

# Identification of possible risk factors for alcohol use disorders among general practitioners in Rhineland-Palatinate, Germany

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## Summary

**QUESTIONS UNDER STUDY:** Research on alcohol use disorders among physicians has been scarce in Germany. The aim of our study was to identify possible risk factors for alcohol use disorders among general practitioners (GPs) working in the outpatient sector in the federal German state of Rhineland-Palatinate (RP).

**METHODS:** An anonymous survey was carried out between June and July 2009. 2,092 practice-based GPs in the federal German state of RP were asked to take part in the cross-sectional study via postal mail. The CAGE screening tool was used in its German version (CAGE-G) to screen for alcohol use disorders (AUD). Moreover, possible risk factors such as work stress (effort-reward imbalance), stress experienced in the leisure time and personality characteristics (Type D personality, resilience) were included in the questionnaire.

**RESULTS:** 808 GPs participated (response rate 38.6%), n = 790 were eligible for the analysis. The frequency of AUD according to the CAGE-G was 18.9% (n = 149). Moreover, nearly one in four general practitioners reported consuming alcohol on a daily basis (23.0%, n = 182). In the logistic regression analyses, stress experienced in the leisure time

was positively related to the occurrence of AUD, whereas resilience was negatively associated.

**CONCLUSIONS:** AUD as screened for by the CAGE-G was frequent in our sample of German GPs. Approaches to reduce their occurrence could comprise actions helping physicians to relieve stress in their leisure time. Furthermore, measures to increase physicians' resilience by improving coping strategies might prove useful.

**Key words:** General practitioners; Germany; alcohol use disorders; psychosocial stress; resilience

## Introduction

There have been inconsistent findings with respect to the frequency of alcohol consumption and alcohol use disorders (AUD) among physicians. Some studies in the US and Europe have shown that physicians consume more alcohol and are at a greater risk of developing alcohol use disorders than the general population [1–3]. Other studies, however, suggest that there are no or only negligible differences between physicians and the general adult population or other professional groups [4–6]. Physicians' reasons to engage in inadequate alcohol consumption are various. Some authors point to psychosocial work stress and job dissatisfaction as key factors that may lead to inadequate substance use among physicians [2, 7]. On the other hand, numerous studies of different occupational groups have failed to identify associations between factors such as work stress or job satisfaction and alcohol consumption [8–10]. A more consistently established risk factor for alcohol consumption among physicians is male gender [5, 11–14]. Further factors discussed in the literature are underlying psychiatric disorders such as depression or anxiety as well as characteristics inherent to the personality of the physicians [7, 15, 16]. Two personality traits that have frequently been investigated in terms of their effect on health are resilience and Type D personality. Whereas resilience is thought to be protective against health problems in the psychoso-

### Abbreviations

AUD	Alcohol use disorders
aOR	Adjusted odds ratio
CAGE	Screening tool for alcohol use disorders such as dependence or abuse; CAGE stands for "cut down", "annoyed", "guilty" and "eye opener"
CI	Confidence interval
DS14	Type D scale-14
ERI-Q	Effort-reward imbalance questionnaire
ERR	Effort-reward ratio
GP	General practitioner
RP	Rhineland-Palatinate
RS-13	Resilience scale (13 items version)
SBUS-B	Scales for the assessment of subjective occupational stress and dissatisfaction

matic domain [17–19], Type D personality has been linked positively to a broad range of health impairments and unhealthy lifestyle habits [20–22]. Hence, these personality traits could also be relevant for AUD among physicians.

In Germany, research on substance use among physicians working in the outpatient sector has been scarce. Little is known about risk factors for AUD in this professional subgroup. To our knowledge, there is only one German study that aimed at estimating alcohol consumption among practice-based general practitioners (GPs) [23]. Hazardous or harmful drinking behaviour was reported by 27.5% of the male and 7.7% of the female GPs. As in most other studies, hazardous or harmful drinking was defined by the quantity and frequency of alcohol intake. This approach does not allow distinctions between problem drinking and more severe forms of AUD such as dependence. Furthermore, no analysis of risk factors except for age and gender was undertaken.

The aim of our study was to identify possible risk factors for AUD such as dependence or abuse within the target population of physicians working in the outpatient sector in Germany. We decided to investigate solely GPs as they hold a key position in the German health care system being the first contact for almost every patient.

## Methods

In 2009, an anonymous survey was carried out among GPs working in the outpatient sector in the German federal state of Rhineland-Palatinate (RP). GPs with specialisation in general medicine and GPs without postgraduate specialty training were eligible. The cross-sectional study targeting  $n = 2,092$  GPs was undertaken via postal mail. The distribution of the questionnaires was organised by the State Chamber of Physicians, which holds a database containing the addresses of all physicians working in the outpatient sector. The questionnaire covered a broad range of variables. Personality traits, perceived stress and health impairments were measured by means of standardised and psychometrically validated instruments. It took participants approximately 20–40 minutes to fill out the questionnaire (time estimation based on pilot interviews).

### Alcohol use disorders

To estimate the prevalence of AUD in the sample, the CAGE questionnaire was used in its German version (CAGE-G) [24]. Consisting of four dichotomous items, this screening tool is characterized by a high degree of efficiency. The number of positively answered items (“yes”) is summed up in a score. We applied the recommended cut-off value  $\geq 2$  to screen for AUD. The CAGE has proven to be a valid screening instrument with good sensitivity and satisfying specificity in hospitalised (and therefore high-risk) populations, whereas its performance in non-hospitalised samples has been varied [25, 26].

Additionally the frequency of alcohol consumption was covered by the question ‘Do you drink alcohol?’ Participants could choose between four categories (“yes, every day”, “yes, occasionally”, “no, I stopped drinking alcohol”, “I never drank alcohol”). By choosing these rather rough categories we wanted to identify physicians who have

made alcohol a part of their daily routine, because this subgroup could be at a greater risk to develop AUD.

### Work stress

The short form of the Effort-Reward Imbalance Questionnaire (ERI-Q) [27] was administered. It consists of 16 items, with three of them pertaining to the subscale “effort”, seven items constituting the subscale “reward”, and six items being assigned to the subscale “overcommitment”. All three scales are assessed on a four point Likert scale ranging from “strongly agree” to “strongly disagree”. We calculated the so-called effort-reward ratio (ERR), which is an indicator of balance between the rewards received and the efforts invested at the workplace. The formula was adjusted to the short form by a correction factor. Furthermore, we calculated the sum score of the overcommitment items. As suggested in the literature [28], both the ERR and the overcommitment sum score were divided into quartiles according to the empirical distribution in the sample.

### Stress in the leisure time

Stress experienced in the leisure time was measured by the scale B4 (labelled “lack of relaxation and recreation”), which is part of the “Scales for the Assessment of Subjective Occupational Stress and Dissatisfaction” (SBUS-B) [29]. Scale B4 consists of nine dichotomous statements participants can either agree or disagree with. The scale is based on psychological stress theories such as the one framed by Lazarus [30], where the subjective experience of stress is the result of an evaluative process of the situation. Items pertaining to this scale refer, for example, to the experience of time constraints, the (in)ability to relax, the performance of pleasant activities, or the freedom to choose activities. We achieved a total stress score by summing up the single item scores and divided the total into quartiles according to the empirical distribution in the sample.

### Job satisfaction

Job satisfaction was measured by the question “How satisfied are you altogether with your current job as a general practitioner?” Participants could answer on a six point Likert scale ranging from “not at all” to “absolutely”.

### Personality factors

We included the Type D personality construct and resilience. Type D was measured by the German version of the scale DS14 [31], which is made up of the two dimensions “negative affectivity” and “social inhibition”. Negative affectivity relates to a dispositional readiness to easily experience negative emotional states, whereas social inhibition refers to the inclination to suppress the acting out of such negative emotions. Persons with Type D personality have both of these dispositions at the same time [31]. The applied version of the DS14 consists of 14 items to be answered on a five point Likert scale ranging from “completely disagree” to “completely agree”. We used the more conservative definition of Type D personality [31]. In this definition, it is required that a subject exceeds the upper limits of the 95% confidence intervals of both negative af-

fectivity and social inhibition at the same time in order to be classified as having a Type D personality.

Resilience was measured by the German short form of the Resilience Scale RS-13 [32]. Resilience relates to the capacity to remain healthy in the face of strain and is therefore a sort of hardiness. The RS-13 is a one dimensional instrument and consists of 13 items assessed on a seven point Likert scale ranging from “completely disagree” to “completely agree”. We achieved a total resilience score by summing up the single item scores. This score was divided into quartiles so that non-linear trends could be identified and effect estimates were comparable to those of the stress measures.

#### Other covariates

Participants were asked for job-related variables such as average weekly working hours, duration of lunch breaks, and the presence of medical colleagues. Moreover, socio-demographic variables such gender, age (in five year categories), marital status, common household with a life partner, and number of children were covered.

#### Statistical analyses

Absolute and relative frequencies were calculated as well as the corresponding 95% confidence intervals, which were used to make comparisons between subgroups. Binary logistic regression analyses were applied to identify possible risk factors for AUD and predictors of daily alcohol consumption. Table 1 shows the explanatory variables considered in the binary logistic regression models. Both forward selection and backward elimination procedures were performed separately. A final set of predictors was then tested in an inclusion method. All analyses were carried out using SPSS version 18.0. The significance level for all statistical tests was defined by setting the error probability  $\alpha = 0.05$ .

#### Missing values

Items 4 and 5 of the ERI-Q (subscale “reward”) had greater proportions of missing values (7.7%,  $n = 61$  and 6.5%,  $n = 51$ ) so that sum scores could not be calculated for a considerable proportion of the participants. To compensate the loss of power caused hereby we imputed missing values of items 4 and 5 for each subject by replacing them with the mean of the other five reward items [33]. Replacements

were only carried out if all other five items of the “reward” scale were answered.

## Results

Eight hundred and eight GPs participated (response rate 38.6%), 790 of these (37.8%) were eligible for the analysis. Eighteen questionnaires were discarded because the physicians did not work as GPs ( $n = 16$ ) or because basic socio-demographic information was lacking ( $n = 2$ ).

#### Socio-demographic and job-related measures

69.7% of the GPs ( $n = 551$ ) were male, 30.3% ( $n = 239$ ) female. Approximately two thirds of the participants (63.5%,  $n = 502$ ) were between 46 and 60 years old. Relatively few participants were 45 years of age or younger (18.0%,  $n = 142$ ). Only few GPs did not live together with a partner (9.5%,  $n = 75$ ) or did not have children (11.6%,  $n = 92$ ). The estimated weekly workload was 54.4 hours (SD = 12.7), about one quarter of which (13.4 hours) was dedicated to administrative work. Table 2 gives an overview of selected socio-demographic and job-related characteristics of the sample.

#### Frequency of alcohol use disorders and daily alcohol consumption

Table 3 presents the prevalence of AUD and daily alcohol consumption in the sample. Furthermore, the 95% confidence intervals are given. The prevalence of AUD in the sample according to the CAGE-G was 18.9% ( $n = 149$ ). Male GPs were affected somewhat more often (20.5%,  $n = 113$ ) than female GPs (15.1%,  $n = 36$ ). Nearly one in four GPs reported consumption of alcohol on a daily basis (23.0%,  $n = 182$ ). Two in five of these daily consumers (40.7%,  $n = 74$ ) also exceeded the CAGE-G cut-off.

Daily consumption of alcohol was significantly more frequent in male (26.1%,  $n = 144$ ) than in female participants (15.9%,  $n = 38$ ). Occasional alcohol consumption was reported by about two thirds of the physicians (68.1%,  $n = 538$ ). Only few GPs declared to never have consumed alcohol (4.9%,  $n = 39$ ) or to have quit its consumption (3.7%,  $n = 29$ ).

**Table 1:** Explanatory variables used in the binary logistic regression models.

Type of variable	Covariate
Socio-demographic variables	Age
	Gender
	Children
	Life partner
Job-related variables	Weekly working hours
	Duration of lunch break
	Working with other GPs
	Job satisfaction
Personality traits	Resilience (RS-13)
	Type D personality (DS14)
Psychosocial (work) stress	SBUS-B B4
	Overcommitment (ERI-Q)
	Effort-reward ratio (ERI-Q)

### Regression analyses

The results of the automatic forward selection and the backward elimination differed only with respect to one predictor in the analysis of AUD. Overcommitment was included in the backward elimination, but not in the forward selection approach. Table 4 contains the adjusted odds ratios (aOR) resulting from the final regression model (inclusion method) alongside with the corresponding 95% confidence intervals (CI). Due to the explorative character of this study, we decided to include the more comprehensive set of predictors. Stress experienced in the leisure time (SBUS-B B4) was positively associated with AUD. The group with the highest stress level had a 2.5-fold higher chance to suffer from AUD than the group with the lowest stress level (95% CI = 1.28–4.67). With respect to the other stress measure overcommitment, none of the chosen contrasts yielded statistical significance (Wald tests). Yet there was a tendency that individuals with higher levels of overcommitment (3<sup>rd</sup> and 4<sup>th</sup> quartile) had a higher chance to be affected by AUD. Contrary to the stress measures, weekly working hours (aOR = 0.98; 95% CI = 0.96–1.00) and re-

silience (aOR for 4<sup>th</sup> quartile = 0.48; 95% CI = 0.27–0.86) were negatively associated with the outcome. Hence, those GPs with comparatively high levels of resilience had a lower chance of suffering from AUD.

Regarding the prediction of daily alcohol consumption, forward selection and backward elimination processes resulted in the same regression model. Table 4 displays the final set of predictors (inclusion method) and the corresponding aOR.

Female GPs had a 36% lower chance of consuming alcohol on a daily basis than their male colleagues (95% CI = 0.42–0.96). Older age was positively associated with daily alcohol consumption. The oldest age group (>60 years) had a more than fourfold chance of daily alcohol consumption when compared with the youngest age group (31–45 years; 95% CI = 2.33–8.12). Resilience was again negatively related to the outcome. Those GPs with the highest resilience level had a 46% lower probability of consuming alcohol daily when compared to their colleagues with the lowest resilience level (95% CI = 0.33–0.89). Contrary to resilience, Type D personality was not significantly associated

**Table 2:** Socio-demographic and work-related characteristics of the sample (n = 790, missings included).

		Male (n = 551)		Female (n = 239)		Total sample (n = 790)	
		n	%	n	%	n	%
Age categories	31–45 years	81	14.7	61	25.5	142	18.0
	46–60 years	348	63.2	154	64.4	502	63.5
	>60 years	122	22.1	24	10.0	146	18.5
Marital status	Married	473	85.8	182	76.2	655	82.9
	Divorced / separated	47	8.5	29	12.1	76	9.6
	Unmarried	19	3.4	22	9.2	41	5.2
	Widowed	8	1.5	5	2.1	13	1.6
Living together with a partner	Yes	501	90.9	196	82.0	697	88.2
	No	36	6.5	39	16.3	75	9.5
Children	Yes	501	90.9	197	82.4	698	88.4
	No	50	9.1	42	17.6	92	11.6
Job satisfaction	Completely / very satisfied	63	11.4	33	13.8	96	12.1
	Rather / to some extent satisfied	333	60.4	168	70.3	501	63.4
	Little / no at all satisfied	153	27.8	38	15.9	191	24.2
		Mean	SD <sup>a</sup>	Mean	SD <sup>a</sup>	Mean	SD <sup>a</sup>
Weekly workload	In hours	56.7	11.7	49.2	13.2	54.4	12.7
Administrative work	In hours	13.5	8.5	13.0	9.5	13.4	8.8
Time for lunch break	In minutes	47.7	27.8	45.3	30.6	47.0	28.7

<sup>a</sup> Standard deviation.

**Table 3:** Relative frequency of alcohol use disorders and daily alcohol consumption (in %, missings included).

		Alcohol use disorders (CAGE-G ≥ 2)			Daily alcohol consumption		
		%	95% CI <sup>a</sup>	n (age group)	%	95% CI <sup>a</sup>	n (age group)
Male	31–45 years	11.1	4.3–18.0	81	12.3	5.2–19.5	81
	46–60 years	23.0	18.6–27.4	348	24.7	20.2–29.2	348
	>60 years	19.7	12.6–26.7	122	39.3	30.7–48.0	122
	All ages	20.5	17.1–23.9	551	26.1	22.5–29.8	551
Female	31–45 years	16.4	7.1–25.7	61	11.5	3.5–19.5	61
	46–60 years	15.6	9.9–21.3	154	15.6	9.9–21.3	154
	>60 years	8.3	0.0–19.4	24	29.2	11.0–47.4	24
	All ages	15.1	10.5–19.6	239	15.9	11.3–20.5	239
Total sample	31–45 years	13.4	7.8–19.0	142	12.0	6.6–17.3	142
	46–60 years	20.7	17.2–24.3	502	21.9	18.3–25.5	502
	>60 years	17.8	11.6–24.0	146	37.7	29.8–45.5	146
	All ages	18.9	16.1–21.6	790	23.0	20.1–26.0	790

<sup>a</sup> 95% confidence interval.

with AUD or daily drinking behaviour in the multivariate analyses.

## Discussion

### Principal findings and their implications

In our sample of GPs in the federal state of RP, Germany, the frequency of AUD according to the CAGE-G screening was 18.9%. The proportion was somewhat higher in male than in female GPs, and it was also slightly higher in the older age classes. Surveys among the German general population, which also used the CAGE-G, have found considerably lower proportions between 8% and 10% [34, 35]. The gender and age stratified descriptive comparisons in table 5 illustrate this discrepancy, which is even more marked for female GPs. Since other studies among physicians mostly used quantity/frequency approaches to define AUD, direct comparisons cannot be made. Nevertheless, the results reported here are well in line with a number of international studies reporting high proportions of risky alcohol consumption (between 14.5% and 30%) among (primary care) physicians [3, 13, 23, 36].

23% of the GPs reported drinking alcohol every day. Male GPs engaged in daily alcohol consumption more often than their female colleagues. In a study among the general population, only 6.4% of the non-abstaining women and 16.2% of the non-abstaining men in West Germany reported daily alcohol consumption as compared to 17.7% and 28.5% in our sample [37].

Since only the frequency of alcohol intake was covered in the questionnaire, conclusions as to the concept of hazardous or harmful drinking cannot be drawn. However, daily drinking has been linked to unhealthy lifestyle habits [38] and health impairments [39, 40] and could therefore be re-

garded as a risk factor in itself. The negative association we found between resilience and daily alcohol consumption may suggest that at least for a part of the physicians, daily alcohol consumption could act as a form of coping mechanism.

Altogether, especially female GPs in our sample seem to be affected more often by AUD and daily alcohol consumption than their counterparts in the general population in Germany. A possible explanation could be that female physicians might be exposed to a greater amount or a different kind of stress than women in the general population, whilst this difference could be less marked in men. One reason for this could be that – in comparison to the general female population in Germany – female physicians more often face the double burden of a challenging job and raising children. The lack of recreation caused hereby could make female GPs more susceptible to maladaptive coping strategies such as inadequate alcohol use.

In the regression analyses, stress experienced in the leisure time and work-related stress as captured by the overcommitment construct were positively related to the occurrence of AUD. Stress experienced in the leisure time seemed to be of even greater importance for the occurrence of AUD in our sample than work-related stress. Thus, it seems crucial for GPs to have leisure time which provides the possibility to relax and recreate. The results of another study of German physicians stress the importance of the life outside the job in a similar way [41]. Here, general satisfaction with life was markedly lower among physicians with a substance-related dependence than among physicians without dependence, whereas the two groups did not differ so much with respect to job satisfaction.

Resilience was negatively related to both the occurrence of AUD and daily alcohol consumption. This result is in line with a number of studies that consistently linked resi-

**Table 4:** Final set of predictors and adjusted odds ratios of the binary logistic regression models to predict alcohol use disorders and daily alcohol consumption (inclusion method).

Predictor	Quartile	Alcohol use disorders (n = 746)		Daily alcohol consumption (n = 781)	
		aOR <sup>a</sup>	95% CI <sup>b</sup>	aOR <sup>a</sup>	95% CI <sup>b</sup>
Weekly workload (hours)		0.98	0.96–1.00	<sup>e</sup>	
Over commitment	1 <sup>st</sup>	ref. <sup>c</sup>		<sup>e</sup>	
	2 <sup>nd</sup>	0.55	n. s. <sup>d</sup>		
	3 <sup>rd</sup>	1.14	n. s. <sup>d</sup>		
	4 <sup>th</sup>	1.35	n. s. <sup>d</sup>		
SBUS-B B4	1 <sup>st</sup>	ref. <sup>c</sup>		<sup>e</sup>	
	2 <sup>nd</sup>	1.27	n. s. <sup>d</sup>		
	3 <sup>rd</sup>	2.03	1.16–3.55		
	4 <sup>th</sup>	2.45	1.28–4.67		
Resilience	1 <sup>st</sup>	ref. <sup>c</sup>		ref. <sup>c</sup>	
	2 <sup>nd</sup>	0.72	n. s. <sup>d</sup>	0.84	n. s. <sup>d</sup>
	3 <sup>rd</sup>	0.57	0.38–0.96	0.45	0.27–0.74
	4 <sup>th</sup>	0.48	0.27–0.86	0.54	0.33–0.89
Age (in years)	31–45	<sup>e</sup>		ref. <sup>c</sup>	
	46–50			1.92	1.01–3.65
	51–55			1.91	1.01–3.63
	56–60			2.04	1.09–3.80
	>60			4.35	2.33–8.12
Gender	Male	<sup>e</sup>		ref. <sup>c</sup>	
	Female			0.64	0.42–0.96

<sup>a</sup> Adjusted odds ratio; <sup>b</sup> 95% confidence interval; <sup>c</sup> reference category; <sup>d</sup> contrast not significant ( $p < 0.05$ ); <sup>e</sup> variable not in the model (eliminated by stepwise procedure).

lience to a relatively lower degree of psychosomatic health impairments [17–19]. The associations between resilience and the two alcohol-related outcomes were non-linear (table 4). From the third quartile onwards, the effect estimates remained fairly stable. This may suggest that a certain level of resilience has a protective effect, which does not alter so much if the degree of resilience increases further. It might therefore be worth considering measures that help to preserve or reach a certain level of resilience when planning interventions to prevent alcohol misuse among GPs. Male gender and older age were identified as predictors of daily alcohol consumption, which is consistent with previous findings [5, 11–14]. We furthermore detected a negative association of the weekly workload and AUD. This seemed to be surprising at first glance. However, it is possible that the presence of AUD may lead to a lower overall functional status and thus to a reduction in the average weekly working hours. Due to the cross-sectional design, the direction of associations cannot be determined definitively.

#### Preventive measures to reduce alcohol use disorders among general practitioners

Our findings suggest that measures aiming at the prevention of AUD in GPs should consider physicians' resilience and the relief of stress in the leisure time. Resilience and the relief of stress through recreation both refer to the way GPs cope with stressful life conditions. It seems essential that this coping process is successful. How can this be achieved? Surveys among GPs and other physicians suggest that resilience in terms of successful coping with stressful life events may be supported by the following strategies: positive attitudes towards the own role and personal limitations [42, 43] instead of self criticism [44], supportive personal relationships with family and friends [42, 43, 45, 46], enough leisure time spent outside medicine including hobbies and holidays [43, 46–48], emotional awareness [43, 46], help seeking behaviour [44] and a problem focused coping style [43, 49]. Some of these strategies may require the ability to set limits and grant priority to own needs [46]. There are also hints that strategies enhancing physicians' resilience can be learned in specialised trainings focusing on stress management [49, 50].

Such training could already be implemented in medical school [44, 51] and could comprise relaxation techniques [50] and the beneficial use of leisure time. The available literature also points to the importance of regular exchanges with professional colleagues such as in Balint groups. Such groups might strengthen the resistance to work-related stress [52]. Our own data underline the importance of professional exchange among colleagues and relaxation techniques, which the majority of the users in our sample found helpful in reducing stress [53].

#### Strengths and limitations

To our knowledge, this is the very first time that the identification of risk factors for AUD was addressed in a state-wide German sample of GPs. Validated and standardized instruments were applied to measure subjective stress, personality factors and health measures. Another strong point is the considerable extent of this survey covering a broad range of variables. A limitation is that we only used a screening instrument to detect AUD, which means that a considerable proportion of false positive results is possible. Literature reviews reveal that the CAGE is a valid instrument to detect dependence [25, 26], but that there may be problems regarding less severe forms of AUD such as alcohol abuse or binge drinking. The CAGE screening instrument seems to capture the characteristics of dependence better than those of hazardous or harmful drinking behaviour. This may be attributable to the fact that it does not comprise questions related to the frequency or quantity of alcohol intake, which do play a role in the definition of hazardous / harmful drinking but not in the definition of dependence.

A further criticism refers to the fact that the CAGE performs best in hospitalised patients, whereas its performance in non-hospitalised and female populations has been varied [25, 54]. Current studies, however, add support to its validity in general populations [55, 56]. Thus, the application of the CAGE-G may have some drawbacks, but this holds true for any screening tool. Another possible source of bias is the delicate nature of the subject under study. AUD are a stigmatized topic, and one could assume that there was an underreporting of these problems. Especially among phys-

**Table 5:** Descriptive comparison of the relative frequency of lifetime alcohol use disorders (CAGE-G  $\geq 2$ ) in the sample of GPs and the general German population [35], stratified by age group (missings excluded).

	General practitioners (n = 780)		General German population (n = 7455) [35]	
	Age category	%	Age category	n
Male	31–40 years	6.9	30–39 years	12.8
	41–50 years	24.1	40–49 years	13.8
	51–60 years	20.2	50–59 years	11.0
	>60 years	19.7	>59 years	<sup>a</sup>
Female	31–40 years	13.3	30–39 years	3.4
	41–50 years	17.4	40–49 years	4.0
	51–60 years	14.8	50–59 years	2.8
	>60 years	8.3	>59 years	<sup>a</sup>
Total sample	31–40 years	9.1	30–39 years	8.1
	41–50 years	21.6	40–49 years	9.1
	51–60 years	18.6	50–59 years	6.9
	>60 years	17.8	50–59 years	<sup>a</sup>

<sup>a</sup> Participants of this survey were between 18 and 59 years.

icians, underreporting of alcohol use has been a frequently discussed topic [3; 57, 58].

Another limitation of this survey is the relatively low response rate of 38.6%. As a substantial proportion of the GPs did not respond, the possibility of selection bias in the sample has to be taken into account. Our sample does not show any bias with respect to the distribution of gender, but we cannot make any statements with respect to other relevant variables such as age because the database used to distribute the questionnaires does not provide the necessary information about the target group. Selection bias can lead to either an over or- an underestimation of point estimates and associations. It seems plausible that those GPs with the highest stress levels would rather not take part in a survey which consumes a considerable amount of time. Therefore, the subjects most inclined to inadequate alcohol consumption possibly did not participate. This might have resulted in an underestimation of AUD and the association between stress and these disorders. Compared to other surveys among physicians in Germany with response rates between 15 and 41% [23, 59–60] we still achieved a satisfactory response. This might be due to announcements made in the journal of the State Chamber of Physicians. On the other hand, mistrust in the institutions involved and the considerable extent of the survey may have prevented some physicians from participating.

Regarding the treatment of missing values, we calculated sensitivity analyses comparing results with and without imputation technique. In the regression models, slight differences occurred with respect to single predictors. All in all, there was a tendency that fewer predictors were included when analysing complete cases only. This finding is probably attributable to the loss of power brought about by excluding cases with a missing value.

There were hardly any differences between the results of the forward selection and the backward elimination procedures. Independently of the chosen selection procedure, fairly stable results were achieved. Due to the explorative nature of our study and the great number of potential influencing variables we decided to use this pragmatic approach.

The cross-sectional design of this study prevents us from drawing firm causal conclusions. However, some of the associations reported here apparently favour one direction of influence. For instance, personality traits can be regarded as fairly stable characteristics. Therefore, they should be more likely to have an influence on behaviour based variables such as alcohol consumption, than the other way around. The same holds true for variables such as gender or age. With respect to the experience of stress, of course, both directions of influence are possible.

### Conclusions

GPs in our sample frequently screened positively for AUD. The results reported here indicate that a low resilience and a lack of stress relief in the leisure time may play an important role with respect to the occurrence of AUD. These findings suggest that actions to reduce stress and increase physicians' resilience by improving coping strategies may prove useful to prevent AUD. Following the dissemination and discussion of our results, the development and imple-

mentation of such programmes, including appropriate evaluation activities, should be considered in Germany. Further research is warranted to determine if similar risk factors for AUD are relevant in other German and international samples of primary care physicians.

**Ethical approvals:** The ethics committee of the medical association of the German state of Rhineland-Palatinate and the data protection officer of Rhineland-Palatinate approved of this study.

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