

# Brief Intervention in Alcohol Intoxicated Adolescent-A Follow-up Study in an Access-to-Care Sample

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## Abstract

In the present study, N=88 children, adolescents and young adults were examined in the emergency unit of three municipal hospitals, who were receiving inpatient treatment there in the year 2008 due to acute alcohol intoxication (AAI). The sample consisted of 49% female (MD=16 years old) and 51% male patients (MD=17 years old). With regard to twelve months prevalence, it was the first AAI for 71% of the patients up to 16 years old, whereas for 47% of patients older 19 years it was at least the tenth AAI. All patients received a brief motivational intervention (BMI) which was designed to encourage them to seek youth-specific counselling after receiving hospital standard care. Of 88 youth, 15 (17%) accepted this offer, and 78 of 88 adolescents (89%) took part in a telephone-based 6-month follow-up. In an intent-to-treat analysis, alcohol prevalence (g/l for the last 30 days) decreased from t1 (M=544, SE=102) to t2 (M=2, SE=0.12). Therefore, the BMI under study appears to be effective in principle, is currently being manualised, and will be tested in a randomised-controlled study.

**Keywords:** Acute alcohol intoxication; Adolescents; Young adults; Binge drinking; Brief motivational intervention

## Introduction

According to German Federal Statistical office data [1], the number of patients aged 10 to 20 years who received inpatient hospital treatment due to acute alcohol intoxication AAI [2] has increased by 170 percent from 9,500 in the year 2000 to 25,700 in the year 2008. Approximately 4,500 of these patients were between 10 and 15 years old when treated in 2008 [3]. In these 10- to 15-year-olds, AAIs requiring treatment increased by 19 percent from 2007 to 2008 (from 3,800 to 4,500 treatment cases). The number of young females with AAI has also increased within the group of 10- to 15-year-olds and has exceeded the number of males: in 2008, they amounted to 2,400 female versus 2,100 male treatment cases [3]. Compared to other European countries, German youth, together with Dutch and Danish youth, are top ranked with regard to AAI last month prevalence (LMP) [4]. Special risk constellations can be described as follows: growing up in a single parent household, being part of an alcohol-consuming peer group, indiscriminate alcohol consumption and co-morbid occurrence of youth psychiatric symptoms [5].

Episodic excessive alcohol consumption followed by AAI is commonly referred to as “binge drinking” (BD), meaning the intake of at least five standard units of alcohol for boys and four standard units of alcohol for girls (e.g., 0.3 l of beer, 0.2 l of wine or 4 cl of spirituous beverages) on one drinking occasion with the primary intention of becoming drunk [6]. However, the BD-term has been criticized as being imprecise and not commonly defined [7] which is why the authors of this article prefer the term “acute alcohol intoxication” (AAI). International research shows that health risks of AAI are manifold [8-11]. Besides possible somatic complications (e.g., by aspiration of vomit, hypothermia, etc.), AAIs are associated with road traffic accidents and other accidents, violent acts and, in combination with further co-morbid mental disorders, with suicides. Young females often become victims of unwanted sexual acts. AAI also increases the risk of consuming further (illegal) psychotropic substances. The more often excessive consumption occurs and the younger the children and adolescents are, the greater the risk for developing an alcohol use disorder (AUD).

Brief motivational intervention (BMI) meaning a person-centred, non-directive intervention was originally developed in the course of treating adult alcohol patients [12]. In a meta-analysis conducted in 2005 [13] average effects were found in adults of  $d=0.41$  (ranging from  $-0.08$  up to  $3.07$ ) at the end of the intervention. Various controlled trials have documented the effectiveness of BMI for youth and young adults who were treated for excessive alcohol intake in emergency units [14-16]. Carey et al. [17] included 62 studies in their meta-analysis on BMI for young adult participants, typically freshman college students, and concluded that reported effect sizes were small, but comparable to the average effect sizes of  $d=0.20$  in the addiction field.

In Germany, to our knowledge no evidence-based studies were conducted so far to test the utility of a brief motivational interviewing approach to minors after emergency hospitalization due to AAI.

In the prospective, naturalistic intervention study at hand (stage-1-study cf. [18]) we examine the general feasibility and efficacy of a semi-structured BMI for young adults and adolescents referred to emergency treatment because of AAI. The goal of our current study refers to both gaining knowledge about the target group of medically referred alcohol intoxicated adolescents and young adults and to identify the utility of the administered BMI. First, we want to find out more about the age and gender structure of participants, their alcohol and drug use history and their history of previous incidents of AAI, their risky substance use and symptoms of psychopathology. We deem this especially interesting, as the current sample—except from some very few cases—equals the

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total access-to-care sample of AAI subjects aged 12-21 in the city of Hamburg in 2008. Second, we want to assess how many participants of the BMI took advantage of recommended further counselling regarding their alcohol use. Moreover, while we cannot give an evaluation of the continued counselling service recommended in the BMI, we still seek insight into what became of the counselling in participants, who took advantage of it. Third, it will be examined in what characteristics the group of “help accepters” differs from the group of “help avoiders” with regard to socio-demographic characteristics and substance use patterns. We hope to be able to derive further ideas for service ameliorations from these analyses. Fourth, we want to gain knowledge about what predicts recurring incidents of AAI in the 6 months following the incident of AAI leading to participation at the current study. As we believe this group carries an especially high risk for future substance use problems, we think it is valuable for further programme conceptualization to identify special features of this target group.

## Methods

### Subjects

Within a 12-month time period (year 2008), N=88 children, adolescents and young male and female adults were examined in the acute care and emergency unit of three municipal hospitals. Inclusion criteria encompassed that subjects (aged 12 to 21 years) were being treated there due to acute alcohol intoxication (diagnosis F10.0; International Classification of Diseases ICD-10) [2]. Almost all of them had been taken to hospital with emergency transportation. Moreover, fluency in the German language was required for study participation. In the three participating hospitals, this number of patients nearly equals the total AAI access-to-care population of subjects in the respective age group in 2008 in the city of Hamburg.

### Procedure/Intervention

Patients were referred to the intervention by emergency unit staff, a mobile phone hotline was available 24 hours per day on weekends or on holidays to contact staff of the current study. From previous experiences we know that medically referred AAIs in youths up to 21 years occur on Friday and Saturday nights or before holidays in 87% of cases [19]. Eligible subjects were usually receiving study information, assessment and the BMI in the morning before their discharge by a trained staff member of our research institution. Most staff members were advanced medical students. Subjects meeting inclusion criteria were invited to participate at the study given they had recovered from the AAI in a fashion so they were fit to hold a conversation of about 40 minutes. Subjects were informed about the study and written informed consent was obtained by participants. Written informed consent was also obtained from either parent or guardian for underage participants as another prerequisite for study participation. After surveying participants with a questionnaire and an interview (t1), a BMI was conducted. The BMI was semi-structured and had the goal to invite participants to seeking youth-specific continuing counselling. The BMI included was designed in a fashion to be non-judgemental and not preachy in tone, however, it was made clear by staff members that the need for emergency treatment after AAI posed an occasion not to be taken light-heartedly and in itself carried a substantial health risk. The idea to think through what had happened the previous night both now and in further youth-specific counselling was spurred.

Recruitment and intervention procedures were approved by the responsible ethics committee of the Hamburg Chamber of Physicians. In communication with patients and caregivers, as well as in the

questionnaires, the term “binge drinking” instead of the term “AAI” was used. Both assessment and intervention lasted for a maximum of 45 minutes.

One to two days after discharge, participants or caregivers, respectively, were invited by a cooperating counselling centre via telephone call to take part in a youth-specific family-oriented continuing counselling program. The umbrella organisation of this counselling centre was a non-profit NGO. The counselling service of this centre is not the subject matter of this study. The service offered consisted alternatively of psychosocial individual or group counselling, youth-specific or family-based counselling, or of advice on other relevant outreach services offered by other health care providers. Six months after the t1-intervention in the emergency unit, a follow-up survey (t2) was conducted via telephone interview.

### Study variables

Study participants were surveyed with an interview on socio-demographic data about family, school or vocational training, respectively, and peers. An anamnesis on the consumption of alcohol and other psychotropic substances was conducted and data on the circumstances of the current AAI were collected. A 4-item risk perception index was assessed using a widely used measure developed by the German Federal Centre for Health Education (BZgA) [20] (Cronbach's  $\alpha=0.84$ ). Besides this, standardised screening instruments for risky substance use and for symptoms of psychopathology were used: The RAFFT screening instrument consists of 6 items on the use of alcohol and illegal drugs with a yes/no answering scheme. Two or more points (red flag) in the RAFFT screening indicate risky substance use behaviour advancing the development of a substance-related disorder [21]. In 14-18 year-olds, the sensitivity of the RAFFT amounts to 75% for alcohol and 92% for illicit drugs [22]. General symptoms of psychopathology were measured with a validated 9-item short version of the widely used symptom checklist SCL (SCL-K-9), which is standardised and for which norm data of a representative sample for Germany exist [23].

### Statistical analyses

Data were pseudonymised, entered into an electronic data file, and analysed with the statistical software program SPSS.17 for Windows [24]. Frequencies were compared using chi square tests, means were compared using t-tests or variance analyses (ANOVAs), depending on the number of groups. For post-hoc comparisons, non-equality of variances was assumed (Tamhane's T2 method) [25]. The total sample size of N=88 at t1 and N=78 at t2 enables us to detect large effects with chi square tests, and medium to small effects with ANOVAs, assuming power  $1-\beta=0.80$  and level of test significance  $\alpha=0.05$  (Cohen's conventions) [cf. 1]. Missing t2 values of n=10 patients were imputed with their values at t1 (last observation carried forward method, LOCF) [26].

To predict the risk for “at least one further acute alcohol intoxication despite hospitalisation experience and BMI”, logistic regressions (LR) were computed with t1 data as predictors. For the LR, we were able to improve normalities of metric variables with arcsine and log transformations [27]. Since a maximum of 5-6 predictors should be included in a regression model for N=88 and  $\alpha=0.05$  [27], several separate analyses for blocks belonging together content-wise were necessary. Predictors resulting from these blocks were then integrated into a shared model to identify the “best” predictors. All LR were computed stepwise with backward elimination (Wald's method).

## Results

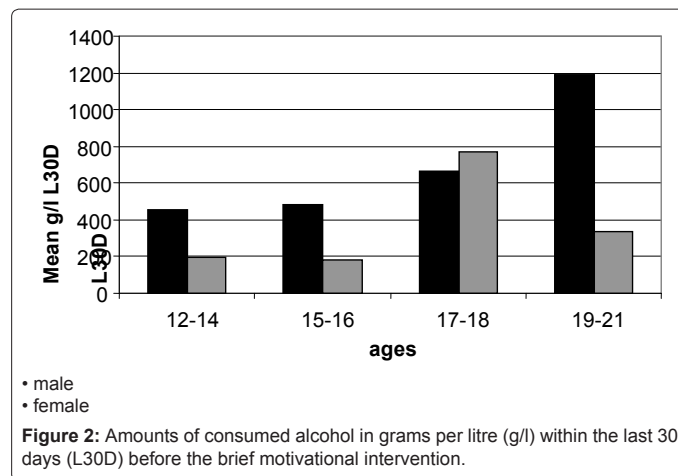
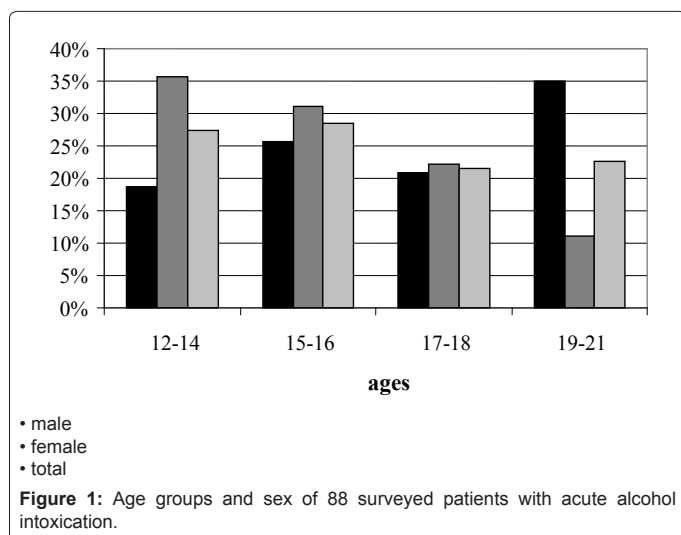
### Results of t1 assessment

**Sociodemographic data:** The sample consisted of N=88 patients (51.1% female, 48.9% male). Age varied between 12 and 21 years in total (M=16.40, SE=0.24). At the time AAI occurred, 65.9% of the sample were no older than 18 years, 27.3% were 14 years or younger. Figure 1 shows the distribution of male and female patients within age groups. The percentage of female patients decreases over the age groups, from 66.7% in the group of 12-14 year-olds to 25.0% in the group of 19-21 year-olds [ $\chi^2(3, N=88)=8.04, p \leq 0.05$ ; medium effect size  $w=0.30$ ].

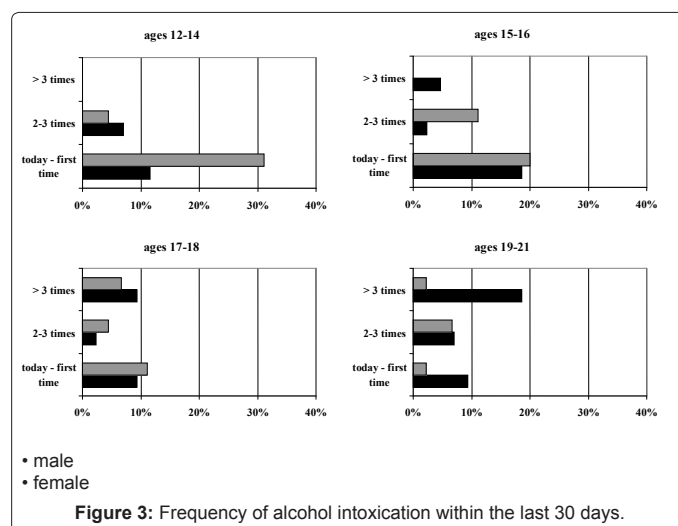
Of all surveyed participants, 68.3% were receiving school education. The percentage of secondary school students or specialised secondary school students was 33.0%. Of all study participants, 13.6% were receiving professional education, while 17.0% were receiving neither professional nor school education. A percentage of 87.5% of all adolescents were living in a household with one or two parents. Asked about possible parental addiction problems, 21.6% confirmed this for their father and 12.5% for their mother. Migration background was reported by 28.4% (migrated themselves: 2.3%, born as child of immigrants: 26.1%).

**Alcohol intake:** Next to the AAI incident that caused hospital treatment, 86.4% of participants report alcohol intake in the last 30 days (L30D) and 97.7% report alcohol intake in the last 12 months (L12M). When they had initiated alcohol consumption, 60.1% were 14 years old or younger. On average, before the AAI incident, M=544.6 g/l pure alcohol (SE=101.99) was consumed in L30D (SE=101.99). As shown in figure 2, participants between 12 and 13 years old consumed an average amount of alcohol of M=175.3 g/l (varying strongly, see SE=404.92), participants between 19 and 21 years old of M=893.04 g/l (SE=172.27).

The L30D prevalence for AAI at t1 was 38.6% (48.8% males; 28.9% females). The L12M prevalence for at least one AAI amounted to 43.3% in total (51.2% in males and 35.6% in females). In 18.2% of the total sample the AAI L12M prevalence exceeded 10 occasions. A percentage of 15.9% of all participants were not hospitalised for the first time due to an AAI. The distribution of grouped L30D prevalence (today first time, today plus further 1 to 3 occasions, today plus more than 3 further occasions) with regard to gender and age groups is shown in figure 3. Differences are significant both between males and females with  $\chi^2(2; N=88) = 7.59, p=0.02, w=0.28$  and between age groups with  $\chi^2(6;$



**Figure 2:** Amounts of consumed alcohol in grams per litre (g/l) within the last 30 days (L30D) before the brief motivational intervention.



**Figure 3:** Frequency of alcohol intoxication within the last 30 days.

$N=88) = 22.64, p=0.00, w=0.45$  (but for the effect within age groups cell frequencies vary considerably). As can be seen in figure 3, it is the first AAI for the majority of participants, especially for females in younger age groups. Of the participants reporting a L30D AAI frequency of “today plus more than 4 further occasions”, 77.8% were male and 50.0% were between 19 and 21 years old, whereas participants reporting the current occasion being the first ever AAI were female in 58.0% of all cases and between 12 and 14 years old in 36.0% of all cases.

**Illicit drugs consumption:** Of the total sample, a percentage of 46.6% had initiated tobacco consumption with 14 years of age or earlier, the L30D prevalence at t1 amounted to 61.4%. Among participants consuming tobacco, the percentage of those consuming 10 or more cigarettes per day was 45.6%. The L30D prevalence for cannabis amounted to 17.0%, the L12M prevalence was 20.5%, and life time prevalence (LTP) was 28.4%. A percentage of 8.9% of females reported regular cannabis intake in L30D, age of onset (AON) was M=15.00 (SE=0.58) on average. In the 9.3% males with regular cannabis in L30D, AON was M=18.35 (SE=0.95) years on average; a significance test could not be computed due to very different case numbers. The consumption of further illegal psychotropic substances was negated by all participants except for one case.

**Risky substance use:** In chi square tests, neither sexes nor age groups differed significantly in both RAFFT versions (alcohol and

drugs). The corresponding percentages for “red flag”-scores are shown in table 1.

**Symptoms of psychopathology:** In the SCL-K-9, participants achieved an average of  $M=2.39$  ( $SE=0.12$ ), a value that discloses a markedly higher general psychopathological burden compared to a representative normative sample ( $M=0.22$ ,  $SD=0.33$ ,  $SE$  not available; [23]). In a two-way ANOVA (sex×age group), female participants were significantly more troubled ( $M=2.65$ ,  $SE=0.16$ ) than male participants ( $M=2.11$ ,  $SE=0.17$ ) with  $F(1;84)=6.27$ ,  $p \leq .01$ , and with a small effect size of  $\eta^2=0.07$ . Means between age groups were not statistically significant different.

### Results of the 6-month follow-up (t2)

**Dropouts:** The follow-up after 6 months included 78 of 88 (88.6%) participants. For drop-out analyses we report results on a descriptive level since significance tests are not permissible due to dissimilar case numbers. Of the dropouts [compared to included participants], 60.0% were male [47.4%], 40.0% [16.7%] had neither a secondary, nor a comprehensive or higher school degree 50.0% [21.5%] reported at least one parent with substance use problems, and 30.0% [17.9%] reported an AAI L12M prevalence of at least ten times.

**Entry into further counselling and comparison of “help accepters” with “help avoiders”:** Only 17.0% of the participants ( $n=15$ ) could be encouraged to seek further counselling as advised in the BMI. The great majority of participants avoided counselling despite invitation (82.9%,  $n=73$ , no significant sex differences). Again, results are reported descriptively. Participants accepting help [compared to help avoiders] had a mean age of  $M=15.87$  ( $SE=0.48$ ) years [ $M=16.51$  ( $SE=0.28$ ) years], and 6.7% [13.7%] were not experiencing an addiction problem in their mothers. 60.0% of them [41.1%] were experiencing AAI for the first time, while 33.3% [16.4%] had experienced more than ten AAI occasions. Table 2 shows the significant results of dependent t-tests for paired samples, comparing t1 and t2. In help accepters nicotine consumption remained virtually unchanged, alcohol consumption measured in g/l is reduced with an approximately medium effect size, while number of days with cannabis consumption is reduced with a large effect size. In the help avoiders also, alcohol consumption in g/l was reduced in L30D prevalence, and psychopathological symptoms decreased, too (each with large-sized effects).

As shown in table 3, 53.3% of all help accepters received youth-specific counselling, while 26.7% received inpatient treatment. For both, 60.0% of all help accepters completed the respective program. The percentage of help accepters that did not relapse within the next half year after BMI amounts to 73.3% and resides under the equivalent percentage of help avoiders (81.0%). The regular completion of each program (including referral) increased the chance of not relapsing to  $OR=2.67$ .

**Prediction of relapse risk:** To predict the criterion “at t2 reported at least one further AAI despite hospitalisation experience and BMI” logistical regressions (LR) were computed, using participant data of t1 as predictors. The LR of 5 variable blocks resulted in 7 significant

RAFFT	Sex		Age group				
	male	female	12-14	15-16	17-18	19-21	total
alcohol	65.1	51.1	58.3	76.0	73.7	65.0	68.2
drugs	30.2	42.2	41.7	36.0	36.8	30.0	36.4

Note: N=88; male=43, female=45

**Table 1:** Risky substance use screening (percentage of “red flag”) using the RAFFT.

Substance consumption and psychopathological symptoms	Help avoiders (n=73)		Help accepters (n=15)	
	M	SE	M	SE
Cannabis L30D	0.55	0.26	4.33	2.29
Cannabis L30D	0.37	0.22	0.47	0.29
Alcohol g/l	562.39	121.86	455.42	82.87
Alcohol g/l	385.26	112.39	226.87	89.72
Psychopathological Symptoms (t1)	2.40	0.13	2.33	0.24
Psychopathological Symptoms (t2)	1.88	0.11	2.14	0.20
Results of dependent t-tests for paired samples (one-tailed)	t	df	p	d'
<b>Results of dependent t-tests for paired samples (one-tailed)</b>	<b>t</b>	<b>df</b>	<b>p</b>	<b>d'</b>
<b>Help accepters</b>				
Alcohol g/L	2.14	14	0.03	0.43
Cannabis L30T	1.86	14	0.04	0.78
<b>Help avoiders</b>				
Psychopathological Symptoms	4.69	72	.00	0.60
Alcohol g/L	2.99	72	.00	0.88

Note: BMI=brief motivational intervention; g/l=grams per litre; L30D=last 30 days prevalence.

**Table 2:** Comparison of help avoiders with help accepters at time of BMI (t1) and at telephone-based 6-month-follow-up (t2).

Accepted help service and results	Help avoiders (n=73) % of cases	Help accepters (n=15) % of cases
Counselling units/sessions		
1	--	53.3
2-5	--	33.3
6-10	--	13.3
Type of counselling/treatment		
counselling	--	60.0
stationary treatment	--	26.7
psychiatrist	--	6.7
self-help group	--	6.7
Type of termination		
completers	--	60.0
dropouts	--	33.3
referrals	--	6.7
Relapse (last six months)		
0 times	81.0	73.3
At least one more time	19.0	26.7

Note: Non-participants in the follow-up were categorised as help avoiders.

**Table 3:** Types of accepted continuing care services and results of these interventions. Descriptive intent-to-treat comparison of data with conservative LOCF imputation.

predictors that were entered into a joint LR. The 4 “best” predictors of 6 in total are summarised in table 4, and are interpreted with the measure of effect size odds ratio (OR), which is calculated as  $\text{Exp}(\beta)$ . In total, as shown in table 4, the best predictors enable a significant prediction with a medium goodness-of-fit ( $R^2=0.34$ ) and a good prediction for not experiencing a further AAI (90.3% hits in the LR classification result).

The question “What *increases* the likelihood of not experiencing an AAI relapse?” can be answered by *mutatis mutandis* using the ORs of table 4:

- If L30D prevalence before AAI at t1 (=number of alcohol intake days) was below sample median, the likelihood (of not experiencing a relapse) is increased to up to 16.67
- If there is no migration background, the likelihood is increased to 5.07
- If neither father nor mother is reported as having “substance use problems”, the likelihood is increased to 3.12 times as high

Correctly classified	Predictors	$\beta$	Exp. $\beta$ (OR)	[C.I.]	p	R <sup>2</sup>
No relapse 90.3%	▪ Less alcohol intake L30D	-2.87	0.06	[0.01;0.66]	0.02	0.34
	▪ Sex (female)	-1.00	0.37	[0.11;1.19]	0.09	
Total 76.1%	▪ Migration background (no)	1.62	5.07	[1.12;22.99]	0.04	0.05
	▪ "Addiction problem" in family (no)	-1.14	0.32	[0.10;0.99]	0.05	

Note: [C.I.] = Confidence interval; Nagelkerke's R<sup>2</sup>; L30D = last 30 days prevalence before intervention; AAI = acute alcohol intoxication; OR = Odds Ratio.

**Table 4:** Combined logistical regression for prediction of no relapse ("no AAI in the 6 months after BMI") according to significant "best" predictors (N=88).

- If the participant is female, the likelihood is 2.72 as high; however, the predictor "sex" has only a marginally significant contribution of p=0.09.

## Discussion

In a stage-I-study N=88 children, adolescents and young adults aged 12 to 21 years receiving inpatient treatment due to an AAI were examined in the emergency unit of three municipal hospitals. In the following, study results are discussed under the perspectives of participation, gender related issues, socio-demographic issues, and substance use.

### Participation

With the present BMI, 15 of 88 participants (17.0%) were convinced to accept help in form of youth-specific counselling after receiving hospital standard care. This percentage may seem small, but is difficult to compare to international research due to the procedural differences, and to national research, because similar projects do not publish transfer quotas. Quite possibly, a ceiling effect could exist in this study: since interviewers in the emergency units were not identical with counsellors for further services, participants did not perceive personal continuity, so the barrier to accepting counselling may not have been lowered enough. On the other hand, under routine care conditions, such a personal continuity cannot be expected, so that the low transfer quota at hand does not raise unnecessary optimism. In this study, 88.6% participants were available for a 6-month telephone follow-up (t2) without any incentive, while in a related international study, a retention rate of 89.5% was reported for participants who completed a 6-month follow-up personal interview that was awarded a financial incentive [16].

### Gender-related issues

According to data of recent studies examining AAI access-to-care samples, a convergence of percentages for female with those for male participants was to be expected [5,28-30]. With 51.1% females (MD age=16 years) and 48.9% males (MD age=17 years), our data virtually exhibit equal distribution. Females are found significantly more often in younger age groups, while male young adults exhibit the highest average consumption amount. A possible explanation from the general field of developmental science could posit that female youth, due to their earlier biological maturation compared to boys, and for reasons of seeking appreciation, engage in more contacts with older male youth and via these, initiate alcohol consumption earlier [31]. Another explanation may be that female youth when engaging in first drinking experiences, may try to keep up with their male peers' drinking, however, due to their bodily constitution, get intoxicated

more quickly. Young women may underestimate the role this bodily sex difference plays and need to find out about it the younger and more unexperienced they are with this regards. Previous results from gender research indicate that females tend to accept offered help more readily [32], which is why they could have been more willing to participate in the study than males, unfortunately we cannot test this assumption due to lacking data on this behalf. Furthermore, girls seem to be more successful in reducing problematic substance use over time. Also, in our study, the chance for not experiencing relapse was raised to OR=2.72 for female participants. More research from a gender perspective is needed to clarify the reasons that motivate especially younger female youths to consume such high amounts of alcohol, such as an early tendency towards rebellion (externalising) or a special form of female over-conformity (internalising) [33].

### Socio-demographic issues

The status of education/professional education did not contribute to predicting relapse, even though participants with lower education tended to be part of the dropouts. On the other hand, migration background is confounded with rather lower education, and also raised the risk of relapsing (OR=5.07). An addiction problem reported for parents also raised the risk of relapsing (OR=3.12). According to findings from transcultural psychiatry [34] it can be speculated that immigrants often find participative, middle-class-oriented treatment models inappropriate: a non-directive "let's find a solution together"-approach as practiced in BMIs could be interpreted as incompetence of the counsellor and thus, promote help-avoiding behaviour. Experienced addiction problems in parents could be a confounder for several family problems: affected parents can be seen as dysfunctional social models, which in turn is accompanied by inadequate parenting behaviours (unpredictable, "laissez-faire"), a dismissive family climate, and genetically predetermined vulnerability (patrilineal genetic transmission) [35-37].

### Substance use

Participants that made use of continuing counselling as well as participants that did not, both exhibited reduced substance use on average in the 6-months-follow-up. Similarly, the relapse predictor L30D prevalence for alcohol intake decreased significantly in both groups: in help accepters to 49.8% and in help avoiders to 68.5% of the initial values. In participants that had additionally consumed cannabis in the group of help accepters, the L30D prevalence decreased significantly to 10.8% of the initial values (Table 3). This gives reason to assume that some help accepters might have sought counselling especially because of their illegal substance use, and that their substance use can be seen as attempted self-medication for unsolved problem areas [35,38]. Another reason for this assumption is the higher percentage of participants with RAFFT "red flag"-scores in help accepters [help avoiders]: 80.0% [65.8%] for alcohol and 60.0% [31.5%] for illicit drugs.

Only if help programs were fully completed (including referrals) chances for not relapsing increased substantially to OR=2.67. This can be understood in such a way that there is a high percentage of help avoiders for whom the AAI is a singular occasion anyway—for instance, resulting from positive, but incorrect alcohol expectancies [6,22]. In help accepters, additional problems probably existed, which is underlined by the initially higher consumption of cannabis as well as the not reduced psychopathological symptoms. This may be one of the reasons why 53.3% did participate only once in a youth-specific continuing counselling.

## Conclusion

A BMI in the emergency care setting can access almost all children, adolescents, and young grownups with AAI. If BMI delivery and continuing counselling delivery remain separated, a maximum of one-fifth of accessed persons will seek continuing care counselling. In the total group of accessed participants the risk for an AAI relapse within the next months is reduced, it is additionally reduced if the continuing counselling service was fully completed. The LMP for alcohol consumption decreases significantly, as does cannabis consumption for help avoiders (after intent-to-treat analysis), which is why the psycho-educational part of BMI should not be limited to alcohol. BMI in the emergency care setting should be viewed as central intervention and, therefore, be theoretically and conceptually sound and manualised. In the perception of the youths, BMI and continuing counselling need to be noticeably intertwined, finding which was found in previous studies regarding the implementation of mental health services in standard care hospital settings and can theoretically be based on attachment theory [39].

Particularly, the continuing counselling intervention must allow for the diagnosis of possible co-morbid mental problems, to enable a targeted referral to medical/ psychiatric treatment, if necessary. Research on the abovementioned aspects will be the task of more advanced intervention studies using control group designs as well as manualised interventions.

Yet, our current research faces several limitations. First, the BMI studied here was only semi-structured. With this uncontrolled stage-1-design at hand, we cannot demonstrate the special efficacy of the BMI in contrast to other impacting influences (low internal validity). It remains unclear, if the BMI initiated change motivation or had the effect of motivational enhancement. The efficacy of the subsequent youth-specific counselling services was not examined.

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## Competing Interests

The authors declare that they have no competing interests.

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