Federal Institute for Risk Assessment

Event-Related Survey of High Consumers of Energy Drinks

Imprint

BfR Wissenschaft

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Publisher:
Federal Institute for Risk Assessment
Press and Public Relations
Max-Dohrn-Straße 8–10
10589 Berlin, Germany

Legally responsible for content (V.i.S.d.P): Dr. Suzan Fiack

Berlin 2014 (BfR-Wissenschaft 05/2014)
20 pages, 10 figures, 2 tables
€ 5,-

Printing: cover, contents and binding
BfR-printing house Marienfelde

ISBN 978-3-943963-21-2
ISSN 1614-3795 (Print) 1614-3841 (Online)

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1 Background

Energy drinks are very popular and are consumed mainly by teenagers and young adults. This type of beverage is currently among those with the greatest growth potential (IfD/Statista, 2010). The manufacturers advertise above all with their performance-enhancing effect in relation to special everyday situations. Due to ingredients such as caffeine and taurine, however, the consumption of energy drinks is suspected of involving health risks, above all with regard to the consumed quantity in combination with risk-increasing factors such as physical activity, fasting, lack of sleep and the simultaneous consumption of alcoholic beverages (BfR, 2008).

There has been no precise definition of energy drinks up to now. The term energy drink is used to describe beverages which, in addition to water and sugar (or sweeteners), usually contain caffeine, often in combination with substances such as taurine, glucuronolactone and vitamins (Zucconi et al, 2013). Energy drinks should not be confused with energy-providing isotonic sports drinks. According to the German fruit juice regulation, energy drinks are refreshing drinks containing caffeine. The maximum permissible quantities in ready-to-use products are 320 mg/l caffeine, 4,000 mg/l taurine, 200 mg/l inosite and 2,400 mg/l glucuronolactone. The caffeine content of the leading energy drink labels in Germany such as Red Bull or Monster Energy lies on this maximum authorized amount (32 mg/100 ml).

Data on the consumption of energy drinks on the basis of national consumption studies are only available to a limited extent. From general market studies it is known that approx. 30 % of the population aged 14 years and older consumes energy drinks at least “seldom”, (VuMA, 2009) and that approx. 1 % of the German workforce consume energy drinks at the workplace (IWD-Marktforschung, 2006). Still missing are data on high consumption and consumption in combination with the risk factors mentioned above. Therefore, consumption studies following a systematic approach are only suitable to a very limited extent to describe the consumption of energy drinks.

The goal of the study was to conduct an event-related survey of high consumers of energy drinks in order to close this data gap. In addition to this, data on risk-increasing factors were collected too.

2 Material and Methods

Within the scope of this survey, the occasions on which a high consumption of energy drinks was to be expected were observed specifically. Therefore the survey does not constitute a representative study of the German population. The following events were identified as occasions for high consumption: in and around discotheques and clubs, at music events and sports events and at LAN parties. The study should comprise about 500 persons. The inclusion criteria for the study were: (i). a consumption of more than 500 ml of energy drink and/or 60 ml of energy shot[1] within the last 24 hours, (ii). the person has his/her main place of residence in Germany and (iii). the participants are able to follow the interview in German. The survey was conducted in the form of a personal interview with the help of a questionnaire so that the consumed quantity was established retrospectively immediately after consumption. As consumption had not yet been completed in many cases, the quantity still to be consumed was established in the form of a prognosis of the quantities expected to be drunk. Total consumption was calculated from these two values.

All persons who satisfied the inclusion criteria on the basis of an advance screening questionnaire were subsequently questioned on the topics of alcohol consumption, the consumption of other beverages, fasting, physical activity, sleeping behaviour, intake of medication and drugs and sociodemography. In addition to the quantity of energy drinks consumed, the occasions and motivation for consumption were also surveyed along with questions regarding risk estimation. A focus was also on the knowledge and acceptance of the consumption recommendations and warning notices on energy drinks. The questionnaire took roughly 12 to 15 minutes to complete, of which approx. 7 to 8 minutes were required to record the quantities of energy drinks and other drinks.

The consumed quantities of energy drinks and all other beverages were estimated with the help of images of container sizes and photos of various glass sizes with details of the defined volume in millilitres (Figure 1). In addition to the container sizes, the numbers of units consumed were also recorded so that the consumed quantity could be calculated subsequently.

[1] Energy shots are offered in smaller portion units of 25-75 ml and contain the ingredients in higher concentrations.

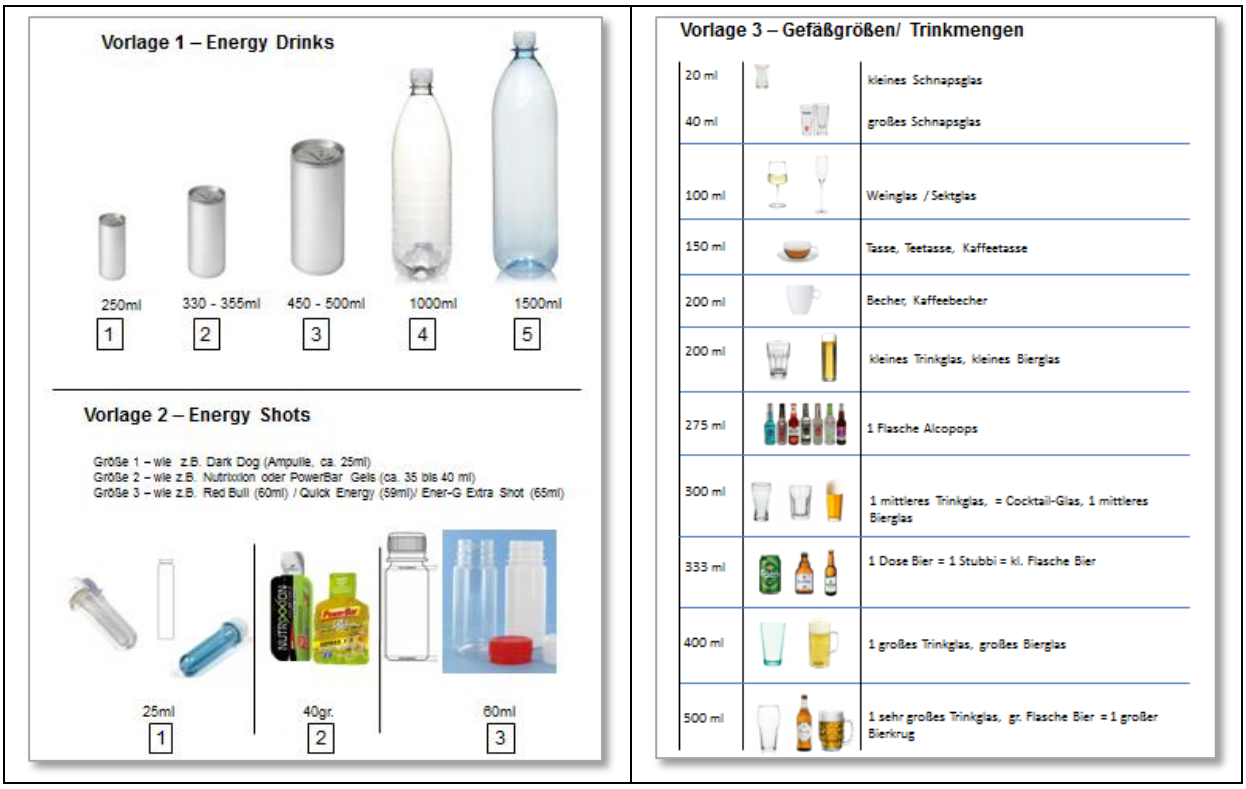

Fig. 1: Models of container and glass sizes / consumed quantities

The data were subjected to a plausibility check and only a few values claiming consumed quantities of ten litres and more, which did not seem realistic, were removed from the data set. Other extreme values remained in the data set and were not replaced by mean values or similar estimation methods.

3 Results

The following data show selected results of the survey which are restricted to the results of the collection of data on energy drinks. Data on the surveyed influencing factors are not looked at any closer here.

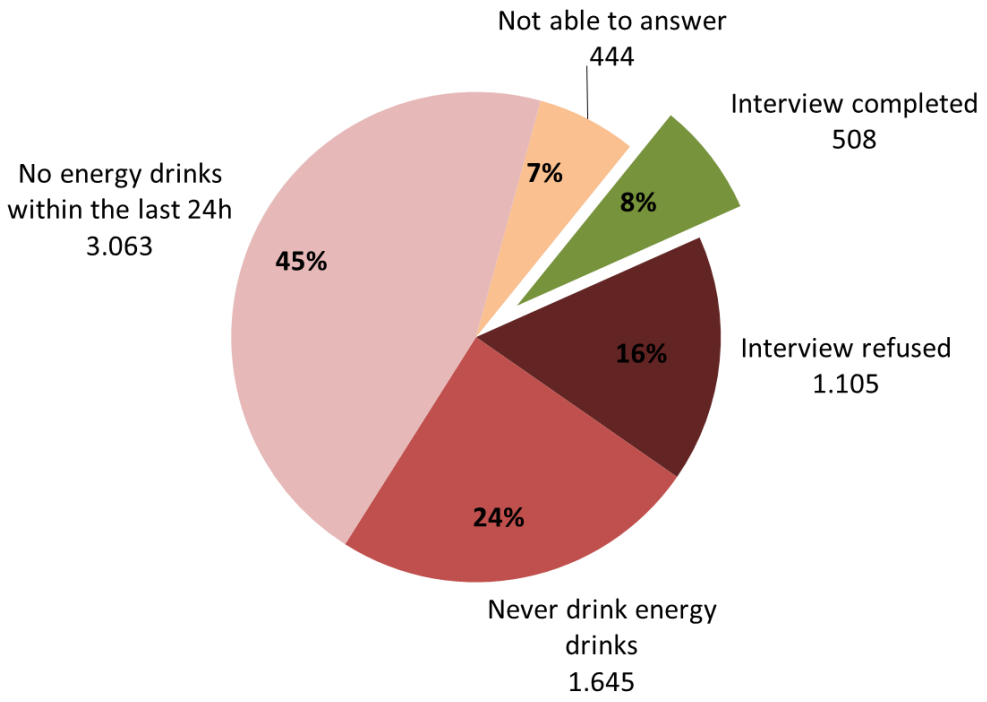

Fig. 2: Result of the total of 7,460 contact interviews

A total of 7,460 people were approached during the survey period. Slightly fewer than half (45 %) of all persons did not consumed any energy drinks in the 24 hours prior to the survey. “No consumption in the last 24 hours” also includes persons who had not consumed the defined minimum quantity, thus not matching the inclusion criteria. Almost a quarter (24 %) of all persons contacted stated that they never drink energy drinks. 16 % of those approached refused to be interviewed irrespectively of whether they would have belonged to the target groups or not. 7 % of the persons were not sufficiently capable of participating in the survey due to alcohol consumption or severe fatigue.

The complete interview was conducted with 508 persons (8 %). After checking the data, 489 interviews were still available for further evaluation. Due to absence of good reference data the data were not weighted.

In the following chapters, all of the results are shown differentiated by the various survey situations. The deliberate choice of the special survey locations and the starkly differingt consumption of energy drinks in these consumption situations makes an undifferentiated summary of all of the conducted interviews inadmissible. In addition, the consumption situations in the data set hardly matches up with the real situation. The number of participants in sports events, for example, is clearly over-represented in comparison with discotheque visitors. Furthermore, reference data are lacking how the individual activities are linked together. Under these circumstances, a summarising presentation would result in severe distortions. The distribution of the conducted interviews in relation to each type of event is shown in Figure 3.

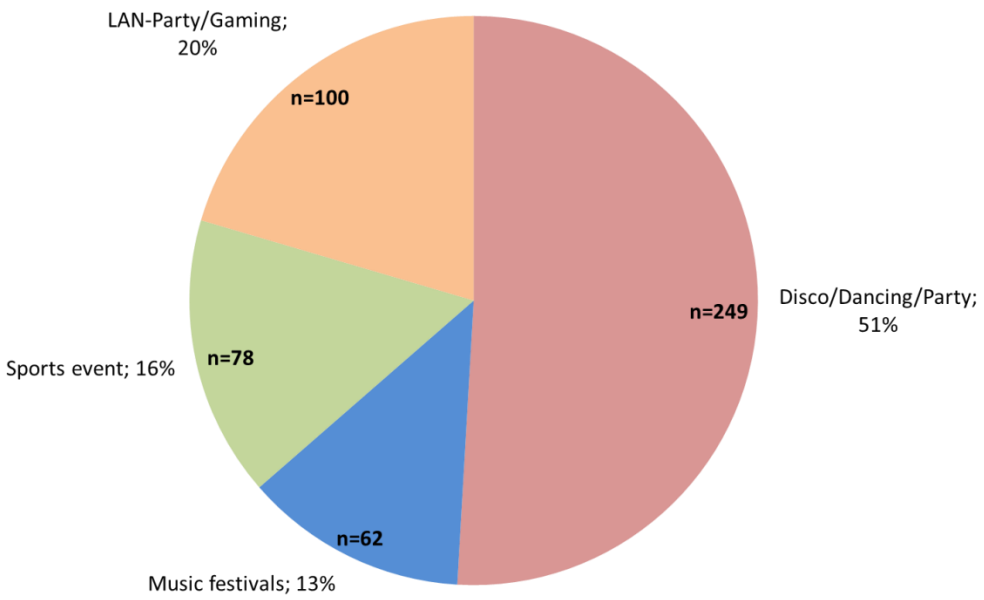

Fig. 3: Number and percentages of evaluable interviews per event type

3.1 Sociodemography

A distinct predominance of male consumers was established in the random sample realised here. On the consumption occasions disco/dancing/party and at music festivals, the ratio of men to women is approx. two thirds to one third. At LAN parties and sports events, the proportion of male consumers even rises to almost 90 % (Tab. 1).

Table 1: Gender distribution per event type

Event Type	Gender	
	Male	Female
Disco/dancing/party	68.3 %	31.7 %
Music festivals	69.4 %	30.6 %
Sports events	87.2 %	12.8 %
LAN parties/gaming	86.0 %	14.0 %

The strong prevalence of male consumers cannot be transferred to the general consumption of energy drinks as the result is strongly influenced by the choice of events. Accordingly, male participants are predominant at the selected sports events, for example.

The age distribution of the target group can also only be observed within one specific event as the target groups at the various events are different. In the disco/dancing/party sector, the average age is 21, whereas the participants in sports events are 33 years of age on average (Fig. 4).

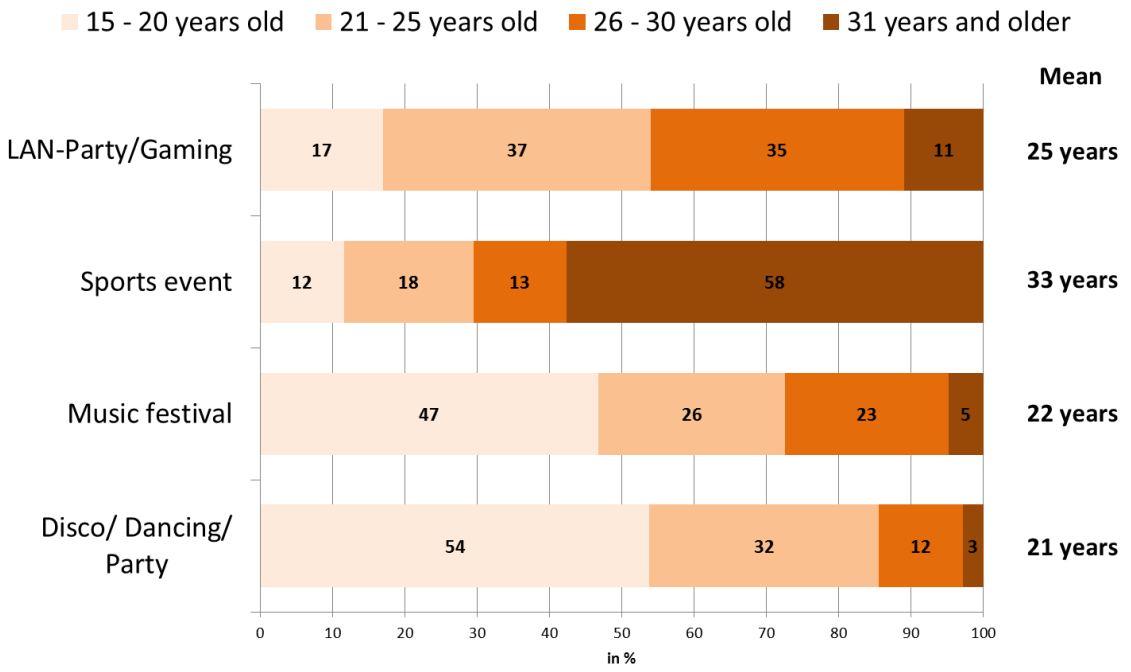

Fig. 4: Sociodemographic characteristics of high consumers: age

With regard to the achieved or targeted education level, (technical) university entrance qualification is predominant, with the exception of the LAN party area where the intermediate high school certificate predominates with 56 % (Fig. 5).

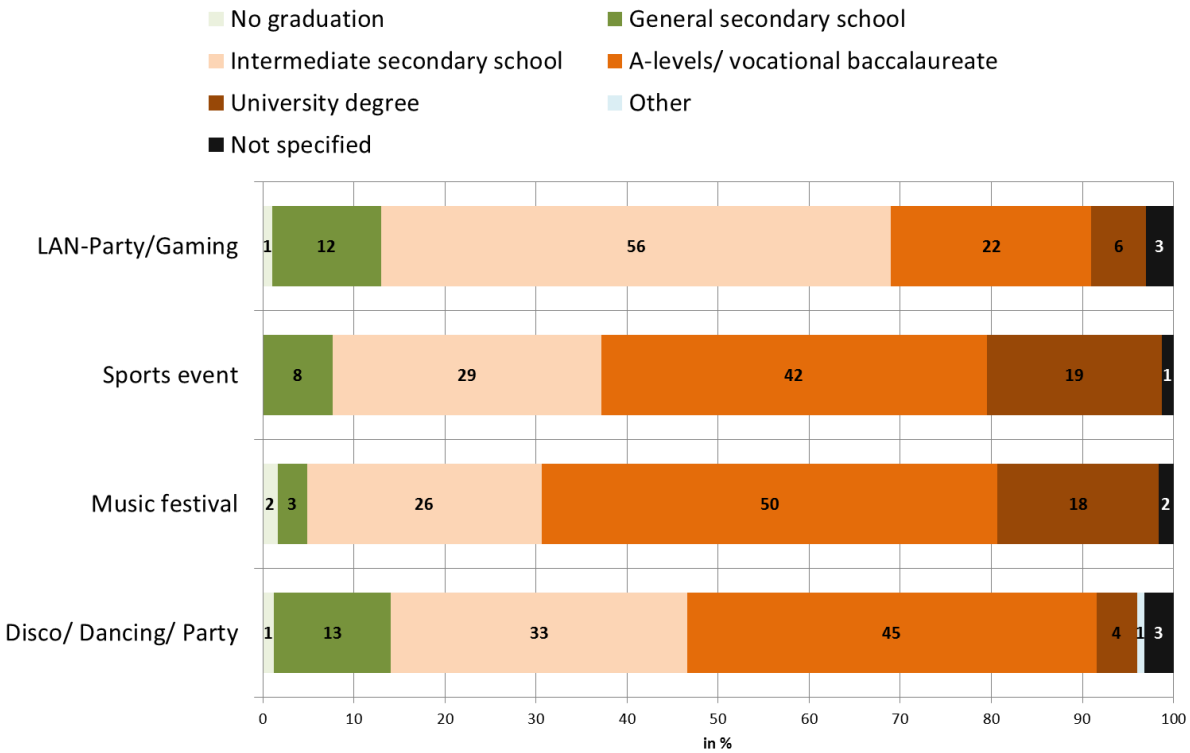

Fig. 5: Sociodemographic characteristics of high consumers: targeted/achieved education level

3.2 General consumption frequencies of energy drinks and energy shots

In addition to the quantity of energy drinks and shots consumed in the last 24 hours, general consumption and consumption frequency were also surveyed. All of the respondents stated that they also consume energy drinks and energy shots in general, with the consumption of energy drinks far outweighing the consumption of energy shots.

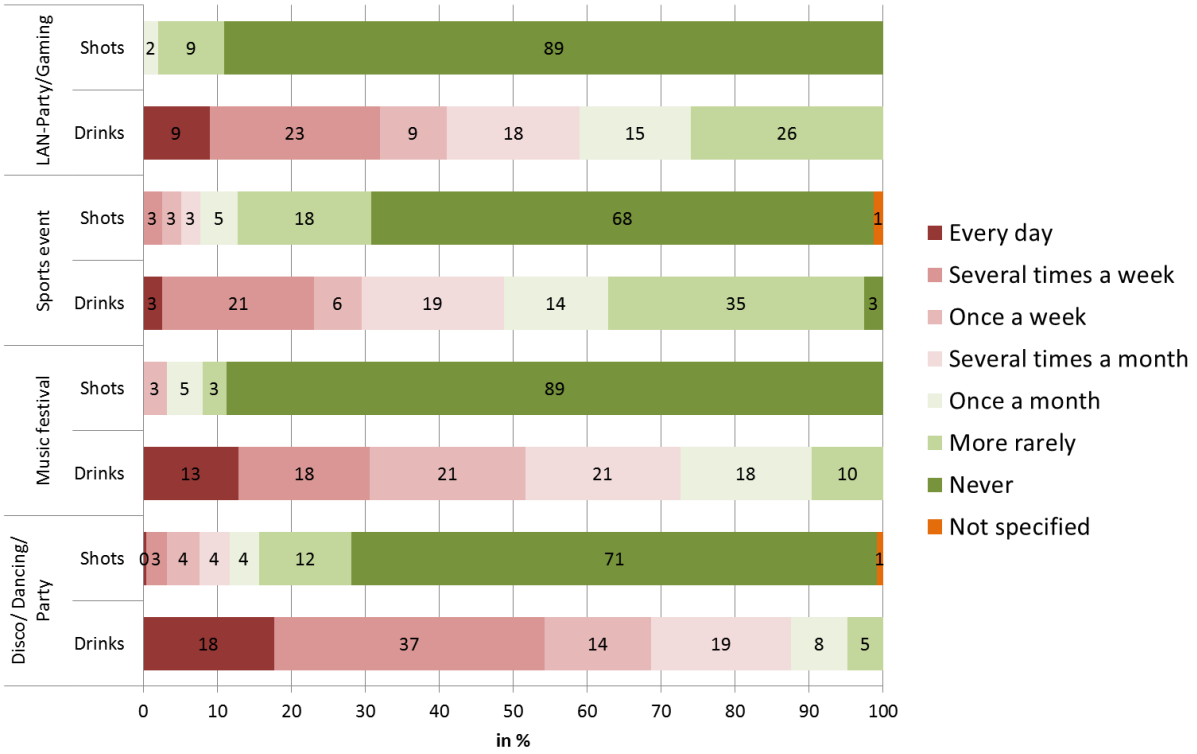

Fig. 6: General consumption frequencies of energy drinks and energy shots in comparison

In the disco/dancing/party area, almost one in five (18 %) of the respondents consumes energy drinks every day. A good third (37 %) stated that they drink energy drinks several times a week. At sports events, roughly a third of those questions stated that they consume energy drinks at least once a week (Fig. 6).

The general consumption of energy shots is not as pronounced and they are not consumed at all by the majority of the respondents. At events in the areas of sports and disco/party/dancing, around ten percent of the respondents consume energy shots at least several times per month.

3.3 Occasions to consume energy drinks

To outline the target groups, questions were also asked about the customary occasions when energy drinks are consumed. Figure 7 shows that energy drinks are mainly consumed on special occasions. All respondents stated that they consume energy drinks when or before they go out. Between 30 and 40 % of all respondents also consume energy drinks at work. Approx. 20 % of those questioned in the area of disco/dancing/party and music festivals answered that they use energy drinks when driving. The most important consumption occasions for the respondents are at sports events in connection with sport and at competitions/races. Where the other occasions are concerned, this group shows the lowest tendency to consume.

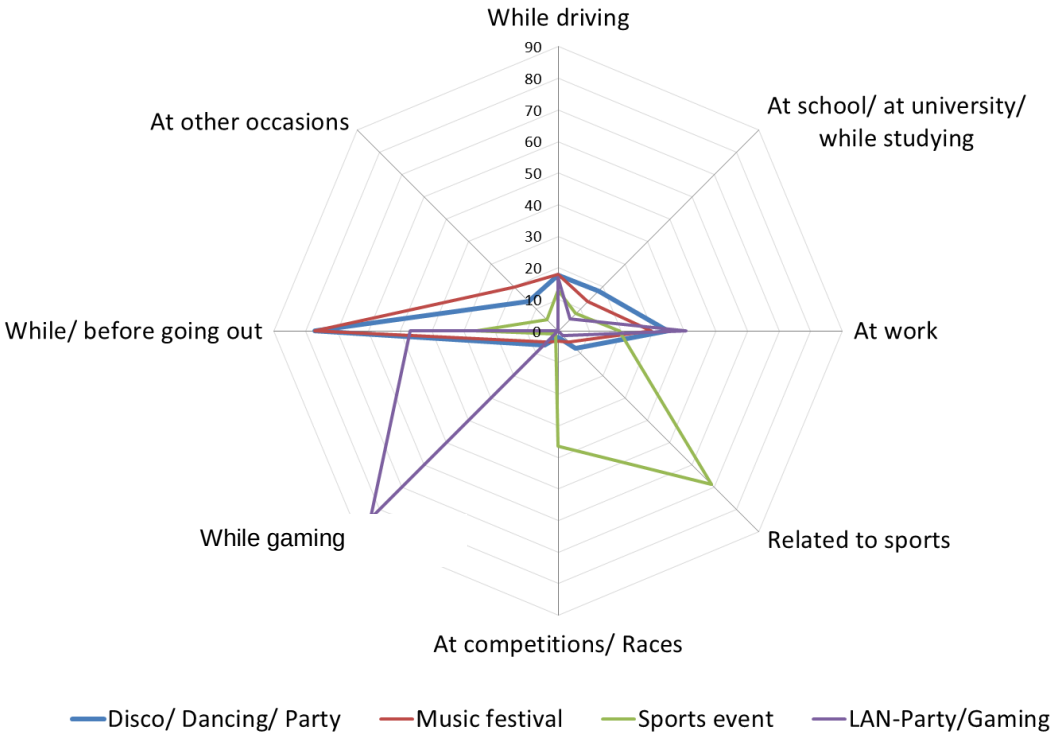

Fig. 7: General occasions to consume von energy drinks

3.4 Motivation for consuming energy drinks

The survey showed that the motivation for high consumers to consume energy drinks matches up with the advertising claims of the manufacturers. The taste and pick-me up and stay-awake effects are given as the main reasons for consumption along with the performance enhancing effects (Fig. 8). The argument of being able to stay awake for longer also plays a role among the surveyed athletes with the reason for this also being the special type of the event, such as sports events that last for several days.

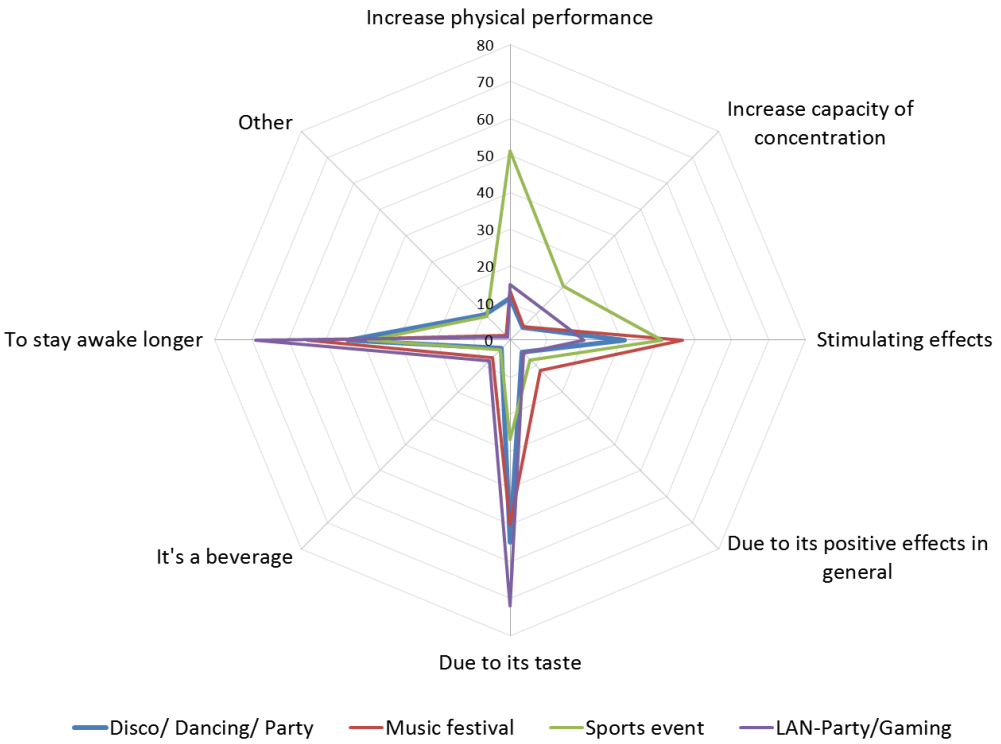

Fig. 8: Reasons for the consumption of energy drinks and energy shots

3.5 Quantities of energy drinks consumed on the day of the survey

The results regarding the consumed quantity relate here to the total quantity, i.e. the estimated quantity up to the time of the survey and the forecast quantity combined. Table 2 shows the entire consumed quantity of energy drinks and energy shots depending on the type of event and differentiates between straight energy drinks, energy drinks mixed with drinks containing alcohol and energy drinks mixed with non-alcoholic drinks. The study shows that energy drinks are not only consumed straight but are also mixed with alcoholic drinks. Approximately half of all of the respondents at music festivals and in the disco/dancing/party area had drunk at least one energy drink mixed with alcoholic drinks. Mixed consumption was of no consequence at sports events. At LAN parties, 25 % of the respondents consumed energy drinks mixed with alcoholic drinks (data not shown). Energy drinks and energy shots mixed with non-alcoholic drinks were of virtually no consequence and were hardly consumed by anyone (data not shown).

Table 2: Consumed quantity of energy drinks and energy shots in ml

		Disco/Dancing/Party	Music Festival	Sports Event	LAN Party/ Gaming	
Straight drinks, total[2]	Valid N	176	45	70	89	
	Mean value	771	680	1,076	1,545	
	Median	500	500	815	1,250	
	95th percentile	2,250	1,500	2,425	3,535	
	Maximum	4,750	1,750	3,750	6,500	
Drinks mixed with alcohol, total	Valid N	143	27	1	25	
	Mean value	1,022	890	-	2,604	
	Median	900	660	500	2,400	
	95th percentile	2,686	2,400	-	4,725	
	Maximum	4,000	2,400	-	5,000	
Straight shots, total	Valid N	9	0	11	2	
	Mean value	144	-	110	75	
	Median	100	-	80	75	
	95th percentile	-	-	300	-	
Shots mixed with alcohol, total	Valid N	1	0	0	0	
	Mean value	-	-	-	-	
	Median	250	-	-	-	
	95th percentile	-	-	-	-	
Straight and mixed drinks, total	Valid N	249	62	78	100	
	Mean value	1,133	943	996	2,042	
	Median	900	750	775	1,503	
	95th percentile	2,750	2,400	2,425	5,466	
	Maximum	8,750	4,160	3,750	6,500	

On average, straight energy drinks were consumed in quantities between approx. 680 ml (music festival) and 1,545 ml (LAN parties). Consumed quantities of 1,500 ml at music festivals to 3,535 ml at LAN parties were recorded for high consumption of straight energy drinks (P95). The consumption of energy drinks mixed with alcoholic drinks was higher on average with 890 ml at music festivals and 2,604 ml at LAN parties. Consumed quantities of 2,400 ml at music festivals and up to 4,725 ml at LAN parties were recorded for high consumption levels of energy drinks mixed with alcoholic drinks (P95).

Only at sports events and disco/dancing/parties were straight energy shots consumed to a significant degree. The mean quantity consumed here was 110 to 144 ml.

When the consumed quantities of straight energy drinks are combined with energy drinks mixed with alcoholic drinks, a consumed quantity averaging 1,133 ml of energy drink results for all persons surveyed in the disco/dancing/party area. High consumption (P 95) accounts for 2,750 ml of energy drink. Although the consumed quantities in the areas of music festivals and sports events lie slightly below these values, they are still comparable with the situations when people go out (see Tab. 1). Respondents at LAN parties reported an average of 2,042 ml of energy drinks and a high consumption (P95) of 5,466 ml.t.

Energy drinks were mixed with vodka in 75 to 85 % of all consumption situations (with the exception of sports). The second most common variant was “Jägermeister[3]”. It was not possible to ascertain the consumed alcohol quantity in the course of the interview as most people did not know the mixing ratio. After researching in discotheques and studying drinks menus, a mixing ratio of 80 % energy drink to 20 % alcoholic drink was assumed.

[2] Total, i.e. the estimated value up to the time of the survey was combined with the forecast quantity
[3] A liqueur made from herbs

3.6 Comparison of normal consumption, highest consumption and recorded consumption quantity of energy drinks

In addition to consumption on the actual day of the survey, normal consumption in comparable situations was also surveyed along with the highest total consumption of energy drinks within a 24-hour period in the past.

Figure 9 shows the stated highest quantities of energy drinks (pink, highest quantity ever consumed) and the quantities normally consumed on comparable occasions (green, quantity normally consumed) along with the quantities consumed on the day of the survey (orange, consumed quantity recorded). It can be seen that the quantities recorded on this day of the survey roughly correspond with the normal consumption on comparable occasions.

The highest quantities of energy drinks ever consumed is roughly twice as high in the areas disco/dancing/party, music festivals and sports events as the quantity recorded on the day of the survey and stands at around 2,000 ml of energy drink. In the LAN party group, the highest quantity ever consumed is on average 2,867 ml, which is roughly a third above the actually recorded average quantity of energy drinks consumed.

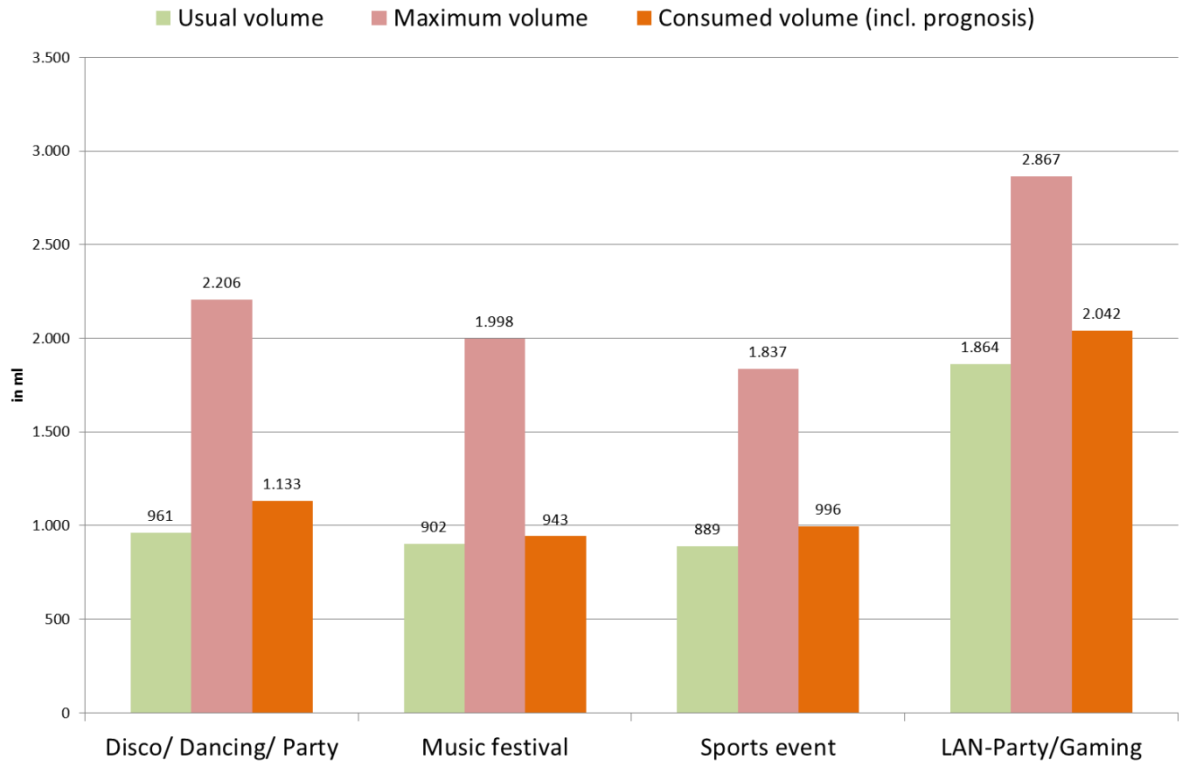

Fig. 9: Comparison of the mean values of normal quantities, highest quantities ever consumed and recorded quantities of energy drinks in ml

3.7 Problem awareness

At the end of the study, the respondents were presented with statements on how to deal with energy drinks which were intended to elucidate awareness of the problem of their consumption. It can be seen from Figure 10 that the estimation of the statements tends to be similar between the groups. However, an ambivalent opinion can also be noticed. On the one hand, there is agreement that energy drinks should be consumed moderately by people who are in good physical condition, but there is also a high level of acceptance of the statement that energy drinks can be consumed without hesitation. It is also clear that the consumption notes on the beverage containers can be ignored on the one hand and not complied with on the other.

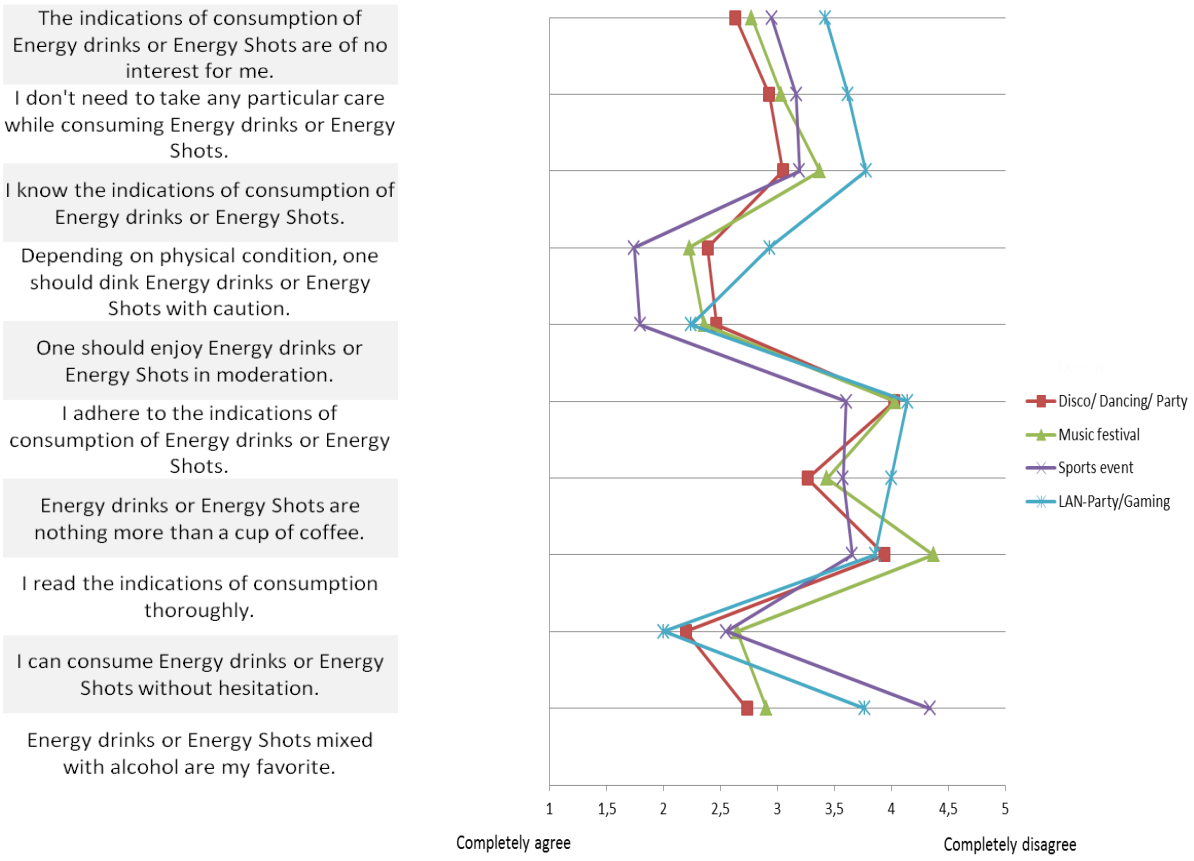

Fig. 10: Evaluation of statements on how to deal with energy drinks

4 Synopsis

Short-term high consumption of energy drinks in combination with risk-enhancing influencing factors such as physical activity, alcohol, fasting and lack of sleep, is suspected of posing a health risk, but hardly any data on the consumption of energy drinks have been available up to now, in particular data on high consumption and on consumption in connection with the above-mentioned risk factors. High consumers of energy drinks were questioned about their consumption behaviour on behalf of the BfR. High consumers were identified as being persons who had consumed more than 500 ml of energy drinks or 60 ml of energy shots within the last 24 hours. The questionnaire-supported interviews which lasted for approx. 15 minutes were conducted at the point of consumption, i.e. in clubs and at music festivals, LAN parties and sports events. The total quantity of energy drinks surveyed is made up of the quantity recorded up to the time of the interview as well as the forecast quantity, as some of the interviews were conducted during the event.

After making 7,460 contacts, a response rate of 489 interviews (approx. 8 %) was acchieved. for evaluation after data cleansing. Energy drinks are often consumed as mixed drinks together with alcoholic drinks with an assumed mixing ratio of 80 % energy drink to 20 % alcoholic beverage.

When the consumed quantities of straight energy drinks and energy drinks mixed with alcoholic beverages are combined, an average of 1,133 ml of energy drink results per person questioned in the disco/dancing/party area. High consumption (P 95) lay at 2,750 ml of energy drink. The quantities consumed at music festivals and sports events lie slightly below these values but are similar to the situations encountered when people go out. When the respondents at LAN parties are observed, an average consumed quantity of 2,042 ml of energy drink and a high consumption (P 95) of 5,466 ml were recorded.

In all areas examined, the recorded consumption quantities reflect the normal consumption quantities on comparable occasions. Energy drinks are consumed regularly, several times a week according to between 25 and 55 % of all respondents, depending on the type of event. The reasons for consumption are given as the ability to stay awake longer, the taste and the enhancement of sporting performance.

Energy drinks are consumed in larger quantities and more frequently on certain occasions than has been assumed up to now. The latest data on the consumption behaviour of high consumers provide important additional information for the risk assessment of energy drinks.

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