drinkers.

The analysis of motivational concepts (i.e., related items of motives) to control drinking showed that three clusters can be found, which are differentially involved in abstainers as well

as in moderate and heavy drinkers. By the chosen type of cluster analysis, it was expected that emotional, physiological, and cognitive concepts would be underlying dimensions. However, the (reliable) outcome revealed three clusters that are related to expected concepts but include additional aspects. Cluster one (C1) covers emotional aspects (Q# 13, F# 32), previous (bad) experience with alcohol (Q# 25, F# 23), and fear of addiction (Q# 6, E# 7), and some general expectations associated with alcohol misuse (Q# 29, F# 14). Cluster two (C2) reflects physiological circumstances in general (F# 21), and is associated with alcohol (Q# 4, F# 27) and sensations (F# 22), as well as some aspects of concrete intentions (e.g., F# 24, F# 31). Cluster three (C3) reflects mainly cognitive concepts (Q# 1, Q# 8, F19) including rules (F# 4, F# 6), internal control (Q# 32, Q# 33) and aspects of health (A# 16, F# 19) and additionally aspects of having "no need" to drink (F# 2, F# 29). The results of cluster analysis indicates that cluster 1 can be interpreted as an "emotional concepts/experience with alcohol," cluster 2 as a "physiological/interactive concept," and cluster 3 as a "cognitive concept/no desire." Item analysis showed acceptable Cronbach's alpha values, indicating a sufficient reliability of each cluster for MCD-Q as well as for MCD-F.

Analyses of mean scores in physiological/interactive concepts (cluster 2) revealed higher scores for imbibers compared to abstainers, but no difference between moderate and heavy drinkers. This indicates that imbibers use this kind of motivational concepts, however, it is not associated with prevention of heavy drinking. Cognitive concepts, and no desire (cluster 3), is less pronounced in heavy drinkers and most pronounced in moderate drinkers. This is in line with the view that cognitive concepts related to internal control, such as rules, and aspects of health are effective motivational concepts to control drinking. Contrarily, emotional concepts and also some previous experiences with alcohol (cluster 1) seem not to operate as an effective control mechanism, as they are positively related with consumption. This finding is in line with an investigation in hindrances to the treatment of alco-

holics (21), where a discrepancy between perceived control and an actual behavior was found in alcoholics due to overestimation of subjective control. This seems predominantly to be the case in emotional concepts generally and for cognitive concepts in controlling quantity by the reason of the alcohol effect during drinking, however, being sober cognitive concepts to control frequency could work properly.

Although presented data are just based on self-report, which implies some limitations on the true amount of the consumption of alcohol, they reflect the main concepts of theories on motivation. Also, a plausible structure of motivations to control quantity as well as frequency of drinking (MCD-Q/ F) in relation to self-reported quantities of alcohol consumption was found. It was shown that for imbibers a reduced motivation to control frequency of drinking as well as a lack in cognitive concepts and a trend to emotional concepts are associated with heavy drinking, whereas moderate drinkers showed the highest scores in controlling frequency and in cognitive concepts.

REFERENCES

1. Brown, S. A.; Munson, E.: Extroversion, anxiety and the perceived effects of alcohol. J. Stud. Alcohol. 48:272–276; 1987.
2. Collines, A. C.; Yeager, T. N.; Lebsack, M. E.; Panter, S. S.: Variations in alcohol metabolism: Influence of sex and age. Pharmacol. Biochem. Behav. 3:973–978; 1975.
3. Corcoran, K. J.: The influence of gender, expectancy, and partner beverage selection on (meta)perceptions in a blind dating situation. Addict. Behav. 21:273–282; 1996.
4. Corcoran, K. J.: The influence of personality, cognition, and behavior on perceptions and metaperceptions following alcoholic beverage selection in a dating situation. Addict. Behav. 22:577–585; 1997.
5. Diel, J. M.: Umfang und Determinanten des Konsums alkoholischer Getränke. Aktuelle Ernährungsmedizin 21:45–55; 1999.
6. Embree, B. G.; Whitehead, P. C.: Validity and reliability of self-reported dinking behavior: Dealing with the problem of response bias. J Stud. Alcohol. 54:334–344; 1993.
7. George, W. H.; Marlatt, G. A.: Alcoholism. The evolution of a behavioral perspective. Recent Dev. Alcohol. 1:105–138; 1983.
8. Goist, K. C. J.; Sutker, P. B.: Acute alcohol intoxication and body composition in women and men. Pharmacol. Biochem. Behav. 22:811–814; 1985.
9. Juarez, J.; Guzman-Flores, C.; Ervin, F. R.; Palmour, R. M.: Voluntary alcohol consumption in vervet monkeys: Individual, sex, and age differences. Pharmacol. Biochem. Behav. 46:985–988; 1993.
10. Leigh, B. C.: The relationship of sex-related alcohol expectancies to alcohol consumption and sexual behavior. Br. J. Addict. 85:919–928; 1990.
11. Lejoyeux, M.; Fueché, N.; Loi, S.; Solomon, J.; Adès, J.: Impulse-control disorders in alcoholics are related to sensation seeking and not to impulsivity. Psychiatr. Res. 81:149–155; 1998.
12. Lisciotto, C. A.; DeBold, J. F.; Miczek, K. A.: Sexual differentia-

tion and the effects of alcohol on aggressive behavior in mice. Pharmacol. Biochem. Behav. 35:357–362; 1990.
13. Mariano, A. J.; Donovan, D. M.; Walker, P. S.; Mariano, M. J.; Walker, R. D.: Drinking-related locus of control and the drinking status of urban Native Americans. J. Stud. Alcohol. 50:331–338; 1989.
14. Mooney, D. K.; Fromme, K.; Kivlahan, D. R.; Marlatt, G. A.: Correlates of alcohol consumption: Sex, age, and expectancies relate differentially to quantity and frequency. Addict. Behav. 12:235–240; 1987.
15. Neff, J. A.; Burge, S. K.: Alcohol use, liberal/conservative orientations, and ethnicity as predictors of sexual behaviors. J. Acquir. Immune Defic. Syndr. Hum. Retrovirol. 8:302–312; 1995.
16. Ratliff, K. G.; Burkhart, B. R.: Sex differences in motivations for and effects of drinking among college students. J. Stud. Alcohol. 45:26–32; 1984.
17. Reeve, J.: Understanding motivation and emotion. Fort Worth: Harcourt Brace Jovanovich; 1992.
18. Room, R.; Leigh, B. C.: Self-control concerns and drinking loss of control in general and clinical populations. J. Stud. Alcohol. 53:590–593; 1992.
19. Sanders, J. B.; Aasland, O. G.; Amunsen, A.; Grand, M.: Alcohol consumption and related problems among primary health care patients. WHO collaborative project on early detection of persons with harmful alcohol consumption I. Addiction 88:349–362; 1993.
20. Weiner, B.: Human motivation. Metaphoers, theories, and research. Newbury Park, CA: Sage; 1992.
21. Zdanowicz, N.; Janne, P.; Reynaert, C.; Vause, M.; Rousseau, J. P.: The discrepancy between alcoholic's perceived control and actual skills. Eur. J. Psychiatry 12:205–214; 1998.
22. Zimmerberg, B.; Mickus, L. A.: Sex differences in corpus callosum: Influence of prenatal alcohol exposure and maternal undernutrition. Brain Res. 537:115–122; 1990.