Journal of Adolescent Health xxx (2016) 1–9

ELSEVIER

JOURNAL OF ADOLESCENT HEALTH

www.jahonline.org

Original article

Developmental Hazards Among Young Alcohol Intoxicated Patients

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Article history: Received October 1, 2015; Accepted March 10, 2016
Keywords: Adolescents; Acute alcohol intoxication; Developmental hazards; CTC; CTQ; KiGGS

A B S T R A C T

Purpose: The rising numbers of alcohol intoxicated adolescents (AIA) treated in emergency care units in several European countries have drawn attention to this target group for prevention. To our knowledge, this is the first study to assess a broad array of developmental hazards and their stability in AIA and to compare their distribution with representative samples (RS).
Methods: A multisite cohort study of AIA aged 13–17 years assessed, in the hospital (t0) and 6 months later (t1), (family) violence, cannabis and alcohol use, school problems, delinquency, homelessness, depression, and suicidality, using items from representative German surveys: Children and Adolescent Health Survey (KiGGS), Childhood Trauma Questionnaire and Communities That Care Youth Survey. We calculated the differences between AIA and RS and corresponding 95% confidence intervals. For AIA respondents who completed t0 and t1 information, we calculated prevalence/persistence/incidence of developmental hazards and corresponding 95% confidence interval.
Results: A total of 342 AIA participated at t0, 228 at t1 (67%). AIA had a significantly higher burden of concomitant risks regarding physical and emotional family abuse, (sexual) victimization, cannabis use, binge drinking, school expulsion, police arrest, gang membership, and being violent. Six months after hospitalization, emotional family abuse (34.1%), cannabis use (23.5%), depression (14.8%), and being violent (13.2%) were especially prevalent.
Conclusions: Developmental hazards are up to six times more prevalent in AIA than in RS. Therefore, when assessing the risk profile of AIA, it is important to consider developmental hazards as well as detrimental alcohol use.

IMPLICATIONS AND CONTRIBUTION

Developmental hazards such as family abuse, homelessness, (sexual) victimization, drug use, school expulsion, and gang membership are up to six times more prevalent among alcohol intoxicated adolescents than in representative samples. These results suggest addressing not only detrimental alcohol use during hospitalization but also developmental hazards.

During the last decade in several European countries, the numbers of adolescents hospitalized after acute alcohol intoxication (alcohol intoxicated adolescents [AIA]) have significantly increased [1–4] and have become a major public health concern. There have been several surveys that have given us more insight into this group of adolescents. Depending on the survey, their mean age ranges from 15.0 [2] to 15.8 years [5], and there is a 5%–10% higher prevalence of boys [4,6–8]. Less than half of AIA live together with both of their parents [4,6], which is significantly less compared to minors in the general population (77%) [9]. Most intoxications occur in public spaces, frequently with the intake of hard liquors and when drinking with peers [2,4,6–8,10]. Smoking tobacco is more prevalent in AIA compared with the general population [4,6] but not the use of illicit drugs [2,4–8,10,11]. AIA appear to drink less frequently, but they intake

Conflicts of Interest: The authors declare that they have no relevant or material financial interests that relate to the research described in this article.
Registry: The study was approved by the ethics commission of the State Medical Chamber Baden-Wuerttemberg: Germany, May 22, 2012; No. F-2012-035.

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1054-139X/
http://dx.doi.org/10.1016/j.jadohealth.2016.03.022

higher quantities of alcohol on a single occasion compared to representative samples [8]. The majority does not habitually abuse alcohol [2,5,6,8,11,12].

Although the understanding of the setting and consumption patterns of AIA has increased, little is known about the types and extent of developmental hazards within this group. Studies have shown a higher prevalence of adaptive disorders, social problems, depression, and suicidal thoughts [6,12] in AIA than among adolescents without a history of alcohol-associated hospitalization. Practitioners who counseled AIA assessed that from 6.6% [10] up to one third of AIA [11] are in need of therapeutic support.

The multiple negative health consequences associated with heavy episodic drinking makes alcohol-induced hospitalization an important starting point for prevention and early intervention measures. Based on a US literature review, Sindelar et al. [13] state that one third to one half of alcohol-positive adolescents in emergency care should receive an alcohol-related intervention. In many countries during the last 15 years, brief interventions for adolescents have been implemented in emergency care situations, aiming to reduce alcohol consumption and alcohol-related harm [14–17]. However, to our knowledge, there are no brief interventions in this setting which address individual and familial risk factors and developmental hazards.

The aim of this study is to describe in greater detail developmental hazards for AIA, extending our research to the areas of family abuse and neglect, school problems, delinquency, homelessness, depression, drug use, (sexual) violence, and suicidality. Furthermore, via a longitudinal design, we wanted to assess the stability of these risks accompanying AIA. At the structural level, knowledge about the psychosocial risk profile of AIA enables the planning and implementation of prevention and early intervention programs. At the individual level, information about threats to healthy development may give practitioners a chance to provide initial support to vulnerable adolescents.

As there is extensive literature linking alcohol misuse in adolescence with various developmental hazards, we hypothesized an above average rate of, for example, family violence, sexual abuse, and physical victimization among AIA. However, knowing that severe intoxications are in part due to age-specific risk behavior, inexperience and low alcohol tolerance, and given the limited knowledge, we currently have on the developmental hazards within AIA (as a subgroup of adolescents with detrimental alcohol use), our study also had an explorative function to obtain more detailed information. As to the stability of developmental hazards after alcohol intoxication, we assume that either highly stable or newly occurring developmental hazards indicate potent and influential factors which professionals need to address.

Methods

Study design

In this article, we present the results of a German multisite cohort study conducted 2012–2014. The study was embedded in the national alcohol-specific prevention program HaLT [17], which is based on local cooperation between hospitals and prevention centers. Participants were included if they were diagnosed with acute alcohol intoxication (International Classification of Diseases, Mental and Behavioural Disorders, 10th Edition; code: F10.0) by the referring physician. Prevention specialists conducted a bedside brief intervention, based on motivational interviewing, when AIA were sober. The aim was to reduce risky drinking behavior and eventually introduce intense support for vulnerable adolescents (for additional information on the survey design, see [18] and Table 1). The questionnaire was distributed by prevention specialists and filled out by the adolescents before the routine brief intervention.

Ten prevention centers throughout Germany were responsible for the recruitment of survey participants. A sample of n = 342 AIA 13–17 years were interviewed during their hospital stay (t0) by means of a written questionnaire and, 6 months later, (t1) by telephone for the occurrence of various developmental hazards. Informed consent of both parents and adolescents, as well as contact data for the t1 telephone interview were collected by the social workers in the hospital. To analyze the stability of the individual's risks reported in the hospital, t0 and t1 data were linked by individual identification numbers. All questionnaires were pseudonymized; the corresponding forms with names and contact data for the phone interview were kept separately from the completed questionnaires. Participants were rewarded with a USB flash drive and a 10-Euro voucher.

Ethical approval

The study was approved by the ethics commission of the State Medical Chamber Baden-Wuerttemberg (Germany, May 22, 2012; No. F-2012-035).

Assessment of developmental hazards

The hospital questionnaire combined, for the most part, scales and items which had already been used in German studies on representative samples: the Childhood Trauma Questionnaire (CTQ) [19] in its German version [20,21]; The Communities That Care (CTC) Youth Survey [22] in its German adaption called SPIN [23] (Groeger-Roth, personal communication); and the German Children and Adolescent Health Survey (KiGGS [24,25]). At t0, items were used with the original wording and reference time span from the previously mentioned studies. At t1, the time span was changed to the 6 months since hospitalization (Table 2).

We assessed eight domains of developmental hazards with 2–4 items each: Physical and emotional abuse in the family (called family violence in this article) was assessed with four CTQ items: Since my childhood (t0)/In the last six months (t1)… persons of my family have hit me so hard that it has left bruises or marks/I have been punished with a belt/stick or another hard object/persons of my family have said hurtful/insulting things to me/I have thought that my parents wished I had never been born [19]. On a five-point Likert scale, the answers range from never true to very often true. We counted any answer besides never as physical or emotional family violence. Depression, delinquency, homelessness, and school absence were assessed with items of the SPIN/CTC survey, executed by the Federal Prevention Council of Lower Saxony [23]. We measured depressive symptoms with a three-item scale (answer options were: no/rather no/rather yes/yes): Sometimes I think that my life is worthless/I often think that I am a failure/In the last year (t0)/In the last six months (t1), I have felt depressed and miserable most of the time. Any subject who answered yes or rather yes was rated as depressed. Two items indicated school problems: Have you ever been expelled from school by decision of a school conference? and, Have you dropped out of school

Table 1
Comparison of AIA sample with representative samples

Survey	Target population	Aim of the survey	Methods of data collection	n	Ø-age, years	Mean difference,[a] Δ (95% CI)	Male, (%)	Mean difference,[a] Δ (95% CI)
Survey participants AIA at t0	Adolescents 12–17 years, treated in hospital after acute alcohol intoxication (ICD-10: F10.0)	Gain knowledge on the prevalence of developmental hazards and identify starting points for professional support	The survey took place within the context of the HaLT prevention program: Specialized social workers contacted adolescents and their parents in hospital, usually one day after alcohol intoxication. They used a paper questionnaire which assessed self-reported developmental hazards.	342	15.5		52	
Childhood Trauma Questionnaire (CTQ) [20][b]	Representative sample of people ≥14 years	Gain information on the prevalence of childhood trauma in the population.	After an announcement by mail, trained interviewers contacted survey participants in their homes who then filled out a paper questionnaire.	(3.289) 78[b]	15.6	−.1 (−.39 to .19)	53	−1.0 (−12.4 to 10.35)
Communities That Care Youth Survey (CTC/SPIN) [26]	Representative sample of pupils grade 6–11 in all types of schools, federal state of Lower Saxony	Gain information as a basis for community prevention planning.	Online questionnaire assessing self-reported problem behavior as well as risk and protective factors. The survey was executed in schools in Lower Saxony.	1.492	14.3	1.2 (1.01–1.39)	47	5.0 (2.46–7.54)
Children and Adolescent Health Survey (KIGGS) [24][c,d]	Representative sample of children and adolescents aged 11–17 years	Regular survey for health monitoring of the young population in Germany	Paper questionnaire assessing self-reported psychological and physical health and health-related quality of life. The survey was executed in 167 specific survey centers all over Germany.	4.747[b]	14.9	.6 (.45–.75)	51	1.0 (−.42 to 2.42)
Survey suicidality [27]	National random sample of adolescents in ninth grade	Gain information on the prevalence of risk factors and their context.	Paper questionnaire assessing self-reported “problems in youth” pupils filled out the questionnaire at school in their classroom.	44.610	15.3	.2 (.12–.28)	51	1.0 (.54–1.46)

Example of how to read the table: The mean age difference between the AIA sample and the sample of the CTQ survey is .1 years with a 95% confidence interval (CI) of −.39 to .19 years.
AIA = alcohol intoxicated adolescents.
[a] Mean difference: AIA sample minus other survey and computed confidence interval (Altman, 2011).
[b] Since the participants' mean age in the Childhood Trauma Questionnaire survey was 41.3 years, we used the unpublished data of a subsample of 78 teenagers aged 14–17 years as a reference (Schmutzer, personal communication).
[c] Calculation based on the subsample of the national Children and Adolescent Health Survey (KiGGS) aged 13–17 years.
[d] For more information on the KiGGS, see the Web site in English: www.kiggs-studie.de/english/home.html.

before finishing it? Two items assessed delinquency: Have you ever been arrested by the police? and, Have you ever been a member of a violent youth gang? The items: Has it ever happened that you had no home/steady place to sleep? and, Have you ever run away from home and not returned for the night? assessed experiences of homelessness. Yes or no were the possible answers. We used six KIGGS items to assess sexual harassment and abuse and involvement in violence (victim/perpetrator) [24]: Have you ever been sexually harassed? and, if yes, has somebody performed a sexual activity with you/in front of you, against your will? Possible answers were no/yes; by youths by adults. Involvement in violence was assessed with: Have you been a victim of physical violence? and, Have you been violent to others? Possible answers were never/once/several times. A seventh KIGGS item addressed cannabis use (never and four options for frequency). We present the results of all KIGGS items dichotomized as occurred or did not occur. Suicidality was assessed with two original items: Have you ever tried to commit suicide? and, I often think about committing suicide. Furthermore, we assessed detrimental alcohol use [25] (frequency of alcohol consumption and quantity of alcoholic drinks on a typical drinking occasion, KIGGS) and collected demographic information.

External validation

We created a developmental hazard index to define a high psychosocial burden. To validate AIA's self-reports, we requested

Table 2
Domains of developmental hazards, survey, and time span they refer to

Domains of developmental hazards	Survey	Referred time period at T0	Referred time period at T1
Family violence	CTQ	Lifetime	6 months
School problems	CTC	Lifetime	6 months
Delinquency	CTC	Lifetime	6 months
Homelessness	CTC	Current	6 months
Depression	CTC	Current/ last year	Current/ 6 months
Use of Cannabis	KiGGS	12 months	6 months
Victim of sexual violence: By adults/by adolescents	KiGGS	Lifetime	6 months
Victim of physical violence/ perpetrator of violence	KiGGS	Lifetime	6 months
Frequent suicidal thoughts	Donath	Current	6 months
Suicide attempt	Donath	Lifetime	6 months

CTC = Communities That Care Youth Survey; CTQ = Childhood Trauma Questionnaire; KiGGS = Child and Adolescent Health Survey. Donath-survey, Donath et al., 2014 [27].

the social workers to assess the extent of psychosocial burden on a five-point Likert scale ranging from well below average to strongly above average and to document the support measures that were implemented.

Reference surveys

For the analysis of t0-results (n = 342), German data from representative samples (RS) were used for reference [20,24–27] (Table 1). Since the participants' mean age in the CTQ survey was 41.3 years [20], we contacted the study team and received the unpublished data for a subsample of 78 teenagers aged 14–17 years (Schmutzer, personal communication). The KiGGS team [25] provided us with an extra analysis with only youths who had already consumed alcohol at least once (Kuntz, personal communication). With the exception of the CTC/SPIN survey, the RS did not differ significantly with regard to mean age and gender distribution (Table 1).

Statistical analysis

We tested for mean age differences between the AIA sample and RS by using the *t* test for independent samples. Similarly, we checked for differences in the distribution of males/females by chi-square test. We calculated descriptive statistics (mean, distribution) for the t0 sample and differences between the hospital sample and the reference samples. We obtained 95% confidence intervals for the differences with Newcomb's formula [28], recommended by Altman et al. [29]. For the analysis of the stability of risks reported at t0, we calculated prevalence, persistence, and the 6-month incidence of developmental hazards and the corresponding 95% confidence intervals. Affirmation of at least one item within one domain counted as a developmental hazard. We defined an accumulation of risk factors (≥2 developmental hazards) as a high psychosocial burden.

The overall frequency of missing values was low (<5% at t0 for 77.8% of the respondents and at t1 for 92.1%), even for taboo or socially sanctioned topics, for example, sexual abuse or delinquency. We treated missing values by domain. If at least one item within a domain had been answered, we treated any missing answer within this domain as a no (which may result in an underestimation of the prevalence of developmental hazards).

We checked for concurrent validity and plausibility of self-reported developmental hazards via correlations and cross tabulations based on the assessment of the social workers (extent of psychosocial burden, measures of support).

Data were analyzed using IBM SPSS statistic software version 22 (IBM Corp., Armonk, NY).

Results

Study sample

Figure 1 displays the recruitment of the survey participants. N = 496 AIA were contacted for survey participation. The sample for analysis at t0 consists of n = 342 subjects (48.1% female) who filled out the written questionnaire during hospitalization (69%).

The t0 participants living together with their biological parents are 46.5%, 44.7% with one parent (usually the mother), 3.1% in a juvenile shelter, and 3.5% in another kind of residence; 17% have an immigration background.

There was a tendency for vulnerable AIA to participate less in t1; however, dropouts did not differ significantly from the sample remaining in the analysis with regard to sex ($p = .94$), age ($p = .08$), immigration status ($p = .15$), and developmental hazards such as family violence ($p = .19$), suicidality ($p = .38$), depression ($p = .41$), experiences of homelessness ($p = .14$), delinquency ($p = .06$), sexual violence ($p = .59$), and drug use ($p = .64$). The difference between the t0 sample and the t0 and t1 sample is significant with regard to school problems ($p = .03$) and the family structure ($p = .01$): AIA who lived together with both parents participated significantly more often in t1 than AIA who lived in another type of family structure or in a juvenile shelter [30].

Plausibility of self-report

There is a high correlation between self-reported developmental hazards in AIA and (1) the extent of psychosocial burden assessed by the social workers (r = .47, $p = .00$) and (2) their initiation of intense support: Adolescents who had reported depression, family violence, suicidality, and dropping out of school received more such offers of support than youths without developmental hazards (e.g., adolescents with suicidal thoughts in 50% of the cases, without suicidal thoughts in 23.3% [$p = .03$]) (for more data see [30]).

AIA compared to representative samples

With the exception of the CTC/SPIN survey, the AIA sample compares well with the nationwide surveys we used as references (Table 1). Table 3 shows comparisons of the study sample with national RS for developmental hazards. With regard to abuse and neglect in the family, the differences between AIA and RSs are highly significant: AIA experience physical violence in the family 3–6 times more often than youths in RS. More than twice as many of AIA have been expelled from school and five times as many report police arrests and gang membership. Statistically significant differences between AIA and RS are also found for drug use, sexual victimization, and involvement in violence (victim/perpetrator). There are no significant differences with regard to depression, suicidality, and sexual violence by adults.

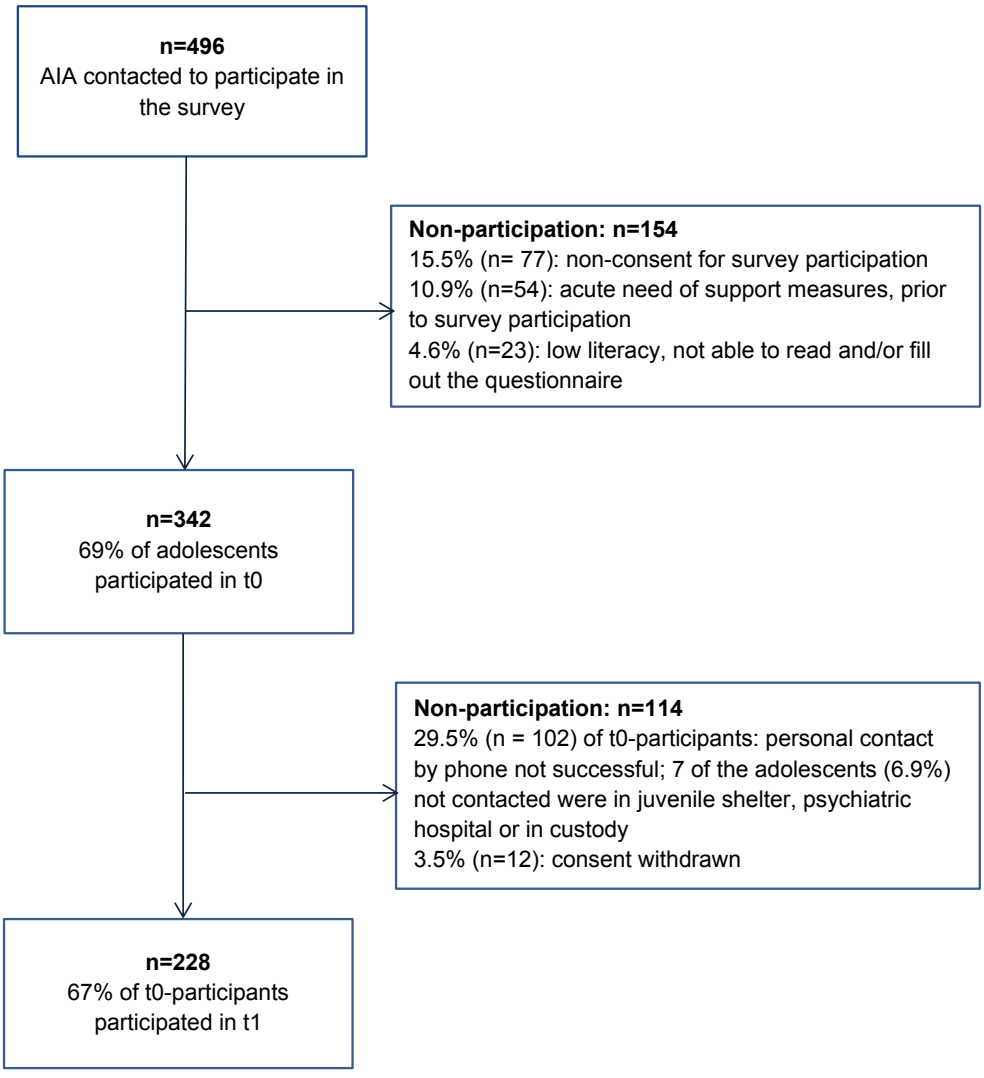

Figure 1. Study flowchart.

With regard to detrimental alcohol use, results are contradictory; 8.5% of AIA consume alcohol ≥2 times a week, which is less than in RS (12.7%). However, when drinking alcohol, AIA tend to drink significantly more often ≥5 standard drinks than youths in RS (29.2% vs. 18.9%).

Prevalence, 6-month persistence, and incidence of developmental hazards

Table 4 illustrates the prevalence of developmental hazards during hospitalization and the *current* psychosocial burden 6 months after hospitalization (n = 228). Nearly 60% of AIA reported in hospital that their parents had said hurtful/insulting things to them, at t1 this continued for more than every fourth adolescent and was a new occurrence for 7.3%. So, AIA experience more often hurtful/insulting comments by family members *in the past 6 months* than their peers in RS *during their lifetime* (Table 3). Approximately, every fourth AIA experienced depression at t0, and at t1, 15% still said they felt depressed most of the time. In the hospital interview, 5.8% (n = 13) said that they were thinking about committing suicide at that time (currently), 12.0% (n = 27) had already tried to commit suicide. At t1 3.5% (n = 8) said, that they had tried to commit suicide since the hospital stay, for five of them it was not the first suicide attempt. Three of 13 adolescents who reported suicidal thoughts in the hospital tried to commit suicide during the following 6 months (cross tabulation calculation not presented). The prevalence of sexual victimization is relatively low; however, 26 adolescents of the n = 216 AIA who answered this item had experienced sexual actions against their will. For five of them, some form of sexual violence continued in the time period after hospitalization.

Discussion

The presented study had two aims. Our first aim was to describe the developmental hazards accompanying acute alcohol intoxications for German youths in more detail than in previous studies. Second, we analyzed the stability of those hazards after

Table 3
Developmental hazards and detrimental alcohol use in AIA (t0) and representative samples (RS)

Developmental hazards[a]	AIA (n)	Yes (%)	RS (n)	Yes (%)	Difference AIA–RS (points)	95% CI	*p*
Family violence[b]							
Hit so hard that it left bruises	326	23.9	78	7.8	+16.1	(6.9–22.6)	.00
Punished with belt/stick	326	16.3	78	2.6	+13.7	(6.4–18.4)	.00
Parents wished I was never born	326	28.5	78	6.5	+22.0	(13.0–28.3)	.00
Parents said hurtful things	326	56.1	78	32.1	+24.0	(11.8–34.7)	.00
School problems							
Expelled from school	342	17.8	1.491	7.1	+10.7	(6.8–15.3)	.00
Dropped out of school	342	3.2	1.491	—	—	—	—
Delinquency			1.491				
Arrested by the police	325	16.6	1.491	3.3	+13.3	(9.5–17.8)	.00
Member of youth gang	325	11.4	1.491	2.5	+8.9	(5.7–12.9)	.00
Homelessness							
No home or place to sleep	325	5.5	1.491	—	—	—	—
Run away, not returned for the night	325	21.5	1.491	—	—	—	—
Depression[c]							
Thoughts that life is worthless	334	29.0	1.491	32.5	−3.5	(−8.7 to 2.1)	.21
Frequent thoughts of being a failure	334	21.6	1.491	20.3	+1.3	(−3.3 to 6.4)	.62
Felt depressed most of time	334	26.3	1.491	25.5	+0.8	(−4.1 to 6.3)	.76
Drug use							
Cannabis use (at least once)	325	35.4	3.737	12.3	+23.1	(18.0–28.5)	.00
Victim of sexual violence							
Sexual harassment by youths	321	5.6	4.667	2.1	+3.5	(1.4–6.6)	.01
Sexual harassment by adults	321	6.5	4.667	2.4	+4.1	(1.8–7.4)	.00
Sexual actions against will by youths[d]	39	41.0	263	14.1	+27.0	(12.2–42.9)	.00
Sexual actions against will by adults[d]	39	28.2	263	18.6	+9.6	(−3.2 to 25.7)	.20
Physical violence							
Victim of physical violence	342	24.6	6.813	4.9	+19.7	(15.4–24.5)	.00
Violent to others	342	31.3	6.813	15.6	+15.7	(10.9–20.9)	.00
Both victim and perpetrator	342	15.8	6.813	5.6	+10.2	(6.7–14.5)	.00
Suicidality							
Frequent thoughts of committing suicide	337	7.7	43.501	5.2	+2.5	(.1–5.9)	.09
Tried to commit suicide	337	11.6	43.440	9.0	+2.6	(.4–6.4)	.14
Detrimental alcohol use							
Drink alcohol ≥ two times/week	324	8,5	2.318	12.7	−4.2	(−7.1 to −.4)	.47
When drinking alcohol, drink five standard drinks or more	324	29.2	2.318	18.9	+11.0	(5.3–15.7)	.00

AIA = alcohol intoxicated adolescents; CI = confidence interval.
[a] For details of item wording and sources see text and Table 2.
[b] Internal consistency of scale to assess family violence: $\alpha = .82$; for the psychometric analysis by testing the instrument in AIA see [21].
[c] Internal consistency of depression scale: $\alpha = .80$.
[d] The results *sexual actions against will* refer to AIA who confirmed *sexual harassment* in the previous item (n = 39, 11.4% of the total sample). This is based on the procedure used in Children and Adolescent Health Survey (KiGGS).

the intoxication. In regard to concomitant risks, our study underlines previous findings on AIA showing the high rates of depression and suicidality. Our results also confirm the above average rate of AIA living in single-parent or patchwork families, which underlines the existing knowledge, that not growing up with both parents is a risk factor for detrimental alcohol consumption in adolescence.

Our study shows a higher rate of delinquent behavior in AIA. This is in good accordance with an US survey that found elevated rates for delinquency (*damaging public property, stealing,* and *shoplifting* [16]) among young alcohol-positive emergency care patients. Since our data show that cannabis use is three times higher in AIA than in RS, our results do not confirm earlier European studies that reported an average drug use in AIA. In a representative German survey, 34.8% of young adults (18–25 years) show a lifetime prevalence for all illicit drugs [31], which is still less than the 12-month prevalence in our significantly younger AIA sample.

Both emotional and physical abuse in the family in the course of a lifetime is 3–6 more prevalent among AIA than in RS. Since it is well known that there is a strong connection between experiences of childhood violence to suicidality [32] and to running away [33], we assume that AIA are an at-risk group for these developmental hazards. Depression during adulthood is frequently linked with suicide ideation or attempts. It can also be a symptom or the beginning of psychosocial problems [34]. At t1, our study shows stable rates for depressive thoughts in every 10th AIA as well as high rates of current cannabis use. In view of the fact that alcohol or drug use in adolescence increases the risk for suicidal behavior, especially in combination with further mental health problems [35], AIA who report both, drug use and depressive thoughts, are an important group to target to prevent suicide (attempts) [36], especially when they already have a history of attempted suicide.

Our study confirms previous findings that most AIA do not show habitual alcohol consumption: Less than 10% consumed alcohol ≥2/week, so for most AIA the intoxication is not part of a pattern of habitual alcohol use (alcohol consumption in a party context on weekends is very prevalent in German youths). However, when drinking alcohol, nearly every third youth drank ≥ five drinks, which is significantly more than in RS.

Even in cases without detrimental alcohol consumption (apart from the intoxication which led to the hospitalization),

Table 4
Prevalence (t0), 6-month persistence, and incidence (t1) of developmental hazards within AIA

	Valid	Prevalence			Persistence			Incidence		
	n	n	%	95% CI	n	%	95% CI	n	%	95% CI
Family violence		Lifetime			6 months			6 months		
Hit so hard that it left bruises	220	48	21.8	(16.9–27.7)	0	0.0	(.0–1.7)	4	1.8	(.7–4.6)
Punished with belt/stick	220	35	15.9	(11.7–21.3)	0	0.0	(.0–1.7)	1	0.5	(.1–2.5)
Parents wished I was never born	220	59	26.8	(21.4–33.0)	20	9.1	(6.0–13.6)	19	8.6	(5.6–13.1)
Parents said hurtful things	220	126	57.3	(50.7–63.6)	59	26.8	(21.4–33.0)	16	7.3	(4.5–11.5)
School problems		Lifetime			6 months			6 months		
Expelled from school	221	32	14.5	(10.4–19.7)	4	1.8	(.7–4.6)	4	1.8	(.7–4.6)
Dropped out of school	221	3	1.4	(.5–3.9)	0	0.0	(.0–1.7)	4	1.8	(.7–4.6)
Delinquency		Lifetime			6 months			6 months		
Arrested by the police	220	34	15.5	(11.3–20.8)	6	2.7	(1.3–5.8)	4	1.8	(.7–4.6)
Member of a youth gang	220	16	7.3	(4.5–11.5)	4	1.8	(.7–4.6)	0	0.0	(.0–1.7)
Homelessness/running away		Lifetime			6 months			6 months		
No home or place to sleep	220	11	5.0	(2.8–8.7)	1	0.5	(.1–2.5)	0	0.0	(.0–1.7)
Run away, not returned for the night	220	41	18.6	(14.0–24.3)	9	4.1	(2.2–7.6)	8	3.6	(1.9–7.0)
Depression		Actual			6 months			6 months		
Thoughts that life is worthless	223	60	26.9	(21.5–33.1)	16	7.2	(4.5–11.3)	7	3.1	(1.5–6.3)
Frequent thoughts of being a failure	223	50	22.4	(17.4–28.3)	15	6.7	(4.1–10.8)	3	1.3	(.5–3.9)
Felt depressed most of time	223	57	25.6	(20.3–31.7)	22	9.9	(6.6–14.5)	11	4.9	(2.8–8.6)
Drug use		12 months			6 months			6 months		
Cannabis use (at least once)	217	78	35.9	(29.9–42.5)	41	18.9	(14.2–24.6)	10	4.6	(2.5–8.3)
Victim of sexual violence		Lifetime			6 months			6 months		
Sexual harassment by youths	216	13	6.0	(3.6–10.0)	3	1.4	(.5–4.0)	1	0.5	(.1–2.6)
Sexual harassment by adults	216	12	5.6	(3.2–9.5)	2	0.9	(.3–3.3)	0	0.0	(.0–1.7)
Sexual actions against will—by youths[a]	26	10	38.5	(22.4–57.5)	1	3.8	(.7–18.9)	0	0.0	(.0–12.9)
Sexual actions against will—by adults[a]	26	5	19.2	(8.5–37.9)	0	0.0	(.0–12.9)	0	0.0	(.0–12.9)
Physical violence		Lifetime			6 months			6 months		
Victim of physical violence	228	52	22.8	(17.8–28.7)	10	4.4	(2.4–7.9)	5	2.2	(.9–5.0)
Violent to others	228	67	29.4	(23.9–35.6)	23	10.1	(6.8–14.7)	7	3.1	(1.5–6.2)
Both victim and perpetrator	228	34	14.9	(10.9–20.1)	9	3.9	(2.1–7.3)	10	4.4	(2.4–7.9)
Suicidality		Lifetime			6 months			6 months		
Frequent thoughts of committing suicide	225	13	5.8	(3.4–9.6)	4	1.8	(.7–4.5)	5	2.2	(1.0–5.1)
Tried to commit suicide	225	27	12.0	(8.4–16.9)	5	2.2	(1.0–5.1)	3	1.3	(.5–3.8)

AIA = alcohol intoxicated adolescents; CI = confidence interval.
[a] The results *sexual actions against will* refer to AIA who confirmed *sexual harassment* in the previous item (n = 26, 11.4% of the total sample). We hereby rely on the procedure executed in the KiGGS (item source).

there is no reason to sound the all-clear signal. AIA are significantly more often exposed to developmental hazards than adolescents in RS and often grow up in a difficult family situation, characterized by high levels of physical and emotional violence at the time of hospitalization and afterward. One possible explanation for the absence of habitual alcohol abuse, in view of multiple individual and familial burdens, is that we encounter AIA at a moment when chronical alcohol abuse has *not yet* developed. However, the low mean age and contact with professionals in the medical setting are an opportunity for early detection. Our study clearly shows a pronounced psychosocial burden for AIA and a high stability of various developmental hazards in the 6 months after hospitalization, which is a strong indication that support for these vulnerable youths is highly advisable. Customized interventions could help avoid the stabilization of detrimental influencing factors in the individual and in the family system and thus prevent harmful cascades of problems in their further development.

Limitations

There are several instances in the survey design that result in the underestimation of developmental hazards described previously. The reasons for dropping out of the study at both t0 and t1 (Figure 1) indicate that vulnerable youths were less likely to participate, that is, AIA with low literacy, those placed in residential treatment or prison and those in acute need of support during their hospitalization. Furthermore, all survey respondents participated in the HaLT program and some of them received extensive institutional support, which might have lowered the 6-month incidence/prevalence of developmental hazards. Since the effects of the HaLT prevention program were not assessed in this survey, statements on the impact of the intervention cannot be made. The answers might also have been biased by the hospital situation, where many AIA feel physically and emotionally miserable and hospitalization might have led to family conflicts. However, the concordance between self-reported developmental hazards and the social workers' assessment strengthen the credibility of the answers.

Another limitation is not having a comparison group in the study design itself, which necessitated the comparison to national data with various constraints such as different modes and settings of data collection [37] as well as mean age differences. Police arrests, gang membership, and drug use are more prevalent in older age cohorts, so the higher prevalence within AIA can partly be attributed to their higher mean age. However, with regard to violence the reference survey found no significant differences between the age cohorts 11–13 and 14–17 years [24], so our results, based on the comparison with a younger age cohort, are reliable. Our study shows that drug use in 15-year-old AIA is more prevalent than in a nationwide survey of young adults in Germany [31]. We conclude that the differences that we

have found between AIA and RS are so substantial, that age differences probably do not affect our results fundamentally.

The different reference time spans in t1 and t0 allow testing for the stability of developmental hazards among AIA; however, they make it impossible to compare the prevalence of hazards during hospitalization and 6 months later. Ideally, at t1 all items should have been tested with the reference time span of the original instrument as well but for practical reasons (conclusiveness of the instrument and time requirement) we refrained.

Strengths of the study are its longitudinal design, the satisfactory sample size given the difficult setting, and the broad array of developmental hazards that are assessed. To our knowledge, this is the first survey providing information on the stability and incidence of developmental hazards among AIA over a 6-month period which goes beyond snapshots in the hospital.

The assessment of the risk profile for AIA should not only focus on detrimental alcohol use but also cover developmental hazards on an individual and familial level and, thus, complete the well-tested instruments which identify alcohol abuse in adolescents [38,39]. An alcohol-induced hospitalization constitutes a chance for the early detection of (1) AIA who practice age-specific harmful alcohol use (given the high rates of binge drinking in our sample) and (2) vulnerable youths exposed to high psychosocial burdens. From a clinical perspective, the survey provides a useful illustration of the fact that the hospitalization of AIA tends to occur in context with other risk behaviors/exposures, and that, it may be useful to consider the wider risk profile of adolescents when targeting them for intervention. The emergency setting is one area that could be used more systematically in respect to its potential for identifying at-risk groups and offering opportunities for intervention.

Acknowledgments

The authors thank all the adolescents and parents for their participation as well as the hospital staff for their vast support. Thanks to the social workers in the HaLT-prevention-centers in Bad Homburg, Berlin, Bielefeld, Kassel, Leipzig, Lörrach, Rastatt/Baden-Baden, Schweinfurt, Wiesbaden, Worms. The authors also thank:

Mr. F. Groeger-Roth from the Federal Prevention Council of Lower Saxony (Landespräventionsrat Niedersachsen) and Prof. Dr. R. Soellner, University of Hildesheim.

The team of Dr. med. Winfried Häuser, Klinikum Saarbrücken, and Dr. Gabriele Schmutzer, University of Leipzig.

Dr. Carolin Donath, Universitätsklinikum Erlangen.

Dr. Benjamin Kuntz and Dr. Thomas Lampert from the KiGGS-team, Robert-Koch-Institut Berlin for kindly providing us with the data of their surveys.

The RiScA-Group (Risk and Protective Factors in the Context of Acute Alcohol Intoxication in Childhood and Adolescence) includes (in addition to the authors): Stefanie Bumke, Cornelius Groβ, Ludwig Kraus, Daniela Piontek, and Ulrich S. Zimmermann.

Funding Sources

The study was funded by the German Ministry of Health (grant ID: IIA5-2511DSM220).

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