DIFFERENTIAL EFFECTIVENESS
OF A BRIEF MOTIVATIONAL INTERVENTION
FOR CHILDREN AND ADOLESCENTS
FOLLOWING ACUTE ALCOHOL INTOXICATION
IN THE EMERGENCY DEPARTMENT

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einer motivierenden Kurzintervention
für Kinder und Jugendliche
nach akuter Alkoholintoxikation
im Notfallsetting
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ABSTRACT

Background. Brief interventions (BI) in the emergency department (ED) provide an opportunity to motivate children and adolescents with risky alcohol use to reduce consumption. However, evidence of effectiveness of this approach is inconclusive. Against the theoretical background of motivational interviewing and the dual process framework of adolescent risk behaviour, this cumulative dissertation examined effectiveness and differential effectiveness of a brief motivational intervention (BMI) delivered in the presumed teachable moment potentially associated with medical treatment as a result of an acute alcohol intoxication (AAI).

Method. The methodological, conceptual, and empirical background for investigation of this research question were elaborated in a study protocol for a randomized controlled trial (RCT) testing the effectiveness of this approach, a systematic review on effectiveness of alcohol BIs for adolescent ED patients and an intervention manual for the delivery of a BMI for children and adolescents following an AAI. Characteristics of the target population with regard to habitual drinking and associated psychosocial problems were investigated using latent class analysis. Effectiveness of the BMI was tested in a RCT against treatment as usual (TAU), which comprised an information leaflet on alcohol-associated risks. Patient variables, counsellor variables and intervention content were examined as potential moderators of intervention effectiveness.

Results. N = 316 ED patients aged 12 to 17 years participated in the RCT. Latent class analysis of habitual drinking identified 5 distinct classes with 61.2% habitually consuming at low-risk. At-risk and high-risk drinking classes showed heterogeneous patterns of habitual drinking with high-risk drinking being most strongly associated with psychosocial problems. Mixed-effects analysis of covariance of data from the RCT revealed that participants who received the BMI did not reduce alcohol consumption and alcohol-related problems statistically significantly stronger than participants who received TAU. Among the potential moderators analysed, multiple regression analyses revealed that perceived counsellors' positive affirmation was associated with greater readiness to change alcohol use after the BMI as was younger age of study participants and finishing the BMI with a goal setting agreement.

Conclusion. Superiority of the BMI over TAU in reducing alcohol consumption and related problems in adolescent AAI patients was not found in this study. However, analysis of habitual drinking and moderator analyses hold implications for further developments of the BMI in order to potentially enhance effectiveness of support for this target population.
**ZUSAMMENFASSUNG**


**Schlussfolgerung.** Eine Überlegenheit der motivierenden Kurzintervention gegenüber der Standardbehandlung in Bezug auf eine Reduktion des Alkoholkonsums und alkoholbezogener Probleme wurde in dieser Studie nicht gefunden. Die Analyse der habituellen Trinkmuster und die Moderatorenanalyse liefern jedoch Ansatzpunkte für eine Weiterentwicklung der Intervention, um eine mögliche Verbesserung der Wirksamkeit eines Beratungsangebotes für diese Zielgruppe zu erreichen.
LIST OF PUBLICATIONS

The thesis is based on the following publications:

Publication I

Publication II

Publication III

Publication IV

Publication V

Publication VI
Diestelkamp, S., Wartberg, L., Arnaud, N., & Thomasius, R. (2016). Einfluss von Berater-/innen- und Interventionsvariablen auf die Veränderungsmotivation von Kindern und Jugendlichen nach einer motivierenden Kurzintervention zur Reduktion riskanten Alkoholkonsums. [Influence of counsellor- and intervention variables on motivation to change...
in children and adolescents following a brief motivational intervention to reduce risky alcohol use]. *Praxis der Kinderpsychologie und Kinderpsychiatrie*, 65, 534-549.

Full texts of the publications are included in appendix I.

*Note:* Due to copyright issues publication no III is published in a shortened version (pages 1 – 20 only) in the published version of this dissertation.
1 **Introduction**

1.1 Alcohol use in adolescence

Alcohol use is one of the three leading risk factors contributing to the global burden of disease (Lim et al., 2012). Among children and adolescents, most alcohol-related harm is caused by episodic heavy drinking ("binge drinking") (Wechsler, Kuo, Lee, & Dowdall, 2000; Reboussin, Songa, Shrestha, Lohmana, & Wolfson, 2006; Deas, Riggs, Langenbuchar, Goldman, & Brown, 2000; Müller et al., 2009). Binge drinking, i.e. consumption of 5 (4 for females) or more standard drinks on one occasion (Herring, Berridge, & Thom, 2008) in the past 30 days is reported by 39% of 15- to 16-year old European school children (Hibell et al., 2012). Whereas regular alcohol consumption among children and adolescents has been on the decline for the past 20 years (Orth & Töppich, 2015; Hibell et al., 2012), heavy episodic drinking has increased between 1995 and 2007 and remained stable on a high prevalence rate between 2007 and 2011 in many European countries (Hibell et al., 2012). This increase in heavy underage drinking is reflected by a sharp increase in numbers of children and adolescents in need of emergency medical treatment following acute alcohol intoxication (AAI) as recently observed in a number of European countries including Germany (Gesundheitsberichterstattung des Bundes, 2016), Great Britain (Healey, Rahmana, Faizal, & Kinderman, 2014), Austria (Fandler, Scheer, Rödl, & Müller, 2008), Switzerland (Caflisch & Uldry, 2013), the Netherlands (van Hoof, Van Der Lely, Pereira, & Van Dalen, 2010), Croatia (Bitunjac & Saraga, 2009), Bulgaria (Loukova, 2011) and the Slovak Republic (Kuzelova et al., 2009).

1.2 Consequences of underage drinking

Consequences of heavy underage drinking are manifold, with the acute consequences being most prevalent among children and adolescents (Fig. 1). Early onset of drinking and heavy drinking have been shown to be related to a number of risk behaviours such as drinking and driving, risky sexual behaviours, violence (as a victim or perpetrator) and behaviours resulting in serious injuries (Hingson, Heeren, & Winter, 2006; Hingson, Heeren, Zakocs, & Winter, 2002; Sindelar, Barnett, & Spirito, 2004). Somatic complications can arise from aspiration of vomit or from hypothermia caused by exposure to low temperatures after e.g. loosing consciousness (Vonghia et al., 2008). The risk of committing suicidal actions is elevated for adolescents under the influence of alcohol (Windle, 2004). Apart from these short-term effects, social problems such as conflicts with parents, peers, teachers and police are common and may have a strong negative impact on adolescents’ development and academic career (Miller, Naimi, Brewer, & Jones, 2007; Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994).
Furthermore, underage binge drinking has been shown to go along with an elevated risk for developing an alcohol dependence later in life (Viner & Taylor, 2007).

Figure 1. Alcohol consumption, effects of alcohol use and related consequences (Alcohol and Public Policy Group, 2010) (reprinted with permission)

1.3 Theoretical models of adolescent alcohol use

As opposed to problematic alcohol use in adults, with a wide variety of theoretically assumed underlying factors and developmental pathways (see West & Brown (2013) for an overview), alcohol use in adolescence is often conceptualised as “risk-taking behaviour” (Jessor & Jessor, 1977; Steinberg, 2010; Wiers, Ames, Hofmann, Krank, & Stacey, 2010; Wiers et al., 2007). This conceptualization is supported by a recent survey on drinking motives among 33,813 11- to 19 year-olds in 13 European countries, who consistently stated social and enhancement motives to be most influential on their alcohol use (Kuntsche et al., 2014). In particular, enhancement motives were most strongly related to frequency of drunkenness. Two theoretical models of alcohol use particularly useful for the prediction of heavy episodic drinking in adolescents will be outlined in the following section.

The framework for the prediction of risky behaviour in adolescents (Wiers et al., 2010) builds on psychological dual process models, which propose that behaviour is determined by controlled, reflective processes as well as by automatic, impulsive processes (Strack & Deutsch, 2004), a theoretical approach that has successfully been applied to the prediction of alcohol use and misuse in adolescents (Wiers et al., 2010; Wiers et al., 2007). Wiers et al. (2010) assume
that risky alcohol use is influenced by reflective control processes (e.g. self-control ability and motivation) and impulsive processes (e.g. automatic affective associations) (Fig. 2).

**Figure 2.** Framework for the prediction of risky behaviour in adolescents (Wiers et al., 2010; © 2010 Wiers, Ames, Hofmann, Krank and Stacey)

Additionally, Wiers and colleagues assume that a number of boundary conditions (e.g. motivational state) and characteristics of the situation influence both reflective and impulsive processes. For example, as proposed by limited resource models of cognitive capacity (Baumeister, Vohs, & Tice, 2007a; Steele & Josephs, 1990), acute alcohol use is assumed to reduce mental capacity for executing controlled cognitive processes (ego depletion) leading to an increased influence of impulsive processes (Baumeister & Vohs, 2007b, Wiers et al., 2007; Köpetz, Lejuez, Wiers, & Kruglanski, 2013). Chronic alcohol use, on the other hand, is presumed to increase the likelihood of future alcohol use, because habituation sensitizes appetitive motivation to consume and weakens controlled cognitive processes (Wiers et al., 2007).

The influence of reflective and impulsive processes on the decision to consume alcohol is also acknowledged in the motivation model of alcohol use by Cox and Klinger (2004). According to this affect regulation model, problematic drinking develops whenever drinking has a high incentive value for an individual in terms of reducing negative affect (drinking to cope) or increasing positive affect (drinking to enhance) (see also Cooper, Frone, Russell, & Mudar, 1995). A high incentive value of drinking strengthens positive affective associations with alcohol use and thereby strengthens the influence of impulsive processes. However, reflective processes such as the motivation for self-regulation mediate impulsive processes (Cox &
Klinger, 2004; Wiers et al., 2010; Baumeister & Vohs, 2007b) and are therefore often the focus of alcohol interventions such as brief motivational interventions (BMI) (Tanner-Smith & Lipsey, 2015).

1.4 Brief Motivational Alcohol Interventions

Brief interventions (BI) are commonly defined as a therapeutic or preventive intervention of short duration (Aalto et al., 2001) typically consisting of one to a maximum of four contacts (McQueen, Howe, Allan, Mains, & Hardy, 2011; Babor, 1994). Brief motivational interventions (BMI) are theoretically based on Motivational Interviewing (MI), a "client-centered, directive method for enhancing intrinsic motivation to change by exploring and resolving ambivalence" (Miller & Rollnick, 2002¹, p. 25). They aim at enhancing motivation, defined as intensity (energy) and direction (approach or avoidance) (Oettingen & Gollwitzer, 2015), as a prerequisite for behaviour change (Prochaska, DiClemente, & Norcross, 1992).

Embedded in a respectful and empathic therapeutic attitude (MI spirit), the MI counsellor applies four principles (express empathy, develop discrepancy, roll with resistance, support self-efficacy) and seven groups of methods (affirmation, reflective listening, open questions, rolling with resistance, summarising, methods for eliciting change talk, methods for eliciting confidence talk) to elicit and strengthen motivation to change (phase 1) and to strengthen commitment to change (phase 2) (Miller & Rollnick, 2002), thereby strengthening desirability (incentive value) and feasibility (expectation) of behaviour change as the two determinants of motivation (Gollwitzer, 2012; Oettingen & Gollwitzer, 2015). From the perspective of the Transtheoretical Model of Behaviour Change (TTM) (Prochaska et al., 1992), MI aims at supporting clients to move through the stages of change (precontemplation, contemplation, preparation, action, maintenance) by applying specific counseling techniques appropriate to the client’s current motivational state (Miller, 1999; Dimeff, Baer, Kivlahan, & Marlatt, 1999).

According to MI theory, exploration and resolution of ambivalence is the core mechanism through which motivation to change can be established (Miller & Rollnick, 2002; Feldstein Ewing, Apodaca, & Gaume, 2016). Ambivalence is expressed by clients' statements in favour of change (change talk) and in favour of the status quo (sustain talk). MI theory presumes a causal mediation chain with counsellors' behaviour influencing client change talk which, in turn, influences behaviour change (Moyers, Martin, Houck, Christopher, & Tonigan, 2009;

¹ A third edition was published in 2013 which includes an extensive make-over of the theoretical basis of MI. However, the 2nd edition (2002) is cited here, because the intervention tested in this dissertation was developed on the basis of the theoretical framework as put forward in the 2nd edition.
Three processes have been proposed to account for MI’s effects on client change talk and thereby on client behaviour (Arkowitz, Miller, Westra, & Rollnick, 2008; Magill et al., 2014). First, MI spirit, such as the empathic therapeutic mindset, collaborative therapeutic alliance and respect for the client’s autonomy (relational hypothesis). Second, counsellor’s MI skills, such as open questions, simple and complex reflections, refraining and shifting focus as non-confrontational styles of dealing with resistance (technical hypothesis) and third, conflict resolution processes incorporating all processes directly addressing exploration and resolution of ambivalence, such as the use of the decisional balance exercise or contrasting of a desired future with reality (conflict resolution hypothesis).

Alcohol BMIs typically include elements like assessment, feedback, reflection on positive and negative consequences of alcohol use, imagining a future with changed and unchanged drinking behaviour, goal setting, change plan, and providing self-help materials (Spirito et al., 2004; Dimeff et al., 1999; Gaume, McCambridge, Bertholet, & Daeppen, 2014a). They typically reflect the two phases of MI (Miller & Rollnick, 2002)², starting off with eliciting and strengthening motivation to change and finishing with addressing the translation of motivation into behaviour, i.e. self-regulation (Oettingen & Gollwitzer, 2015). Self-regulation is primarily addressed by the BMI elements “goal setting” and “change plan”, which includes identification of potential barriers for goal attainment and development of strategies to achieve goals (Köpetz, 2013).

BMIs can be delivered in a variety of settings ranging from general practitioners (GP) practices to community health centres, pharmacies or in-patient primary health care services (Kaner et al., 2007; Dhital, Norman, Whittlesea, & McCambridge, 2013). At-risk alcohol consuming children and adolescents are difficult to be identified and reached, since this target group does not regularly attend GPs or other community services (World Health Organization, 2015). However, the emergency department (ED) has been identified as one of the very few settings in which heavy drinking children and adolescents can successfully be identified and reached (Healey et al., 2014). In addition to being a setting granting access to adolescents irrespective of sociodemographic and -economic background, treatment in an ED is often presumed to be associated with a greater likelihood for subsequent health behaviour change, because it is assumed to provide a so called "teachable moment" (Lawson & Flocke, 2009).

² Miller & Rollnick (2013) replaced the 2-phases model (eliciting motivation and strengthening commitment) as proposed in Miller & Rollnick (2002) by a 4-process model (engaging, fokussing, evoking, planning), thereby refining the former phase 1 “eliciting motivation” into the 3 processes of “engaging, fokussing, evoking”.

1.5 The concept of the teachable moment

Treatments in an ED are often referred to as providing a “teachable moment”, which is conceptualized as an “event or set of circumstances which leads individuals to alter their health behavior positively” (Lawson & Flocke, 2009, p. 25) and which is presumed to be associated with an increase in responsiveness to behaviour change counselling (Boudreaux, Bock, & O’Hea, 2012; Maio et al., 2000, Lawson & Flocke, 2009; Barnett et al., 2002). Furthermore, an ED visit caused by an alcohol-related event is assumed to be associated with an even greater effectiveness of alcohol BIs, an assumption which has received empirical support (Walton et al., 2008; Longabaugh et al., 1995). According to MI theory, the salient negative consequences of alcohol use in this situation facilitate exploration of ambivalence, especially in adolescent clients who often perceive little ambivalence towards their alcohol use (Wiers et al., 2007; Feldstein Ewing et al., 2016). Consequently, the ED visit following an AAI is presumed to represent a unique opportunity to reach at-risk alcohol consuming children and adolescents in a “window of opportunity” for delivering a brief alcohol intervention (Spirito et al., 2004).

1.6 Evidence for the effectiveness of brief alcohol interventions in the emergency department

A number of systematic reviews and meta-analyses found BIs to be effective in reducing alcohol consumption in adults (European Monitoring Centre for Drugs and Drug Addiction, 2016; O’Donnell et al., 2014; Wachtel & Staniford, 2010; Vasilaki, Hosier, & Cox, 2006; Nilsen et al., 2008; Tripodi, Bender, Litschge, & Vaughn, 2010; Kaner et al., 2007; McQueen et al., 2011; Burke, Arkowitz, & Menchola, 2003). A Cochrane review of 22 randomized controlled trials investigating effectiveness of BIs in general practice included more than 7500 adult participants and found significant reductions in alcohol use at 1 year and longer follow-ups in the intervention groups (Kaner et al., 2007). McQueen and colleagues (2011) prepared a systematic review on effectiveness of BIs delivered to heavy alcohol users in general hospital wards. They included 14 randomized controlled studies with participants of 16 years of age and older. Patients who had received a BI reported reduced alcohol consumption at 6 and 9 months follow-up when compared to control groups. Most BI research addressed primary health care settings and although inconsistent evidence for BI efficacy and effectiveness exists (Emmen, Schippers, Bleijenberg, & Wollersheim, 2004; Rhodes et al., 2015), the vast majority of cumulative evidence supports efficacy and effectiveness of alcohol BIs for adult populations in primary health care (Nilsen, 2010).
The few existing studies on alcohol BI efficacy and effectiveness for children and adolescents report heterogeneous results (Foxcroft, Coombes, Wood, Allen, & Almeida Santimano, 2014; Jensen et al., 2011; Kohler, & Hofmann, 2015). Different settings (e.g. college campuses, general practices, emergency departments) and heterogeneous interventions, outcome measures and study populations make it difficult to generalize findings (Wachtel, & Staniford, 2010). Whereas BIs for heavy drinking college students have been found to be effective in reducing alcohol consumption at least in the short term (6 months follow-up) and alcohol-related problems also over longer follow-up periods (Carey, Scott-Sheldon, Carey, & DeMartini, 2007a), evidence of BIs for adolescents in clinical settings is more inconclusive (Wachtel & Staniford, 2010). Yuma-Guerrero, Velasquez, Von Sternberg, Maxson, and Garcia (2012) conducted a systematic review on trials conducted in the US which included adolescents who screened positive for at-risk drinking in the ED. Although 4 of the 7 included studies in this review found a significant intervention effect on at least one outcome related to alcohol consumption or alcohol-related consequences, authors conclude that evidence is not clearly supporting effectiveness of screening, brief intervention and referral to treatment (SBIRT) for this target population. A systematic review by Newton et al. (2013) analysed trials evaluating “targeted” BIs (n = 4) (i.e. addressing adolescents whose ED visit was preceded by alcohol use) and "universal" BIs (n = 5) (i.e. addressing adolescents identified through screening). While most study participants in both control and intervention groups across the included studies reduced alcohol use and reductions were typically greater in the intervention groups, these differences were statistically non significant in the majority of studies. Significant intervention effects were found on selected outcomes only (quantity of alcohol use (Spirito et al., 2011) or alcohol-related consequences (Walton et al., 2010) and often varied across follow-up time points. Authors conclude that neither targeted nor universal BIs yielded clear benefits with regard to a reduction of alcohol use or alcohol-related problems.

In summary, findings do not provide a clear picture of evidence for BIs targeting alcohol-involved adolescents in the ED. Authors mainly attribute this inconsistency of findings to the small number of existing randomized controlled trials (n = 4; Newton et al., 2013) as well as the methodological heterogeneity of studies, such as varying patient inclusion criteria as well as intervention contents and BI delivery modes (Forsythe & Lee, 2012; Wilson, Heather, & Kaner, 2011; Yuma-Guerrero et al., 2012; Newton et al., 2013). In addition to generating a broader evidence base through the conduction of more and methodologically more comparable studies, another way to learn more about why some studies’ findings support effectiveness of
BIs for alcohol-involved adolescents in the ED and some do not is moderator analyses (Apodaca & Longabaugh, 2009; Field, Baird, Saitz, Caetano, & Monti, 2010; Daeppen, 2008).

1.7 Moderators of brief intervention effectiveness

As outlined above, the evidence base for effectiveness of BIs targeting alcohol-involved adolescents in the ED is inconclusive and to date it is not clear why some studies’ findings support their effectiveness and some do not (Apodaca & Longabaugh, 2009; Field, Baird, Saitz, Caetano, & Monti, 2010; Daeppen, 2008). Consequently, moderator analyses are called for in order to shed light on variables influencing effectiveness (Daeppen, 2008; Kaner, 2010; Nilsen, 2010). The concept of a moderating variable has been defined as follows.

The effect of $X$ on some variable $Y$ is moderated by $M$ if its size, sign, or strength depends on or can be predicted by $M$.  

(Hayes, 2013, p. 208)

Moderator variable analysis provides answers to the question of who responds to an intervention under what circumstances (Kraemer, Kiernan, Essex, & Kupfer, 2008) (Fig. 3).

![Moderator Model](image)

Figure 3
Moderator Model (adapted from Hayes, 2013)

Empirical findings on potential moderators of alcohol BI efficacy and effectiveness in various settings and for various target populations will be outlined in the following sections.

1.7.1 Patient variables

It has been suggested, that the target population addressed by a BI is an important aspect to consider when examining BI effectiveness (Wojnar, & Jakubczyk, 2014). Gender was examined as a potential moderator of alcohol BI effectiveness for adolescents in the ED by Monti et al. (1999) and Barnett et al. (2010). In both studies, no differential effects on males and females were found. A study comparing a face-to-face BI for children and adolescents in the ED with a face-to-face BI plus a computer-delivered exercise on drinking motives showed differential gender effects with females reducing their drinking significantly more when receiving the BI
plus computer-delivered exercises (Wurdak, Wolstein, & Kuntsche, 2016). However, another analysis of two BI studies on effectiveness of a BI in the ED for adolescents following an alcohol-related event found females to respond less to the intervention (Becker et al., 2012). Another study by Saitz and colleagues (2009) found non-alcohol-dependent women to reduce their drinking more than their male counterparts following a BI. The same study also examined age as a potential moderator of BI effectiveness and found younger adults to benefit more from a BI, as they showed greater reductions of alcohol consumption than older adults. Barnett et al. (2002) examined a sample of 13 – 19 year-old alcohol-positive ED patients and found younger age to be associated with a greater likelihood of being in the action stage for cessation of immoderate drinking at 3 months after receiving a BI.

Alcohol use severity at baseline has been studied more intensively as a moderator of BI effectiveness. Barnett et al. (2010) found BIs in the ED for 18 – 24 year-old young adults to be more effective for patients who screened positive in the Alcohol Use Disorder Test (AUDIT) at baseline. This finding is supported by another BI study of 13 – 17 year-old ED patients where the BI was more effective in reducing average number of drinking days per month and frequency of high-volume drinking for adolescents who screened positive for problematic alcohol use at baseline (Spirito et al., 2004), a finding that is supported by findings in adult ED patients (Blow et al., 2009). However, it has to be noted that BIs for alcohol dependent drinkers have been found to be less effective (Saitz et al., 2009). In a college student sample heavy alcohol users were also found to reduce their alcohol use less after a BI when compared to moderate users (Carey, Henson, Carey, & Maisto, 2007b). Moderator analyses of two RCTs examining BIs for 13 – 17 year-old and 13 – 18 year-old ED patients following an alcohol-related event found frequent high-volume drinking at baseline to be associated with worse response to the intervention (Becker et al., 2012). Barnett et al. (2002) also found lower alcohol use at baseline to be associated with greater likelihood of being in the action stage of change for cessation of immoderate drinking at 3 months follow up of a BI for alcohol-positive 13 – 19 year-old ED patients. In sum, despite some conflicting evidence, a number of findings support the hypothesis that BIs work best for individuals with moderate to risky drinking as opposed to low drinking and severe or dependent drinking (Barnett et al., 2010; Spirito et al., 2004; Blow et al., 2009; Saitz et al., 2009).

Some studies investigated whether the attribution of the ED visit as being caused by alcohol use moderated intervention effectiveness. Typically, alcohol BI studies in the ED include patients with a positive result in an alcohol screening test, regardless of whether alcohol use was involved in the event which lead to hospitalisation or not. Those studies which tested
whether attribution of the ED visit as being caused by alcohol use moderated intervention effects found that those patients who perceived alcohol to have contributed to their need for hospitalisation to reduce drinking more after a BI (Walton et al., 2008; Cochran, Field, & Caetano, 2014). Contrary to this finding, Barnett et al. (2010) found patients with lower attribution of alcohol in the event leading to hospitalization to be associated with lower alcohol use at 12 month follow-up of a BI.

Mental illness was examined as a potential moderator of BI effectiveness in a sample of adult ED patients. Six months follow-up data showed no differences in BI effectiveness for mentally ill and healthy control patients (Krupski et al., 2012). Barnett et al. (2002) found higher depression in adolescent ED patients treated for alcohol to be associated with greater readiness to change drinking behaviours. Furthermore, high levels of impulsivity often associated with externalizing behavioural problems have been found to go along with worse response to BIs in college-aged students (Feldstein Ewing, LaChance, Bryan, & Hutchison, 2009; MacKillop, & Kahler, 2009).

1.7.2 Intervention variables

The content of a brief intervention is an element often neglected in BI research (O’Donnell et al., 2014). In the more than 30-year history of BI research, content has changed substantially. Furthermore, the term BI is used for a variety of short interventions ranging from 5 minute brief advice to sophisticated 60 minute motivational interventions applying a broad range of methods, techniques and tools. It is therefore essential to take into account BI content as a factor influencing effectiveness (McCambridge, 2013).

BIs following the motivational interviewing technique may integrate different interactional tools, which have been studied with regards to their impact on BI effects. The decisional balance exercise, for example, is designed to support clients’ perception of discrepancy between current behaviours and long- and mid-term goals in life, hereby eliciting and / or enhancing motivation to change harmful behaviours. According to MI theory and the conflict resolution hypothesis (Arkowitz et al., 2008; Miller & Rollnick, 2002), the central mechanism of change in MI is exploration and resolution of ambivalence. Hence, the application of MI tools such as the decisional balance exercise, which is presumed to help clients to explore benefits and costs of their current alcohol use, are assumed to facilitate raising awareness of ambivalence and thereby providing the first step on the way to resolution of ambivalence and establishment of a motivation to change. Whereas the conflict resolution hypothesis has generally received empirical support (McNally, Palfai, & Kahler, 2005), recent findings have
not supported the decisional balance exercise as an effective mechanism in BIs (Gaume et al., 2014a; Miller, & Rose, 2015).

Another MI tool is the readiness ruler, an instrument to assess readiness to change and to evoke client change talk by asking resource-oriented questions. According to the causal mediation chain of MI (Moyers et al., 2009; Magill et al., 2014) client change talk influences motivation to change. However, to the author's knowledge, no studies have investigated the effects of the use of the readiness ruler on intervention effectiveness to date.

According to MI theory (Miller & Rollnick, 2002), goal setting is an integral part of a MI intervention and is used in the second phase of MI to strengthen commitment to change. It is recommended to be applied with clients in the preparation stage of change according to the TTM (Prochaska et al., 1992; Miller, 1999) and is accompanied by the development of a change plan, an intervention component which aims at strengthening self-control ability as an important element of reflective control processes (Wiers et al., 2010). Lee et al. (2010) found alcohol BIs for hazardous drinkers in the ED to be associated with greater reductions in alcohol-related consequences when the intervention included a goal setting agreement and change plan of high quality.

1.7.3 Counsellor variables
Quality and quantity of counsellors’ MI spirit and skills such as empathy, affirmation and supporting clients’ autonomy are among the most important mechanisms of change according to MI theory (Miller & Rollnick, 2002). A recent study by Gaume et al. (2014b) found interventions by counsellors with more work experience, more favourable BMI attitudes and expectancies as well as higher MI skills to be associated with stronger reductions in alcohol use in a sample of 20 year-old male heavy drinkers. Another study conducted by the same research group (Daeppen et al., 2010) found superior counsellors’ MI skills to be positively related to patients’ utterances in favour of behaviour change (change talk) during the session, which in turn were associated with greater reductions in alcohol consumption at 12 month follow-up. Other studies also support the positive effect of counsellors’ MI skills such as empathy, supporting clients’ self-efficacy and highlighting clients’ personal responsibility for change (Carey et al., 2007b; McNally et al., 2005; Gaume, Gmel, Faouzi, & Daeppen, 2009; Gaume, Gmel, & Daeppen, 2008). Furthermore, a literature review by Apodaca and Longabaugh (2009) found counsellors’ behaviours inconsistent with MI theory to be associated with worse intervention outcomes. The impact of counsellors’ empathy and therapeutic alliance on BI efficacy for heavy drinking college students was also investigated by Feldstein and Forcehimes
(2007). In this study, no influence of these counsellor variables on BI efficacy was found. Bertholet, Palfai, Gaume, Daeppen, and Saitz (2014) analysed three RCTs and found an effect contrary to MI theory, i.e. they found greater MI spirit to be associated with more drinking.

In sum, conditions influencing effectiveness of BIs are not well understood (Apodaca & Longabaugh, 2009; Daeppen, 2008; Gaume et al., 2014a) and there is a particular need for investigation of the differential effectiveness of alcohol BIs for children and adolescents in ED (Field et al., 2010), because only a small number of studies has been conducted in this setting with this target population. Knowledge on moderators of intervention effects is essential in order to tailor interventions to patients’ needs, to develop appropriate interventions for nonresponders and to adapt interventions in order to make them more (cost-)effective (Kraemer et al., 2008).
2 RESEARCH QUESTIONS

The objective of this dissertation was to investigate the effectiveness of an alcohol BMI for children and adolescents delivered in a presumed teachable moment, i.e. following an acute alcohol intoxication and to examine conditions of effectiveness. Empirical data for answering this research question were drawn from the HaLT-Hamburg trial which will be described in the following section.

2.1 The framework research project HaLT-Hamburg

The empirical data analysed in this dissertation were collected in the research project Health network ‘alcohol abuse in adolescence’: Improved access-to-care for children and adolescents with at-risk alcohol use ("HaLT-Hamburg") which constituted a sub-project of psychenet – the Hamburg Network for Mental Health (Härter et al., 2012) funded by the German Federal Ministry of Education and Research [grant number 01KQ1002B]. The HaLT-Hamburg trial was conducted at the German Center for Addiction Research in Childhood and Adolescence (principal investigator: Rainer Thomasius; trial registration: Current Controlled Trials ISRCTN31234060).

The HaLT-Hamburg trial evaluated the effectiveness of a manualised BMI for children and adolescents following AAI in ED in reducing risky drinking (Sack, Diestelkamp, Küstner, & Thomasius, 2012). The HaLT-Hamburg BMI was based on the so called “bridging session” (Brückengespräch) of the German alcohol prevention programme HaLT-Hart am Limit (“Stop – close to the limit”) (Kuttler, 2006). This programme aims at reducing at-risk alcohol use in children and adolescents under 18 years through universal alcohol prevention activities (“HaLT – proactive”) and indicated prevention by offering children and adolescents who are treated in EDs following an AAI and their caregivers a so called “bridging session” (Brückengespräch) before they are released from hospital ("HaLT – reactive"). The programme HaLT - Hart am Limit is currently implemented at more than 150 locations across Germany (www.halt-projekt.de).

The HaLT-Hamburg trial evaluated the effectiveness of the approach of the "reactive" component (BI in the ED) of the HaLT-Hart am Limit programme. The trial was a two-arm cluster randomized controlled trial (RCT) with follow-up assessments at 3 and 6 months post intervention. Participants in the intervention group received standard medical care and a single session manualised alcohol BMI before discharge from hospital with one telephone booster session 6 weeks after the BMI. Caregivers of adolescents in the intervention group also received
a short manual-guided intervention. Participants in the control group received treatment as usual (TAU) only, which comprised standard medical care and written information on negative consequences of alcohol use in adolescence and information on a youth specific substance use counseling agency. Primary outcomes were reductions in numbers of binge drinking episodes in the past 30 days, quantity of alcohol use on a typical drinking day and alcohol-related problems in the past 3 months. Secondary outcome was further treatment seeking. Ethics approval was attained from the Chamber of Psychotherapists in Hamburg, Germany. Figure 4 displays the CONSORT flow diagram of the study design.

Figure 4. CONSORT flow diagram of the HaLT-Hamburg study design
2.2 Research questions and related hypotheses

In order to answer the overall research question on effectiveness and differential effectiveness of an alcohol BMI delivered to adolescent AAI patients in the ED, three research questions and related hypotheses were addressed in this dissertation and will be described in the following section.

2.2.1 Research question 1

As outlined in chapter 1.6 (Evidence for the effectiveness of brief alcohol interventions in the emergency department), evidence of the general approach of delivering alcohol BIs and BMIs to children and adolescents in the ED is currently scarce and existing evidence on their effectiveness is inconclusive. The HaLT-Hamburg trial was the first trial to evaluate effectiveness of this approach for adolescent AAI patients, no RCT has tested effectiveness of this approach in this specific target population before. Therefore, research question 1 reads as follows.

Research question 1: Are ED-based BMIs for children and adolescents treated for AAI more effective in reducing alcohol use and alcohol-related problems than treatment as usual?

According to the concept of the teachable moment (Lawson & Flocke, 2009) and MI theory (Miller & Rollnick, 2002), motivational interventions are presumed to be more effective when delivered under circumstances in which negative consequences of the respective behaviour are salient. These theoretical assumption is supported by empirical evidence (Barnett et al., 2002; Walton et al., 2008; Longabaugh et al., 1995). We therefore assume that, despite inconclusive evidence for the general approach of delivering alcohol BIs to adolescent ED patients, the HaLT-Hamburg BMI will be effective in reducing alcohol use and related harm, because it is delivered in the presumed teachable moment following an AAI. The related hypothesis 1 reads as follows.

Hypothesis 1. Study participants in the intervention group of the HaLT-Hamburg trial will reduce alcohol use and alcohol-related problems at 3 and 6 months follow-up statistically significant more than participants in the control group.

2.2.2 Research question 2

According to the dual process framework of risk behaviour in adolescence (Wiers et al., 2007; 2010), habitually frequent and heavy alcohol use strengthens impulsive processes involved in future alcohol through two pathways. First, habitual heavy alcohol use strengthens impulsive processes through sensitization, a process which strengthens the appraisal of alcohol as an
emotional stimulus, which in turn strengthens alcohol-associated automatic approach tendencies (Wiers, Van Woerden, Smulders, & De Jong, 2002). Second, frequent heavy alcohol use strengthens impulsive processes through the resulting accumulation of situations, in which the individual has to decide whether to engage in risky alcohol use or not while under the acute influence of alcohol (i.e. after consumption of the first glass). Acute alcohol use has been found to reduce cognitive processing capacity (ego depletion) which promotes the impact of impulsive processes on behaviour (Baumeister & Vohs, 2007b; Wiers et al., 2010). Because the MI approach primarily addresses reflective processes (i.e. motivation, self-regulation), it is assumed that habitual alcohol use moderates BMI effectiveness, a notion supported by empirical evidence (Barnett et al., 2010; Spirito et al., 2004; Blow et al., 2009; Saitz et al., 2009). As a first step preceding moderator analysis, the exploratory research question 2 will therefore examine habitual drinking patterns in the HaLT-Hamburg sample of adolescent AAI patients.

Research question 2: What kind of habitual drinking patterns can be identified in a sample of children and adolescents treated in an ED following AAI?

2.2.3 Research question 3

Research question 3 examines potential moderators of BMI effectiveness and hereby addresses client variables, counsellor variables, and intervention components.

Research question 3: Which variables moderate effectiveness of a BMI for children and adolescents treated in an ED following AAI?

Whereas MI theory emphasizes the role of counsellors' variables and intervention components as moderators of intervention effectiveness (Arkowitz et al., 2008; Miller & Rollnick, 2002), Wiers' and colleagues' framework of adolescent risk-behaviour (2010) and Cox' and Klingers motivational model of alcohol use (2004) provide the theoretical background for those hypotheses relating to patient characteristics as moderators of intervention effectiveness.

Habitual drinking patterns. As outlined above (chapter 2.2.2), habitual heavy alcohol use is assumed to strengthen the impact of impulsive processes on risky alcohol use (Wiers et al., 2007, 2010). Because BMIs primarily address reflective processes, it is assumed that a BMI for adolescents with habitual high-risk drinking is less effective than for risky drinkers. On the other hand, adolescents who habitually consume at low risk may experience little ambivalence about their drinking and, according to MI theory, may therefore be less likely to develop a motivation to change their alcohol use (Miller & Rollnick, 2002). A number of findings support the hypothesis that BMIs work best for individuals with moderate to risky drinking as opposed
to low drinking and severe or dependent drinking (Barnett et al., 2010; Spirito et al., 2004; Blow et al., 2009; Saitz et al., 2009). Consequently, hypothesis 2 of the dissertation reads as follows.

**Hypothesis 2.** Adolescents with risky habitual drinking at baseline reduce alcohol consumption more at 3 and 6 months following the *HaLT-Hamburg* BMI than adolescents with low-risk and high-risk habitual drinking.

**Psychosocial problems.** Psychosocial problems such as depression or externalizing behavioural problems may be associated with worse response to BIs in adolescents and young adults (Barnett et al., 2002; Feldstein Ewing et al., 2009; MacKillop & Kahler, 2009). According to affect regulation theories of alcohol use (Cooper et al., 1995; Cox & Klinger, 2004), a strong motive for alcohol use can be the reduction of negative affect (drinking to cope) or the increase in positive affect (drinking to enhance). Drinking to cope is presumed to be a symptom of inappropriate or missing alternative coping skills to avoid negative affect. Translated into the framework of adolescent risk-taking by Wiers et al. (2010), drinking to regulate affect would strengthen automatic affective associations with alcohol use and thereby strengthen impulsive processes involved in risky alcohol use. Additionally, according to Wiers et al. (2010), emotion and mood influence impulsive as well as reflective processes as boundary conditions. Impulse control, on the other hand, impacts reflective control processes directly. Hence, more severe psychosocial problems (e.g. depression/anxiety, self-esteem problems, anger-control problems, aggressive-dissocial behaviour) are assumed to strengthen the influence of impulsive processes and weaken the influence of reflective control processes and thereby reduce BMI effectiveness. Consequently, hypothesis 3 reads as follows.

**Hypothesis 3.** Adolescents with more severe psychosocial problems reduce alcohol consumption less at 3 and 6 months following a BMI in ED than adolescents with less severe psychosocial problems.

**MI skills.** In addition to patient variables, counsellor variables are assumed to moderate BMI effectiveness. MI skills such as counsellor’s empathy and affirmation are among the most important mechanisms of change according to MI theory and specifically the relational hypothesis of MI (Arkowitz et al., 2008; Miller & Rollnick, 2002) (see chapter 1.4). Empirical findings mainly support this hypothesis (Carey et al., 2007b; McNally et al., 2005; Gaume et al., 2008; Gaume et al., 2009; Apodaca & Longabaugh, 2009; Feldstein & Forcehimes, 2007; Bertholet et al., 2014). Consequently, hypothesis 4 reads as follows.

**Hypothesis 4.** Interventions lead by counsellors with perceived greater realization of MI skills are associated with greater reductions in alcohol consumption at 3 months following a BMI in ED.
Goal setting. According to MI theory (Miller & Rollnick, 2002), goal setting is an important element of an MI intervention and it is used to strengthen commitment to change once a motivation to change has been established. BMIs typically finish with a goal setting agreement accompanied by a change plan on how to achieve goals (Miller, 1999; Dimeff et al., 1999). Empirical support for goal setting as an active ingredient of BMIs was provided by Lee et al. (2010) (see chapter 1.4). Therefore, hypothesis 5 was formulated as follows.

Hypothesis 5. Interventions that finish with a written goal setting agreement are associated with greater reductions in alcohol consumption at 3 months following a BMI in ED.

Decisional balance. The decisional balance exercise is presumed to help clients to explore benefits and costs of their current health behaviour and to facilitate raising awareness of ambivalence as well as to resolve ambivalence (Miller & Rose, 2015). In the HaLT-Hamburg trial, use of the decisional balance exercise was optional to the counsellor. Evidence on the effects of applying the decisional balance exercise on BI effectiveness is inconclusive to date (McNally et al., 2005; Gaume et al., 2014a; Miller & Rose, 2015) (see chapter 1.4) so that the decisional balance exercise as a moderator of BI effectiveness was examined exploratory in this dissertation.

Exploratory analysis 1. Are interventions that include the use of the decisional balance exercise associated with greater reductions in alcohol consumption at 3 months following a BMI in ED?

Readiness and confidence ruler. The use of the readiness ruler as a tool to elicit and strengthen motivation to change and the confidence ruler as a tool to assess and strengthen confidence in behaviour change was also optional to the counsellors in the HaLT-Hamburg trial. Due to the lack of empirical evidence regarding the effects of the use of the readiness and confidence ruler on intervention effectiveness, this research question was examined exploratory.

Exploratory analysis 2. Are interventions that include the use of the readiness or confidence ruler associated with greater reductions in alcohol consumption at 3 months following a BMI in ED?
3 Methods

This dissertation comprised six steps with six respective publications.

3.1. Methodological background - Study protocol of the HaLT-Hamburg trial

In a first step, the study design for the randomized controlled HaLT-Hamburg trial was developed and the background, rationale, hypotheses and methodology of the trial, which provided the empirical data for this dissertation, were outlined in the study protocol. The trial was conceptualized as a two-arm cluster-randomized trial with hospital at a weekend as unit of randomization. Eligible for study participation were children and adolescents admitted for AAI (diagnosis F10.0; ICD 10; World Health Organization, 2011) and their caregivers if they fulfilled the following inclusion criteria: 1. at hospitalization they were under the age of 18 years, 2. at time of intervention delivery they had sufficiently recovered from AAI and showed sufficient mental-cognitive receptiveness, 3. they were fluent in German, 4. informed consent was given by participant and parent(s)/caregiver(s), 5. absence of severe injuries. Baseline data were collected in hospital by research assistants. Follow-up assessments were conducted via telephone 3- and 6-months after hospitalization. Primary hypothesis were defined as the expectation that study participants in the intervention group would reduce alcohol use (past 30 day binge-drinking frequency and number of standard drinks consumed on a typical drinking occasion) and alcohol-related problems at 3 and 6 month follow-up stronger than participants in the control group in a statistically significant way. Binge drinking was defined as consumption of 5 (4 for girls) or more alcoholic drinks at one occasion (Herring et al., 2008) and was assessed using a single question adapted from the Alcohol Use Disorder Identification Test Consumption subscale (AUDIT-C) (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). A standard drink was defined to include 10 g ethanol. Alcohol-related problems were assessed by a brief version of the Rutgers Alcohol Problem Index (RAPI) (Earleywine, LaBrie, & Pedersen, 2008). Participants were asked 16 questions about the frequency of experiencing different problems in the past 3 months while they were drinking alcohol or as a result of their alcohol use ("Not able to do your homework or study for a test"; “Got into fights with other people (friends, relatives, strangers)”; “Wanted to stop drinking but you couldn't”). Response options ranged from “never” to “more than 10 times”. Sample size calculation revealed a required total sample size of N = 312 for the detection of a medium effect (0.26) with 80% power, a type I error set at 5%, and an assumed intra-cluster correlation of 0.05. Statistical analyses were planned to be conducted using mixed-effects analysis of covariance (ANCOVA) models.
adjusted for baseline differences to examine differences between intervention and control group with intervention condition as fixed effect and clusters (hospital on a weekend) as random effect on an intention-to-treat (ITT) basis.

### 3.2 Conceptual background - The *HaLT-Hamburg* intervention manual

In a second step, the concept of the BMI was developed and outlined in a counselling manual. The 45-minute brief intervention is based on MI (Miller & Rollnick, 2002\(^3\)) and components reflected BMI elements as put forward by Spirito et al. (2004). Its 5 components are: 1. Introduction to the session with positive feedback on patient’s willingness to engage in the intervention, expression of interest and concern transporting a positive and empathic therapeutic mindset and explanation of the intervention’s aim and content. 2. A semi-structured interview assessing circumstances of the intoxication and alcohol-related risk behaviors. 3. Exploration phase incorporating discussion of motivation to drink, normative feedback, exploring pros and cons of current alcohol use, optional use of MI tools (i.e., importance and confidence ruler, decisional balance exercise) and establishment of future scenarios with changed and unchanged alcohol use. 4. Summary in which the counsellor structures and sums up what has been discussed, highlights personal responsibility for change and asks the patient for his/her conclusion from what has been discussed so far. 5. Closure of the session beginning with identification of drinking goals and potential barriers and development of strategies for goal attainment. The BMI session is finished with a written agreement on drinking goals, the introduction of a cooperating youth-specific counseling agency and affirmation of patient’s self-efficacy. Additionally, the manual provides detailed information on realisation of the parent intervention and telephone-booster session. The manual comprises theoretical background and practical guidance for all elements of the intervention.

### 3.3 Empirical background - Systematic Review and Evidence Synthesis

In a third step of the dissertation, the empirical background regarding effectiveness and feasibility of the approach of delivering BIs in the ED to adolescents in the presumed teachable moment following an alcohol-related event was examined by conducting a systematic literature review and grey literature search. The systematic literature review aimed at providing an overview over current findings on the effectiveness of BIs for this target group. A search for controlled trials evaluating BIs for participants aged 12–25 years treated in an ED following an

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\(^3\) Aspects of the updated theoretical MI conceptualization as put forward in the 3rd edition (Miller & Rollnick, 2013) were referred to in the final version of the manual.
alcohol-related event was conducted. Additionally, a grey literature search was conducted to support findings from the systematic review with evidence from practice projects and uncontrolled trials. Following the RE-AIM framework for programme evaluation (Glasgow, Vogt, & Boles, 1999), data on effectiveness, acceptance, implementation and reach were extracted from all relevant records.

For the systematic review, the databases Medline, EMBASE, PubMed, Science Citation Index Expanded & Social Sciences Citation Index (Web of Science), PsycInfo, Database of Abstracts of Reviews and Effects (DARE), CINAHL, Cochrane Clinical Trials & Cochrane Database of Systematic Reviews, Psynex and Current Controlled Trials were searched. Search terms for the study population were ‘adolescent*’, ‘child*’, ‘youth’ and ‘young’ each combined by the Boolean operator ‘OR’. Search terms for the intervention were ‘intervention’, ‘brief intervention’, ‘early intervention’, ‘psychotherapy, brief’ each combined by ‘OR’. The study outcomes were addressed by the search terms ‘alcohol*’, ‘substance’, ‘ethanol’, ‘binge drinking’, ‘at risk drinking’, ‘problem drinking’, ‘high-risk drinking’, ‘risky drinking’, ‘alcohol drinking’, ‘alcohol-related disorders’ and ‘alcoholic intoxication’, again combined by ‘OR’. The setting was addressed by the search terms ‘hospital*’, ‘emergency department’, ‘emergency care’, ‘emergency service’, ‘hospital’, ‘emergency medical services’, ‘emergency medicine’, ‘emergency treatment’, ‘hospital department’ and ‘emergency services, psychiatric’ combined by ‘OR’. In a final step, all search results for the searches ‘population’, ‘intervention’, ‘outcome’ and ‘setting’ were combined by ‘AND’ to retrieve the relevant list of records.

In order to collect additional evidence for effectiveness and feasibility of BIs in this context stemming from uncontrolled trials, best practice reports, government documents or press releases, web-based searches with the search engine ‘google’ were conducted using the keywords ‘alcohol’, ‘alcohol intoxication’, ‘adolescents’, ‘underAge’, ‘minor’, ‘emergency department’, ‘brief intervention’ in combination with names of European countries.

Records were included in the systematic review if (1) study participants were aged between 12-25 years and (2) were treated in an emergency care setting (inpatient or outpatient) following an alcohol-related event, (3) the intervention was brief (max. 60 mins) consisting of a maximum of 3 sessions with a minimum of one session delivered in the ED, (4) outcome measures addressed alcohol consumption, alcohol-related risk behaviours, alcohol-related negative consequences and / or seeking of further alcohol treatment or counselling, (5) control condition(s) consisted either of no treatment, standard care, an intervention other than a BI or a BI of different intensity, and (6) the study design was a controlled trial with one or more follow-
up assessments. Records were included in the analysis of the grey literature search if inclusion criteria (1) – (4) were met, respectively.

The systematic review was conducted according to the standards defined in the PRISMA statement (Moher, Liberati, Tetzlaff, & Altman, 2009). Data were extracted using a checklist that was developed on the basis of the Cochrane Effective Practice and Organisation of Care Group (EPOC) Data Collection Checklist (Cochrane Effective Practice and Organisation of Care Group, 2002) and methodological quality of the selected studies was assessed using the Cochrane Collaboration’s tool for assessing risk of bias (Higgins & Green, 2011).

3.4 Effectiveness of the HaLT-Hamburg intervention

In the fourth step of the dissertation, research question 1 was addressed by testing the effectiveness of the HaLT-Hamburg BMI in reducing binge-drinking frequency, number of alcoholic drinks on a typical drinking occasion and alcohol-related problems as assessed by the RAPI (Earleywine et al., 2008) in comparison to the control condition (TAU). Analyses were based on intent-to-treat and multiple imputation was used to account for missing follow-up outcome data and single missing values. Statistical analyses were conducted as outlined in the description of the study protocol (chapter 3.1). Analyses were performed using SPSS statistical software package (version 22) (IBM, 2012).

3.5 Latent class analysis of habitual risky drinking patterns

As a fifth step of the dissertation and as a prerequisite for moderation analyses regarding habitual drinking, a latent class analysis (McCutcheon, 1987) examined habitual risky drinking patterns in the HaLT-Hamburg sample. Research question 2 was addressed in this step of the dissertation. According to prior research (Barnett et al., 2010; Spirito et al., 2004; Becker et al., 2012; Barnett et al., 2002), severity of baseline drinking is one of the moderators of BI effectiveness for adolescents most supported by empirical evidence. However, descriptive information on alcohol use in samples of adolescent AAI patients provide little information on subgroups of risky drinkers, since they traditionally report means of one-dimensional measures for the entire sample and hereby obscure patterns of variable endorsement relevant for identifying high-risk subgroups.

Therefore, the author examined patterns of drinking defined by a combination of variables representing different aspects of risky drinking in adolescence, an approach recently used in a number of studies examining adolescent drinking (Chiauzzi, DasMahapatra, & Black, 2013; Ray, Stapleton, Turrisi, & Philion, 2012; Reboussin et al., 2006; Bohnert et al., 2014).
Latent class analysis (LCA) was used to identify subgroups of adolescents with distinct patterns of habitual risky drinking as defined by quantity of consumed alcohol on a typical drinking occasion, frequency of binge drinking and drunkenness, alcohol-related problems, prior alcohol-related hospitalizations and alcohol-related risk behaviors. Characteristics of the identified latent classes were examined with regard to sociodemographics, concurrent substance use and psychosocial problems applying analysis of variance (ANOVA) and chi-square tests using SPSS statistical software package (version 22) (IBM, 2012). Latent class analysis was performed using MPlus Version 5 (Muthén & Muthén, 2011).

3.6 Analyses of moderators of intervention effectiveness
In the last step of the dissertation, potential moderators of BI effectiveness were examined (research question 3). Sociodemographics (age, gender, school status), habitual risky drinking and psychosocial problems were tested as patient variables potentially moderating intervention effectiveness. Habitual risky drinking was operationalized as membership in one of the latent classes of habitual risky drinking identified in the LCA described in the previous paragraph (chapter 3.5). Psychosocial problems were assessed using the Screening for Mental Disorders in Adolescence (SPS-J) (Hampel & Petermann, 2005) with its subscales for internalizing (anxiety/depression, Cronbach’s $\alpha=.89$, and self-esteem, Cronbach’s $\alpha=.71$) and externalizing (aggressive-dissocial behavior, Cronbach’s $\alpha=.78$, and anger-control problems, Cronbach’s $\alpha=.75$) problems. Analyses of moderating effects of patient variables were conducted by including the respective variables as covariates in the analyses of intervention main effects applying mixed-effects analysis of covariance (ANCOVA) models in SPSS (IBM, 2012).

The influence of counsellor variables (perceived empathy, positive affirmation, competence, congruence) and components of the intervention (use of the readiness and confidence ruler, decisional balance exercise, written goal agreement) on intervention effectiveness was examined using multiple regression analysis with counsellors’ and intervention variables as predictors and alcohol consumption at 3 month follow-up as dependent variable. To examine counsellors’ MI skills, patients in the BMI group rated counsellors’ empathy, affirmation, competence, and congruency using the short version of the Index of Basic Therapeutic Skills (BIS) (Stucki, 2004) on a 4-point Likert scale (e.g., “counsellor respects me and cares for me”; 0=“totally disagree”; 3=“totally agree”, Cronbach’s $\alpha=.91$). Counsellors documented the use of the readiness and confidence ruler, the decisional balance exercise and the preparation of a written goal setting agreement on a documentation sheet using a binary yes / no answering format. Readiness to change was assessed using an algorithm (Heidenreich &
Hoyer, 2001) allowing allocation of individuals to the different stages of change as proposed by Prochaska and DiClemente (1983). Adolescents’ and counsellors’ age and gender were included as covariates in the regression analysis.
4 Overview of Publications

The dissertation comprises six publications reflecting the six steps of the dissertation as outlined in the methods section. While the background and methods applied for the six steps have been described in the previous chapters, this section focuses on providing an overview over the results of the six respective publications. Full texts of the publications are included in appendix I.

4.1 Publication I – The HaLT-Hamburg study protocol (Methodological background)

The background, rationale, hypotheses and methodology of the HaLT-Hamburg trial, which provided the empirical data analyzed in this dissertation, were outlined in a study protocol.


4.2 Publication II – The HaLT-Hamburg intervention manual (Conceptual background)

The theoretical background and practical guide for the HaLT-Hamburg BMI and parent intervention was outlined in the respective intervention manual for counsellors. The manual provides information on prevalences, consequences and motives for risky alcohol use in adolescence. Additionally, three theoretical models of adolescent alcohol use are introduced, risk and protective factors are described and criteria for detection of risky alcohol use in children and adolescents are presented. The introduction section finishes with an overview over the current state of research on effectiveness of alcohol BIs followed by a comprehensive outline of the theoretical background of MI according to Miller & Rollnick (2002; 2013) and the transtheoretical model of behaviour change (Prochaska & DiClemente, 1983; Prochaska et al., 1992). Evaluation results of the HaLT-Hamburg trial are outlined and discussed in the following chapter. The final chapter of the manual comprises a detailed description and guide to the delivery of the HaLT-Hamburg BMI for adolescent AAI patients, the parent intervention and the telephone booster.

4.3 Publication III – Systematic literature review (Empirical background)

The empirical background regarding effectiveness, feasibility and current status of implementation of the approach of delivering BIs in the ED to adolescents in the presumed teachable moment following an alcohol-related event was examined by conducting a systematic literature review supported by a grey literature search.


Results. Seven randomised controlled trials (RCT), 6 practice projects, 1 non-randomised pilot study and 1 observational study were identified. Six of the seven RCTs observed reductions of alcohol consumption following the ED visit regardless of the form of care. Two RCTs found statistically significant differences between conditions for alcohol consumption outcomes (Monti et al., 2007; Spirito et al., 2011) and two studies found such differences for subgroups based on gender (Wurdak & Wolstein, 2012) or baseline alcohol use (Spirito et al., 2004). Combined effects for the 3 alcohol consumption outcomes (drinking quantity, drinking frequency and frequency of high-volume drinking) were calculated for 4 RCTs which reported relevant data and ranged from $d = 0.19$ (Spirito et al., 2004; Spirito et al., 2011) to $d = 0.20$ (Segatto, Andreoni, de Souza, Diehl, & Pinsky, 2011) and $d = 0.25$ (Monti et al., 2007). Of the 4 RCTs that examined effects on alcohol-related problems (Spirito et al., 2004; Monti et al., 1999; Segatto et al., 2011; Monti et al., 2007), one (Monti et al., 1999) reported statistically significant stronger reductions in the BI group at 6 month follow-up compared to the standard care group. Seven of the 15 publications identified in the searches assessed whether study participants accessed alcohol treatment or counselling following the BI (Caflisch & Uldry, 2013; Monti et al., 1999; Newton et al., 2013; Monti et al., 2007; Delphi, 2010; Fenzl, Mayring, Drobesch-Binter, Moshitz, & Gschwendner, n.d.; Stolle, Sack, Broening, Baldus, & Thomasius, 2013). Referral rates in BI groups ranged from 17% (Fenzl et al., n.d.) to 88% (Caflisch & Uldry, 2013) with a mean referral rate of 35.4%. On average, 68.8% of eligible youth agreed to take part in the BI. Participation rates ranged from 21.7% (Fenzl et al., n.d.) to 97.8% (Segatto et al., 2011). Acceptance of the BI by patients and / or clinic staff was systematically asssed in 3
studies (Spirito et al., 2004; Wurdak & Wolstein, 2012; Delphi, 2010) with ratings varying between “good” and “very good”. Data on implementation were reported in 3 of the 15 publications (Wurdak & Wolstein, 2012; Spirito et al., 2011; Prognos, 2008) with ‘good’ to ‘satisfactory’ ratings of feasibility of BI delivery in the hospital setting.

In sum, findings indicate growing research efforts into this approach and the number of identified practice projects reflects a need perceived by practitioners to address this target population with appropriate support. However, evidence of effectiveness of this approach in reducing consumption and related harm remains weak. Data on acceptance, implementation and reach indicated feasibility of integrating alcohol BIs in the clinical setting, although data on these measures were infrequently collected.

4.4 Publication IV - Effectiveness of the HaLT-Hamburg intervention (Research Question 1)

This step of the dissertation tested the hypothesis that the HaLT-Hamburg BMI is more effective in reducing risky drinking than TAU by analysing 3 and 6 months follow-up data of the HaLT-Hamburg trial. Additionally, moderator analyses of patients’ sociodemographic variables (age, gender, school status), and psychosocial problems (SPS-J, Hampel & Petermann, 2005) were reported in this publication.


Results. Study participants in both the intervention and the control group reduced alcohol consumption and alcohol-related problems significantly after hospitalisation. However, the differences between groups were statistically non-significant at both follow-ups. At 3 months follow-up, the mean change in binge drinking frequency was -1.36 (95% confidence interval [CI], -1.81 to -0.91), a reduction of 62.1% in the BMI group and -1.29 (95% CI, -1.77 to -0.95), a reduction of 49.0% in the control group. The mean change of alcohol-related problems was -6.72 (95% CI, -7.68 to -5.76), a reduction of 58.3% in the control group. The difference in mean changes between groups were similar at 6 months
follow-up for all outcomes. Moderation analyses including gender, age, school status and psychosocial problems (SPS-J, Hampel & Petermann, 2005) were also non-significant.

4.5 Publication V - Habitual drinking patterns in adolescents with acute alcohol intoxication (Research question 2)

As a prerequisite for moderator analyses of habitual risky drinking, latent classes of habitual drinking were examined in the *HaLT-Hamburg* sample. Latent habitual drinking classes were compared with regard to patients' age, gender, concurrent substance use and psychosocial problems.


**Results.** Five sufficiently large classes of adolescents with meaningfully distinct habitual drinking patterns were identified. 61.2% of the sample reported low-risk habitual drinking (class 1, "low-risk") as characterized by below sample average alcohol consumption, alcohol-related problems, and alcohol-related risk behaviors. Membership in this class was associated with negative screening results for problematic use of other substances and psychosocial problems.

Class 2 “moderate risk” (5.7%) was characterized by a relatively high proportion of adolescents reporting at least one occasion of drunkenness (66.7%) and binge drinking (58.8%) in addition to the index episode accompanied by a positive CRAFFT-d screening (Tossmann, Kasten, Lang, & Strüber, 2009). While adolescents in this class exhibited risky alcohol use and experienced some alcohol-related problems, this class did not show high scores on other risk factors associated with the development of alcohol-related disorders such as other substance use or psychosocial problems. Class 3 “frequent drunk” (15.8%) was most prominently characterized by a very high prevalence of drunkenness (100% at least once in the past 30 days) and frequency of drunkenness (median of 4 occasions in the past 3 months). Similar to class 2, adolescents in this class screened positive for alcohol-related risk behaviors while not exhibiting frequent other substance use or psychosocial problems. Members of classes 2 and 3 (16.5% of the total sample) were classified as habitual risky drinkers.

Classes 4 and 5 (16.5% of the sample) were classified as high-risk drinkers. Class 4 "alcohol-related problems" (11.4%) comprised adolescents reporting severe alcohol-related problems as indicated by a mean brief RAPI-score 4 times above that of class 1 and by the highest proportion of adolescents with previous alcohol-related hospitalizations (32.5%). Membership in this class was associated with most severe psychosocial problems, in particular
with a positive screening result for aggressive-dissocial behavior and anxiety/depression. Furthermore, members of this class reported most days of nicotine use and scored high on drug-related risk behaviors. Class 5 "excessive drinking" (5.1%) was most strongly characterized by excessive drinking with a mean consumption of 18.46 standard drinks on a typical drinking occasion. This group also showed high prevalences and frequencies of binge drinking and drunkenness, screened positive for alcohol-related risk behaviors (CRAFFT-d), and exhibited a very high average brief RAPI score indicating severe alcohol-related problems. This group also screened positive for psychosocial problems, in particular aggressive-dissocial behavioral problems.

Drinking classes did not differ with regard to sociodemographic variables. Two additional classes were identified in the LCA. However, these classes were underrepresented (3.8% of the total sample; n = 6 each) and could therefore not be included in further analyses. Preliminary descriptive analyses indicated that these classes may represent further subgroups of high-risk drinking with a mean of 22.2 standard drinks consumed on a typical drinking day (SD 2.98) in class 6 and a median 3-month frequency of drunkenness of 19 occasions (IQR 13) in class 7.

In sum, findings revealed that in the HaLT-Hamburg sample of 12 to 17 year-old AAI patients, habitual drinking patterns were very heterogeneous with 61.2% reporting habitual low-risk drinking. Additionally, findings revealed a class of adolescents who are frequently drunk without experiencing major negative alcohol-related consequences and another class comprising adolescents experiencing severe alcohol-related problems while consumption is moderate. High-risk habitual drinking was associated with an elevated risk for aggressive-dissocial behavioral problems. Findings may be used for tailoring BMIs.

4.6 Publication VI - Moderators of brief intervention effectiveness (Research question 3)

In the last step of the dissertation, moderating effects of patient variables, counsellor variables and intervention components were examined. Moderating effects of patient variables, i.e. sociodemographic variables and psychosocial problems were examined and reported in publication IV (chapter 4.4). No moderating effects of the examined patient variables were found. Null findings for the moderating effect of habitual drinking operationalized as membership in the latent classes of habitual risky drinking (publication V, chapter 4.5) were not published.
Modest effects of counsellor variables and intervention components were analysed in publication VI, the results of which are described in the following section. As outlined in hypotheses 3-5 and exploratory analyses 1 and 2 (see chapter 2.2.3), examination of moderating effects was planned to be conducted with alcohol use as the dependent variable. However, multivariate correlation analysis revealed no significant associations between counsellor and intervention variables and alcohol use. Therefore, a post hoc decision was made to examine moderating effects on readiness to change alcohol use as the dependent variable. Readiness to change was deemed an appropriate dependent variable for the analyses of potential moderating effects of counsellor and intervention variables, because according to MI theory (Miller & Rollnick, 2013) and the transtheoretical model of behaviour change (Prochaska & DiClemente, 1983; Prochaska et al., 1992) readiness to change is assumed to be a necessary prerequisite for behaviour change. Additionally, readiness to change was the most proximate outcome variable available in the study, i.e. it was measured directly following the intervention as opposed to 3 months post intervention for alcohol use measures. Therefore, it was assumed that potential differential effects of counsellor’s MI skills and of the use of different intervention components were more likely to be found on readiness to change measured directly post intervention than on alcohol use measured 3 months post intervention. Empirically, the association between readiness to change and changes in alcohol use was supported (Daeppen, Berthrolet, Gmel und Gaume, 2007).


Results. Data of N = 5 counsellors (3 female, 2 male) with a mean age of 41.6 years (SD = 9.7) were examined in this study. Realisation of counsellors’ therapeutic skills was rated by adolescents as good to very good with means of 2.5 (empathy) to 2.8 (congruence and positive affirmation) on a rating scale ranging from 0 ("totally disagree") to 3 ("totally agree"). Among the available MI tools, counsellors used the importance and confidence ruler the most (in 64.5% of BMIs), followed by the formulation of a written goal agreement (58.9%) and the use of the decisional balance exercise (39.7%). Bivariate correlations revealed statistically significant positive associations between all four therapeutic skills with readiness to change. Among the MI tools, the use of the confidence ruler and the formulation of a written goal agreement were
significantly associated with readiness to change alcohol use in the bivariate analysis. Multivariate regression analysis revealed that higher scores on the therapeutic skill “positive affirmation” (Nagelkerkes $R^2 = 7.1\%; p<.01$), finishing the intervention with a written goal agreement (Nagelkerkes $R^2 = 2.9\%; p<.05$) and younger patients' age were associated with greater readiness to change (Nagelkerkes $R^2 = 10.2\%; p<.01$). In total, 20.2\% of the variance was explained by the variables included in the model (Nagelkerkes $R^2 = .202, F = 9.34, p < .001$). Adolescents’ gender and counsellors’ age and gender were not associated with readiness to change.

In sum, findings support assumptions of MI theory, because it was found that counsellor's positive affirmation most strongly predicted adolescents readiness to change alcohol use after the BMI.
5 Discussion

5.1 Summary and discussion of overall results

This dissertation provided the first in-depth analysis of effectiveness and differential effectiveness of the approach of addressing adolescents ED patients with a BMI in the presumed teachable moment following an acute alcohol intoxication.

The systematic review and European evidence synthesis conducted to establish the empirical background for the research questions addressed in this dissertation was the first review to identify European evidence for this approach and the first review to support evidence on effectiveness with data on implementation, acceptance and reach of BIs for this target population. Although a considerably higher number of RCTs than in previous reviews was included (Ahmed & Mackway-Jones, 2007; Newton et al., 2013), evidence of effectiveness of BIs for this target population remained inconclusive. Participation rates varied strongly and programme acceptance was generally rated favourable, but was rarely assessed. Few publications contained information on BI implementation. Overall, the review revealed that there were substantial activities under way in Europe to provide BIs in EDs to children and adolescents following an alcohol-related event, underlining the need perceived by practitioners to offer support to this target group.

Effectiveness of the HaLT-Hamburg BMI (research question 1) was examined in publication IV. Contrary to hypothesis 1 of this dissertation, adolescents who received the HaLT-Hamburg BMI did not reduce alcohol use and alcohol-related problems stronger than adolescents who received TAU. Both intervention and control group reduced binge drinking frequency, number of drinks consumed on a typical drinking day and alcohol-related problems statistically significant at 3 and 6 months follow-up. The finding that youth across both trial conditions reduced their alcohol use significantly is consistent with findings of previous studies with adolescent ED patients (Segatto et al., 2011; Monti et al., 1999; Bernstein et al., 2010; Spirito et al., 2004; Wurdak et al., 2016). However, the many of these studies found significant effects of the intervention in subgroups (Spirito et al., 2004; Wurdak et al., 2016) or on other outcomes such as alcohol-related problems, alcohol-related injury and drinking and driving (Monti et al., 1999) or quit attempts (Bernstein et al., 2010).

In response to the exploratory research question 2, five latent classes of distinct habitual drinking patterns were interpreted in the studied sample. The analysis revealed that habitual drinking was very heterogenous within the sample with 61.2% classified as practicing low-risk drinking, two classes representing risky drinking (“moderate-risk” (5.7%) and “frequent drunk”
(15.8%), and two classes representing high-risk drinking (“alcohol-related problems” (11.4%) and “excessive drinking” (5.1%)). Membership in the two high-risk drinking classes was associated with significantly more severe psychosocial problems, especially aggressive-dissocial behaviours. In contrast to other studies, our findings did not replicate findings on cannabis use being strongly associated with risky drinking (Reboussin et al., 2006; Wagner & Anthony, 2002). This finding is likely due to the young age of our study sample and the associated low prevalence of cannabis use. Also contrary to previous research (Grant, Stinson, & Harford, 2001), we did not find associations between drinking patterns and age or age of onset of alcohol use. The age accumulation in our sample around age 15 with relatively small variance may have resulted in the need for a larger sample size in order to detect statistically significant age differences between classes. Finally, often observed gender differences (Bouthoorn, van Hoof, & van der Lely, 2011; Chiauzzi et al., 2013) were not replicated in this study. However, our finding might be due to male and female adolescent drinking habits assimilating as recently observed in Great Britain (Healey et al., 2014). Results support prior findings (Müller et al., 2009) that a hospitalisation due to an AAI is not a sufficient indicator for habitual high-risk drinking, on the contrary, habitual drinking in this population is very heterogeneous. Findings may help counsellors to better tailor interventions to patients’ needs by using the identified classes as a form of classification system for admitted adolescents.

Examination of research question 3 revealed that, contrary to hypotheses 2 & 3 of this dissertation, no differential intervention effects of patient variables, i.e. habitual drinking patterns, sociodemographic variables or psychosocial problems were found. This finding showed that the HALT-Hamburg BMI was not effective in subgroups of the sample, as found in previous studies (Spirito et al., 2004; Wurdak et al., 2016). However, from the available data it cannot be made clear whether this finding reflects a missing moderating effect of the examined variables or whether this finding is due to the lack of a main effect of the intervention condition.

Regression analysis of moderating effects of counsellor and patient variables (hypotheses 4 & 5; exploratory analysis 1 & 2) revealed that interventions lead by counsellors with greater perceived positive affirmation were associated with greater readiness to change alcohol consumption. Among the MI tools tested, interventions which were concluded with a written goal setting agreement were associated with greater readiness to change, hereby confirming hypothesis 5 of the dissertation. However, it has to be noted that only a small share of variance (2.9%) could be explained by this variable. Exploratory analyses 1 & 2 revealed that the use of the decisional balance exercise and the use of the readiness and confidence ruler did not predict readiness to change in the multivariate analysis. Furthermore, younger patients’ age predicted
greater readiness to change after the BI. Results support prior research pointing out the importance of counsellors’ MI skills, especially positive affirmation, for eliciting motivation to change alcohol use (Gaume et al., 2009; Daeppen et al., 2010).

In sum, findings of this dissertation provide valuable information on general evidence for BMIs targeting adolescent ED patients following an alcohol-related event (publication II & IV), characteristics of the target population (publication V), and on counsellor and intervention variables associated with greater readiness to change alcohol use after the BMI (publication VI). However, null findings regarding the effectiveness of the HaLT-Hamburg BMI raise most questions and will therefore be discussed in particular in the following section.

5.2 Discussion of results regarding the effectiveness of the HaLT-Hamburg BMI
Several possible explanations may be discussed when interpreting the lack of a significant main effect of the intervention condition on alcohol use outcomes and alcohol-related problems in the HaLT-Hamburg trial.

One possible interpretation is that the BMI may in fact have been effective, but confounding variables and/or methodological issues prevailed analyses from detecting significant differences between groups (Jenkins, McAlaney, & McCambridge, 2009; Heather, 2014). A confounding variable often discussed for its potential to mask intervention effects under research conditions is the assessment (McCambridge & Kypri, 2011; Bischof, Freyer-Adam, Meyer, John, & Rumpf, 2012; Heather, 2014). A number of studies have observed that the mere fact of providing detailed information on e.g. alcohol use is often associated with reductions in alcohol use (McCambridge & Kyprie, 2011). In the HaLT-Hamburg trial assessment was extensive, lasting about 30-45 minutes, comprising a face-to-face interview and a self-report questionnaire, so that we cannot rule out the possibility that assessment procedures may have caused alcohol use reductions in the control group. Another confounding variable with the potential to (partially) mask intervention effects is what is known as a research participation effect (Heather, 2014). The awareness of participating in a research project on alcohol use may elicit or increase attention paid to drinking and thereby cause reductions. Furthermore, the statistical problem of regression to the mean, i.e. the tendency of extreme scores of a variable to exhibit a less extreme score when assessed at a second time point, may also have contributed to the difficulty of detecting effects at follow-up (Heather, 2014; McCambridge, Kypri, & McElduff, 2014).

An alternative possible interpretation for the lack of a main effect of the intervention condition in the HaLT-Hamburg trial is that both intervention and control group participants
reduced their drinking and alcohol-related problems as a reaction to the alcohol-related hospitalisation and the BMI did not have an additional effect. This interpretation is supported by findings that the experience of a hospitalisation may itself elicit health-related behaviour change (Boudreaux et al., 2012; Longabaugh et al., 1995; Bischof et al., 2012; Sommers et al., 2006). Conceptually, both understandings of the teachable moment as heightened intervention responsiveness and as a cueing event for behavior change can be derived from the current literature (Boudreaux et al., 2012; Lawson & Flocke, 2009).

Another hypothesis often discussed as a possible explanation for null findings in BMI studies is that counsellors’ MI adherence may not have been adequate (Heather, 2014; Gaume et al., 2008). In the HaLT-Hamburg trial, audio-recording of the BMI sessions was not feasible, which is why we did not have the possibility to conduct an objective in-depth analysis of MI fidelity. Participants in the HaLT-Hamburg trial rated counsellors’ empathy and positive affirmation as high to very high with an average of 2.5 (SD = 0.6) for empathy and 2.8 (SD = 0.4) for positive affirmation on a 4-point likert scale ranging from "0" (do not agree) to "3" (completely agree), supporting the notion that counsellors’ MI skills were adequate. However, publication V of this dissertation also revealed that stronger positive affirmation was associated with a stronger motivation to reduce alcohol use, lending support to the hypothesis that this might be a mechanism of action possibly useful for enhancing intervention effectiveness.

Another aspect worthwhile taking into account when interpreting null findings of the HaLT-Hamburg trial is the fact that the BMIs were delivered within a short time frame of just a couple of hours following an AAI. Alcohol myopia theory (Steele & Josephs, 1990) posits that acute alcohol consumption impacts perception and thought in a way that information-processing is altered. Fewer situational cues can be processed at the same time and evaluation of incoming cues is impaired. Sevincer & Oettingen (2009), for example, found that study participants under the influence of alcohol evaluated the likelihood of achieving a desired goal mainly by judging desirability of the goal, disregarding feasibility of goal attainment. In the HaLT-Hamburg trial, the BI took place between 7 - 9 o'clock a.m., just a few hours after study participants had presented to the ED. Blood alcohol level (BAC) was not determined before BI delivery, because of concerns that this technical procedure might impair the patient-counsellor therapeutic alliance. In many cases (45.9 %) BAC was not even determined at time of ED presentation. In order to examine mental and cognitive capacity for study participation, participants were asked to repeat study procedures in their own words. However, we cannot rule out the possibility that study participants had a BAC > 0 ‰ at time of intervention delivery, possibly affecting participants’ goal committment. Future studies should therefore include BAC assessment before
BI delivery. Additionally, a stronger focus on booster sessions after discharge from hospital could provide a way to reach adolescents at later time points when myopic processes are not at work.

Finally, interpretation of the HaLT-Hamburg findings may benefit from looking more closely at the age-specific developmental characteristics and needs of the target population of 12 to 17 year-olds. To date, studies on BIs have widely applied BIs with the same content for adolescents and for adults. The same structure and BI elements (Segatto et al., 2011; Monti et al., 2007; Spirito et al., 2011; 2004; Dimeff et al., 1999) have been applied for adolescents and adults, thereby implicitly presuming that the same mechanisms of action in BIs apply in adult and adolescent populations. However, initial doubts have been raised whether the presumed central mechanism of action of MI, i.e. resolution of ambivalence, is as effective in adolescents as in adults (Feldstein-Ewing et al., 2016; Thus et al., 2008), because adolescents often experience little ambivalence with regard to their alcohol use (Wiers et al., 2007). Another age-specific characteristic of the target population is that adolescence is a developmental phase prone to higher incidences of risk-taking behaviours, because impulsive processes influence behaviour much stronger than in adulthood (Jessor, 1987, 1991; Wiers et al., 2010; Steinberg, 2010). According to the dual systems model of adolescent risk-taking proposed by Steinberg (2010), reward-seeking increases from pre- to mid-adolescence, whereas self-control only gradually matures from the age of around 10 years, leaving the phase of mid-adolescence especially prone to the exhibition of impulsive behaviours (Albert & Steinberg, 2011). In addition to this developmental preponderance of impulsive processes, Wiers et al. (2010) propose that habitual alcohol use as well as acute alcohol use further strengthen automatic, impulsive processes involved in risky alcohol use (see chapter 1.3). In sum, there is strong evidence that automatic, impulsive processes play a particularly influential role in excessive alcohol use during adolescence. The MI approach, however, is a rational approach to behavior change based on self-reflection and resolution of ambivalence, thereby directly addressing reflective control processes. Automatic processes are presumed to be influenced indirectly through the moderating function of reflective control processes on impulsive processes (Wiers et al., 2010; see also Figure 1, p. 6). Taking into account the presumed predominant role of automatic processes influencing adolescent alcohol use, a single MI session may not be intense enough to alter automatic processes with regard to alcohol use.
5.3 Limitations

A number of potential limitations have to be taken into account when interpreting this dissertation’s findings. While the realization of the HaLT-Hamburg trial as an effectiveness trial (i.e. under conditions resembling real-world conditions as opposed to research-conditions) is one of the trials most important strengths, it also imposes some limitations. For example, audiorecordings of BI sessions for fidelity assessment were not conducted in order not to interfere with the establishment of a therapeutic alliance according to MI spirit. Therefore, we were not able to objectively rate MI adherence or analyse MI microskills, such as the frequency of open questions or reflective listening. However, patients rated counsellors’ perceived MI skills, thereby providing a subjective measure of counsellors’ MI skills from a patients’ perspective which seemed an acceptable compromise. For the same reason (i.e. not to interfere with the establishment of a therapeutic alliance), BAC was not assessed prior to BI. As outlined above (chapter 5.2), according to alcohol myopia theory (Steele & Josephs, 1990), positive BAC might have impaired information-processing and goal commitment during the intervention (Sevincer & Oettingen, 2009).

Furthermore, participants and counsellors were not blinded to the assigned trial conditions, so that we cannot rule out that performance bias influenced results. However, as this bias typically leads to an overestimation of effects, it is likely that this bias did not affect results in this study. Research assistants who conducted telephone interviews for collection of follow-up data were not blinded to trial condition, because the content of the interview revealed whether the study participant had seen a counsellor during hospitalisation. However, if detection bias takes effect, it typically results in an artificial overestimation of differences between groups. Since no statistically significant differences between groups were observed in the HaLT-Hamburg trial, this potential source of bias can be neglected when interpreting results.

Another potential limitation of the HaLT-Hamburg study is that self-report data on one of the primary outcomes, number of standard drinks consumed on a typical drinking occasion, may be imprecise due to the commonly reported drinking habit of sharing one bottle of a self-made mix of spirits among a group of adolescents. This drinking habit often implies that consumers are not aware of the quantity of spirits contained in a bottle and that they have problems indicating the number of drinks consumed. Additionally, underreporting of alcohol use may have been an issue due to the retrospective assessment through self-report (Babor, Steinberg, Anton, & Del Boca, 2000). However, in order to increase quality of data, alcohol consumption data were assessed through an interview by trained research assistants in confidentiality and a non-judgemental and non-confronting way. Generally, self-report data on
alcohol use have been found to be a valid method for drinking assessment in this population (Vitale, van de Mheen, van de Weil, & Garretsen, 2006).

The sample size might have been another methodological limitation of the HaLT-Hamburg trial. In the intervention group (n = 141), we did not quite reach the sample size needed to test for a medium effect (n = 156). Furthermore, sample size calculation with a medium effect might have been too optimistic. The systematic review (publication II) revealed combined effects for alcohol consumption outcomes in the included studies ranging from d = 0.19 to d = 0.25, indicating small to medium effects (Döring & Bortz, 2016). Study replications with sample sizes powered for detecting small effects would be desirable. Furthermore, it has to be noted that the sample size for the HaLT-Hamburg trial was calculated for testing the main effect of the intervention condition and not for moderation analyses.

### 5.4 Implications for future research

The systematic review and European evidence synthesis (publication II) revealed a gap between implementation efforts by practitioners on the one hand and the evidence base for effectiveness of this approach on the other hand. Therefore, further research is needed to clarify the current evidence base and potentially enhance effectiveness of alcohol BMIs for adolescent AAI patients. Because the HaLT-Hamburg trial provided the first randomized controlled evaluation of a BMI for adolescent AAI patients, study replications would be desirable. As Heather (2014) noted, results of a single trial do not provide sufficient information to differentiate between absence of evidence and evidence of absence. It would be desirable, if study replications included larger sample sizes which would allow the detection of small effects. Additionally, replications with no-contact control groups, as recently realised by Rhodes et al. (2015) in an adult ED sample, would be desirable in order to examine possible effects of assessment and research participation on reductions in alcohol use and alcohol-related problems. Detailed and objective assessment of MI fidelity, e.g. through audiorecordings and analyses of transcripts with the Motivational Interviewing Treatment Integrity (MITI) code (Moyers, Manuel, & Ernst, 2014) or the MITI-d (Brueck et al., 2009) respectively, would also be highly desirable in future studies. Furthermore, BAC assessment prior to BI delivery would be desirable in order to examine possible effects of alcohol myopia (Steele & Josephs, 1990; Sevincer & Oettingen, 2009) on intervention effectiveness. Finally, as outlined above, considerable neuroscientific evidence and theoretical considerations support the need for a youth-specific refinement of alcohol BMIs, particularly addressing automatic, impulsive processes involved in alcohol use.
5.5 Practical implications
Against the background of the lack of evidence of effectiveness provided by the HaLT-Hamburg trial, one option would be to recommend de-implementation of the BMIs delivered in the nationwide HaLT-Hart am Limit programme. However, as outlined above, this step might be premature, since at this point, no sufficient evidence of absence of effectiveness was established.

While future research needs to establish further evidence on effectiveness and potentials for enhancing effectiveness, some practical implications can be derived from this dissertation’s findings. Findings of the latent drinking classes analysis (research question 2) provided valuable information for counsellors delivering BMIs to adolescent AAI patients. First, knowledge about characteristics of drinking classes may facilitate individualization of interventions. In particular, interventions could be tailored to focus on characteristic drinking habits taking into account associated other substance use and psychosocial problems. Second, two screening instruments were identified which distinguish well between relevant classes. The CRAFFT-d separated well between class 1 “low-risk” (negative screening) and all other classes (positive screening) and may therefore be a useful tool to identify classes and plan interventions accordingly. Furthermore, the brief RAPI performed well in identifying the risky drinking classes 2 and 3 (positive screening, mean scores 7–9) and high-risk drinking classes 4 and 5 (mean scores 26–27). Counsellors delivering BIs for adolescent AAI patients are therefore recommended to explore different facets of habitual drinking (beyond quantity and frequency) carefully as well as to use the screening instruments CRAFFT-d and brief RAPI.

Analyses of counsellor and intervention variables (research question 3) provided a valuable contribution to the growing field of “second generation” research (Guralnick, 1993) examining potential moderators of effectiveness and mechanisms of action and thereby providing information for conceptualization of counsellors training and intervention delivery. In line with MI theory, this dissertations’ findings indicate that MI skills should be a central focus of counsellor training, in particular the therapeutic skill “positive affirmation” due to its association with patients’ readiness to change alcohol use. Finishing the intervention with a written goal agreement can be recommended, whereas the use of other MI tools was not associated with readiness to change.

5.6 Conclusion
The HaLT-Hamburg trial did not provide evidence of effectiveness for the approach of targeting adolescent AAI patients with a BMI during hospitalisation. However, current implementation practice of this approach documented the need perceived by practitioners to address this target
group with appropriate support. While some practical implications for intervention delivery were derived from this dissertation, future research is needed in order to enhance effectiveness of this approach.


REFERENCE


students at 140 campuses. *Journal of the American Medical Association*, 272, 1671-1677.


APPENDIX I

Full-texts of publications for the dissertation.

Note: Due to copyright issues publication no III is published in a shortened version (pages 1 – 20 only) in the published version of this dissertation.
Publication I. Brief motivational intervention for adolescents treated for acute alcohol intoxication in the emergency department – a randomized controlled trial (Study protocol)


Format: published article
Background: Alcohol misuse among youth is a major public health concern and numbers of adolescents admitted to the emergency department for acute alcoholic intoxication in Germany are recently growing. The emergency setting offers an opportunity to reach at-risk alcohol consuming adolescents and provide brief interventions in a potential “teachable moment”. However, studies on brief interventions targeting adolescents in emergency care are scarce and little is known about their effectiveness when delivered immediately following hospitalization for acute alcohol intoxication. In this protocol we present the HaLT-Hamburg trial evaluating a brief motivational intervention for adolescents treated in the emergency department after an episode of acute alcoholic intoxication.

Methods: The trial design is a parallel two-arm cluster randomized-controlled trial with follow-up assessment after 3 and 6 months. N = 312 participants aged 17 years and younger will be recruited Fridays to Sundays in 6 pediatric clinics over a period of 30 months. Intervention condition is a manual-based brief motivational intervention with a telephone booster after 6 weeks and a manual-guided intervention for caregivers which will be compared to treatment as usual. Primary outcomes are reduction in binge drinking episodes, quantity of alcohol use on a typical drinking day and alcohol-related problems. Secondary outcome is further treatment seeking. Linear mixed models adjusted for baseline differences will be conducted according to intention-to-treat (ITT) and completers (per-protocol) principles to examine intervention effects. We also examine quantitative and qualitative process data on feasibility, intervention delivery, implementation and receipt from intervention providers, receivers and regular emergency department staff.

Discussion: The study has a number of strengths. First, a rigorous evaluation of HaLT-Hamburg is timely because variations of the HaLT project are widely used in Germany. Second, prior research has not targeted adolescents in the presumed teachable moment following acute alcohol intoxication. Third, we included a comprehensive process evaluation to raise external validity. Fourth, the study involved important stakeholders from the start to set up organizational structures for implementation and maintaining project impact.

Trial registration: Current Controlled Trials ISRCTN31234060 (April 30th 2012).

Keywords: Emergency department, Adolescents, Brief intervention, Alcohol intoxication, Randomized-controlled trial
Background

Alcohol misuse and particularly episodic heavy drinking is a significant public health concern across contemporary societies [1]. In 2011, 47% of European students aged 15 to 16 years experienced alcohol intoxication at least once in their lifetime and 17% did so during the last month [2]. In Germany, the number of adolescents admitted to in-patient treatment for acute alcoholic intoxication (AAI) is recently growing. During the last years the number has more than doubled to over 26,000 in 2011 [3], with high rates of repeated episodes of alcohol intoxication if not treated adequately [4].

Personal health risks associated with AAI for adolescents have been widely documented, including aggressive [5,6] and risky sexual behavior [7] and elevated mortality rates through injury [8] and traffic accidents [9]. Moreover, heavy episodic drinking in adolescence is associated with a number of social and developmental problems, such as deleterious effects on neurocognitive and hormonal development [10-12] and cognitive and emotional abilities [13-15]. Social conflicts, delinquency and problems of academic adjustment are often associated with repeated episodes of heavy drinking [16,17] also puts youth at risk for chronification of problematic substance use patterns into adulthood [18,19]. Beyond these immense personal risks, alcohol-related problems also impose significant economic burdens on public health care [20]. Thus, excessive alcohol use in adolescents continues to be a major public health problem [21,22] and indicated preventive interventions as early as in adolescence are essential [23,24].

Current evidence for brief alcohol interventions

To date, brief interventions (BIs) are among the most empirically supported individual level interventions for reducing alcohol use and alcohol-related problems in adolescents [25,26]. They are often based on principles of Motivational Interviewing (MI) [27], which is characterized by an empathic approach to the client and a non-judgemental and non-confrontative counseling style [28]. Such short-term preventive or therapeutic interventions usually span one to three sessions [29,30] with the goal to establish and support intrinsic motivation for behavior change and/or further treatment seeking [31].

A comprehensive body of evidence documents the usefulness of BIs for problematic alcohol use in primary care [32] and general hospitals [29]. The emergency department (ED) has been identified as a feasible setting to implement early interventions for problematic alcohol use [33,34] and efficacy of BIs in ED has attracted a substantial body of research [35-37]. However, with few exceptions [4,38-41] to date adolescents have been only sparsely addressed [42,43]. None the less a small number of studies indicate feasibility and effectiveness of BIs for adolescents in an ED following an alcohol-related event such as alcohol-induced injury [38-40]. While these studies vary substantially in key conceptual and methodological issues and the heterogeneity of findings limits generalization [Diestelkamp SD, Drexsel M, Arnaud N, Thomasius R: Brief Interventions for Alcohol-involved Adolescents in Emergency Care: A Systematic Review, forthcoming] [43], these studies are informative because they support the notion that alcohol-related events causing hospitalization are associated with a “teachable moment” that opens a window of opportunity for effective intervention [44-46]. The experience of a potentially life-threatening AAI resulting in hospitalization supposedly leaves adolescents in a state of increased responsiveness to alcohol-related counseling [46,47]. While awareness of alcohol having prompted ED hospitalization generally influences BI outcomes [45], there is currently a lack of studies addressing the potentials of BIs following AAI hospitalization. Given the articulated need for indicated preventive interventions for AAI we build on the current empirical and conceptual base for BIs in this context as well as our own favourable pilot results for feasibility and initial effectiveness in this context [4]. In this study protocol we present the design and current implementation of a randomized-controlled trial that aims at evaluating effectiveness of a manualized brief motivational intervention (BMI) (indicated intervention) for children and adolescents who are being treated in the ED immediately following AAI, an approach that has been established in Germany and other European countries [48-50] over the last 10 years (see below) but has not been rigorously tested to date. Moreover, we include additional evaluative components to address practical conditions within the “real-world” ED-setting that might affect effectiveness and implementation [51,52].

**HalT-Hart am LimiT (“Stop – close to the limit”)**

HalT [53] is a German alcohol prevention project that involves a broad network of cooperating institutions to pursue the goal of early prevention of heavy alcohol use among children and adolescents [54]. It is one of the most broadly applied alcohol-specific prevention projects for under 18 year-olds and is currently implemented in more than 160 locations across Germany. It was initiated against the background of growing numbers of children and adolescents in need of emergency medical care following an episode of AAI and growing evidence that adolescents with at-risk alcohol consumption can best be reached in the ED setting [55]. HalT involves two strategies. First, a proactive or structural prevention component which aims at promoting responsible alcohol use through outreach work in schools, informing festival organizers and pub owners about risks of underage drinking and providing support for correct implementation of alcohol-specific...
regulations for the protection of minors. Second, a behavior-oriented or reactive component which includes an individual level “bridging session” targeting children and adolescents in the ED following an AAI and a brief consultation for their caregivers. The reactive component is topic to the study presented in this protocol. The “bridging session” is a single-session, semi-structured indicated preventive intervention based on core principles of MI and implemented by trained facilitators before discharge from hospital. Facilitators provide information on risks associated with excessive drinking and strategies for reducing these risks while highlighting personal responsibility for behavior change. They aim at raising awareness for consequences of risky alcohol consumption and establishing a positive relationship in order to motivate adolescents to take part in an experience-oriented group-training (risk-check) for risk-related competences which is offered by a cooperating counseling agency as part of the HaLT project (not further addressed in this protocol). Parents or caregivers are also addressed in hospital in order to enhance their motivation to support their child in participating in the group-training. To date, HaLT services have been partly evaluated but not using rigorous evaluation methods (RCT). Moreover, existing results [54,56-58] are difficult to generalize because in the field HaLT is practically implemented in a broad spectrum of modulations and lacks standardized procedures in intervention content and delivery. The HaLT-Hamburg intervention, which is subject of the trial presented in this protocol, includes a number of further developments when compared with HaLT. First, a theory-based manualized BMI including a counseling session with caregivers. Second, a manualized training for facilitators in delivering the HaLT-Hamburg BMI. Third, definition of standards regarding qualification of facilitators. Fourth, regular clinical group supervision for facilitators and fifth, a pragmatic manual adherence monitoring. Internationally, to our knowledge we are the first to evaluate effectiveness of a BMI for adolescents admitted for AAI in the ED using a randomized-controlled design.

Objective and hypotheses

The objective of this study is to evaluate the effectiveness of a manual-based BMI for adolescents admitted for AAI in the ED. Effectiveness will be evaluated by expected reductions of binge-drinking frequency (5 or more standard drinks at one occasion (4 for female) [59]), quantity of alcohol consumption on a typical drinking day and alcohol related problems at 3 and 6 month follow-up. Our primary hypothesis is that children and adolescents under the age of 18 years who receive the manualized BMI following AAI hospitalization will show lower levels on these outcomes when compared to controls not receiving this treatment. We also include further health care utilization in response to the BMI as secondary outcome. Help seeking in the care system as recommended in our BMI is closely related to intention to change [60] and appropriate for additionally judging intervention effectiveness. We thus hypothesize that children and adolescents who receive the BMI will significantly more often access further counseling regarding alcohol use in the 6 months following hospitalization than children and adolescents who do not receive the BMI. Moreover, we will examine a number of expected moderating variables such as psychopathological symptoms, drinking history, concurrent substance use and family environment. Finally, alongside our RCT we include additional evaluation components that focus on process, context and practical implications for BMI delivery under “routine conditions” in the ED setting.

Methods

Trial design, setting and time frame

The HaLT-Hamburg study is a parallel two-arm (intervention and control) stratified cluster RCT with follow-up assessments at 3 and 6 months post intervention with hospital on a weekend as unit of randomization and weekend as stratum. All participants receive standard inpatient ED care for AAI. Participants in the intervention group additionally receive a single session manualized BMI before ED discharge with one telephone booster session 6 weeks after the BMI. Caregivers of adolescents in the intervention group also receive a short manual-guided intervention by the same facilitator that delivered the BMI to the adolescent. Participants in the control group receive treatment as usual (TAU) only which is written information on negative consequences of alcohol use in adolescence and information on youth specific substance use counseling agencies. Recruitment of hospitals started in February 2011. Participant data collection started in July 2011 and lasts 30 months with final follow-up assessments being planned for July 2014. Figure 1 displays the CONSORT flow diagram of the study design.

Participating hospitals

ED directors of six pediatric hospitals identified as main treatment providers for alcohol-intoxicated adolescents under the age of 18 [61] in the City of Hamburg, Germany, were invited to a network conference at project launch, informed about the aims and procedures of the project and asked to participate. The conference was hosted by the Hamburg authorities for Health and Consumer Safety (BGV) who cooperates closely in project implementation. It was made clear that BGI’s will be delivered by external trained facilitators funded by health insurers since high workload and limited resources by ED staff are widely perceived as barriers for implementation in this context [34]. All six clinics spanning the area of the city agreed to participate in the study. In order to reach as
many eligibles as possible the BGV issued an instruction for the Hamburg rescue coordination center to transfer adolescents with AAI to the six participating ED’s.

Participants

Eligibility

Study participants are children and adolescents admitted for AAI (diagnosis F10.0; ICD 10; [62]) in one of the participating clinics and their caregivers. They are eligible for participation if they fulfill the following inclusion criteria: 1. at hospitalization they are under the age of 18 years, 2. at time of data collection and intervention delivery they have sufficiently recovered from AAI and show sufficient mental-cognitive receptiveness, 3. they are fluent in German, 4. informed consent is given by participant and parent(s)/caregiver(s), 5. absence of severe injuries. We have purposefully limited exclusion criteria and designed inclusion/exclusion criteria for study participation to reflect actual clinical conditions. In principle, all individuals that would receive the BMI under “real” clinical conditions are eligible to participate in the study. This way we aim at maximizing external validity of our study findings. The age limit reflects the age range addressed in the German-wide HaLT project.

Recruitment and procedure

Given that previous studies indicate that in Germany most AAI’s in youth happen at Friday and Saturday night [61], and an everyday stand-by recruitment was not possible due to limited resources, we recruit participants in the participating clinics on Friday, Saturday and Sunday mornings (between 7 – 9 am). Recruitment and data collection is carried out by trained research assistants and intervention delivery by trained facilitators who form a mobile intervention team. Coordination of attendance and resource availability is managed by a detailed operation schedule for each weekend. At each weekend in the evaluation period, research assistants contact all participating hospitals and ask about under 18 year-olds admitted to ED following AAI. If this is the case and if the patient has not been discharged in the same night, a research assistant visits the patient in hospital, informs about the project (evaluation and intervention), confidentiality, voluntariness of participation and right to withdraw consent and
obtains active informed consent to participate in the study from patients and caregivers. Patients in the intervention and the control group are informed that they are compensated with incentives (shopping vouchers) summing up to €60 for complete data collection (€10 for baseline assessment and €25 for each completed follow-up assessment). If eligible patients and their caregivers who are willing to give consent are hospitalized in a clinic that was randomly assigned to form the intervention group for this weekend, the research assistant contacts one of the facilitators to deliver the BMI. Adolescents in the intervention group are contacted by telephone 6 weeks after hospitalization for a 5–10 minute manualized booster session to enhance motivation to pursue alcohol-related goals as set in hospital. All study participants are assessed via telephone for follow-up at 3 and 6 months post intervention. Approval for the study was obtained from the ethics committee of the Chamber of Psychotherapists Hamburg (Germany) prior to data collection. The study is conducted in accordance with CONSORT guidelines (Additional file 1) and is registered under Current Controlled Trials ISRCTN31234060 (http://www.controlled-trials.com/ISRCTN31234060).

**BMI condition**

**HaLT-Hamburg brief intervention**

The BMI is based on the German prevention program “HaLT-Hart am Limit” (“Stop – close to the limit”) and was adapted in a participatory process with cooperating practice partners, a youth-specific substance use counseling agency and an outpatient clinic for adolescents and young adults with substance use disorders. It is based on MI [28] and components reflect BMI elements as put forward by Spirito et al. [38]. The intervention is manual-based and consists of one 45-minute session. It’s 5 components are: 1. Introduction to the session with positive feedback on patient’s willingness to engage in the intervention, expression of interest and concern transporting a positive and empathic therapeutic mindset and explanation of the intervention’s aim and content. 2. A semi-structured interview assessing circumstances of the intoxication and alcohol-related risk behaviors. 3. Exploration phase incorporating discussion of motivation to drink, normative feedback, exploring pros and cons of current alcohol use, optional use of MI tools (i.e., importance and confidence ruler, decisional balance sheet) and establishment of future scenarios with changed/unchanged alcohol use. 4. Summary in which the facilitator structures and sums up what has been discussed, highlights personal responsibility for change and asks the patient for his/her conclusion from what has been discussed so far. 5. Closure of the session beginning with identification of drinking goals and potential barriers and development of strategies for goal attainment. The session is finished with a written agreement on drinking goals, the introduction of the cooperating youth-specific counseling agency and promotion of patient’s self-efficacy.

**Counseling session for caregivers**

Parents maintain significant influence on adolescent’s alcohol use and parental integration has been proposed to greatly enhance efficacy of targeted prevention programs [63]. When caregivers pick up the adolescent in hospital they can easily be reached and are offered a brief consultation by the same facilitator who delivered the BMI to the adolescent. Caregivers are encouraged to reflect on the AAI episode of the minor and develop strategies to prevent future risky alcohol use. They are provided with general information on alcohol and alcohol-related risks and are encouraged to seek further family- and/or substance use related services if required. Afterwards parents, facilitator and adolescent get together for a summary statement that focuses on supporting the adolescent’s sense of self-efficacy with regards to the attainment of his/her alcohol-related goals.

**Telephone booster**

Adolescents are contacted by telephone 6 weeks after discharge from hospital. The booster session is structured (manual-guided), lasts about 5–10 minutes and aims at enhancing content of the BMI and increasing motivation to pursue alcohol-related goals as set in hospital.

**Control condition**

Participants in the control group are approached by a research assistant. After informed consent is given, they receive TAU which presently consists of oral and written information on cooperating youth- and family-orientated counseling agencies combined with the recommendation to contact a counseling agency and a flash drive with information on negative consequences of alcohol misuse for children and adolescents. Personal contact for TAU has a duration of 5–10 minutes.

**Treatment fidelity**

Generally, the intervention is designed in a standardized way, yet it leaves facilitators with a certain leeway. This mentality reflects practitioners needs for flexibility and empathic focus on the client’s concerns in a MI spirit while keeping structure and content of the intervention sufficiently standardized [64]. Treatment fidelity is maintained using several strategies. First, the intervention (as the counseling session with parents/caregivers) is manualized. It provides clear guidelines and steps to be followed when carrying through the BI. Guidance is further enhanced by a short “memo-card”, which includes cues for core elements of the introduction, interview, exploration, summary and closure to the session and a
reminder of the optional use of MI-tools. Additionally we developed a guide for delivering the telephone-booster. Second, all facilitators have a masters degree in psychology, social education work or related fields and are experienced in working with minors and their parents. Third, facilitators are initially trained by experienced and certified trainers (a clinical psychologist, a social educational worker and a research psychologist) in MI skills and in delivering the manualized BMI (12 hrs of training). On a bi-monthly basis facilitators are clinically supervised to discuss problems and experiences of implementation, engage in role-plays and receive retraining if required. Moreover, the manual was developed in a participatory approach by a team of experienced professionals including social education workers and senior clinical psychologists to raise practitioners acceptance and secure practicability under clinical conditions.

Measures
Primary outcomes of the trial are reductions of past-month binge-drinking frequency, past-month quantity of alcohol consumption on a typical drinking day and alcohol-related problems in the past 3 months. We define binge drinking as consumption of 5 (4 for girls) or more alcoholic drinks at one occasion [59] and consider it as adequate primary outcome because it increases the risk for and often precedes AAI [4]. To assess binge drinking frequency we use a single question that is adapted from the Alcohol Use Disorder Identification Test Consumption subscale (AUDIT-C) [65] as used in a previous study [66]. Additional primary drinking outcome will be quantity of alcohol consumed on a typical drinking day as another indicator of risk for repeated AAI. For both alcohol measures (binge drinking and quantity of alcohol intake on a typical drinking day), we consider one unit of alcohol (standard drink) to include 10 g ethanol and we use a graphical overview of various types of drinks to help respondents answer the question and to ensure standardized responses. To assess alcohol-related behavioral problems we use the Rutgers Alcohol Problems Index (RAPI) [67] which is widely used and valid for an adolescent target population [68-71]. The secondary outcome concerns further seeking of counseling for alcohol use, which is retrospectively assessed by a single dichotomous (yes/no) question at both follow-ups and details on access and duration of services used.

Additionally we assess concurrent substance use following the assessment standards III of the German Society for Addiction Research and Therapy [72], repeated hospitalization due to AAI, general psychopathology through a short version of the Symptom Checklist SCL-9-K [73] and the Screening of Psychological Disorders in Adolescence (SPS-J) [74] as a behavioral screening instrument for early detection of externalizing and internalizing problems. Furthermore we assess readiness to change through an algorithm [75] allowing allocation of individuals to the different stages of change as proposed by Prochaska and DiClemente [76] and alcohol-related cognitive variables such as knowledge (modified from [77], social norms [77], self-efficacy (selected items of the Alcohol Abstinence Self Efficacy Scale (AASE-G) [78]) and attitudes through a 9-item semantic differential [79]. All assessment instruments are based on self-reports. We collect basic demographic data on age, gender, ethnic- and socioeconomic family status.

Additional components of evaluation
As mentioned above we include additional components to evaluate effectiveness alongside our RCT design. In summary, we examine quantitative and qualitative process data on intervention delivery, implementation and receipt from intervention providers, receivers and regular ED staff which is guided by the framework of RE-AIM (Reach, Effectiveness, Adoption, Implementation, and Maintenance) as suggested by Glasgow and colleagues [80]. This framework represents a systematic approach to the evaluation of research translation potentials into practice and has been applied for the evaluation of implementation of BI’s in ED before [34].

Intervention implementation and delivery
We will explore qualitative contextual information about AAI treatment in the participating clinics and whether the HaLT-Hamburg intervention is familiar to the clinic staff. Furthermore we examine attitudes, level of interest/commitment and perceived barriers for routine implementation among ED staff (medicals, nurses) and BMI facilitators. This information includes structural conditions affecting delivery (e.g., is the BMI delivered in a separate room or a corridor with hospital staff, patients and visitors passing by) as well as duration of session and type and duration of possible interruptions. Facilitators complete a short record indicating details about intervention delivery (such as content, MI-techniques used, referral to further counseling) after each BI. Finally, heads of departments will be interrogated providing information on perceived barriers and ressources for long term project implementation.

Receipt and acceptance of BMI
Patient’s acceptance of the intervention is evaluated with the Treatment Satisfaction Questionnaire (Fragebogen zur Patientenzufriedenheit ZUF-8, [81]) using 8 items (e.g. “To what extend did the counselling session meet your needs?”). For adherence to MI spirit patients rate their perception of facilitator’s therapeutic skills with 8 items (e.g. “the facilitator respects me”, “the facilitator seems empathic”) on a 4-point response scale immediately
after the BI session in hospital (Index of Basic Therapeutic Skills (BIS) (short version) [82].

Feasibility
Similar to the approach of Linakis et al. [23] we assess feasibility through the number of enrolled participants and the number of those who complete all elements of the intervention. An indication for feasibility will be given if at least 80% eligible participate and 90% or more of those who participate complete the intervention before discharge from hospital.

Randomization
Because of limited resource availability, individual level random assignment of eligible participants to BMI or control condition is not feasible in this study. Instead a stratified cluster randomization is deemed appropriate with weekends (N = 129) as stratum and hospital (N = 6) on a weekend as unit of randomization. Over a data collection period of 30 months this yields a total of N = 774 possible clusters. This approach leads to a high number of clusters, which is highly recommended [83] and assures that at each weekend patients in one half of the hospitals are assigned to the BMI and the other half to the control condition. The total amount of possible combinations between strata and hospitals is balanced in a way that each clinic acts equally often as control and BMI condition and assures that all clinics are either control or BMI condition at each weekend. The resulting randomization plan was established prior to the data collection process by a research assistant from the Department of Medical Biometry and Epidemiology (University Hospital Hamburg-Eppendorf) who is not involved in the project, using the statistical software package SAS, Version 9.3 [84].

Sample size
The sample size is calculated for the three primary outcomes binge-drinking frequency, quantity of alcohol consumption on a typical drinking day and alcohol related problems at 3 month follow-up. Type I error is set to 5% for each of these outcomes. With an effect size of 0.26 and a power of 80%, 2 x 153 patients need to be included if randomization occurs at patient level. With an assumed intra-cluster correlation of 0.05 and an average of 1.264 included patients per cluster, we calculated a design effect of 1.013. Hence, the required sample size increases to 156 patients and 154 clusters per group, resulting in a total sample of N = 312. Clusters (hospitals per weekend) without patients will not be included in the analysis. With an expected participation rate of 80%, we anticipate N = 390 ED patients to be assessed for eligibility over a recruitment period of 30 months in the six participating hospitals. Based on a prior pilot-study [4], this sample size is feasible.

Statistical analysis
Basic descriptive statistics will be calculated for baseline variables, and according to trial arm (BMI vs. control). Intention-to-treat (ITT) analysis will be based on available data from all randomized patients at 3 and 6 month follow-up. In case of missing follow-up values multiple imputation will be performed [85]. For primary and secondary hypotheses we will use linear mixed models adjusted for baseline differences to examine differences between intervention and control group with intervention condition as fixed effect and clusters (hospital on a weekend) as random effect. The two-sided ?-level is set to 0.05. Additional analysis will be conducted on a per-protocol analysis set. Process data on intervention delivery, implementation and receipt will be analyzed in subsequent steps.

Discussion
In this study protocol we present the design and current implementation of a randomized-controlled trial which aims at evaluating the effectiveness of the indicated HaLT-Hamburg intervention for children and adolescents following treatment due to AAI in the ED. Beside a rigorous trial design with focus on relevant alcohol-related outcomes, we include additional evaluative components to address important issues of feasibility and practical implementation under “real-world” conditions in an ED-setting.

Strengths and limitations
The study has a number of significant strengths. First and foremost, a rigorous evaluation of this intervention is timely because HaLT interventions are already widely applied in Germany in different modulations. HaLT interventions are brief and based on MI, which has been proven effective for reducing alcohol-related problems [64,86]. Previous study results are promising [54,56-58], yet difficult to generalize and full scale trial evaluations including process and implementation evaluation are missing to date. Overall, with our study we contribute to the literature mainly because studies addressing effectiveness of BI’s in the ED with a focus on minors hospitalized following an alcohol-related event are scarce [Diestelkamp SD, Drechsel M, Arnaud N, Thomasius R: Brief Interventions for Alcohol-involved Adolescents in Emergency Care: A Systematic Review, forthcoming] and most existing RCT’s in the ED setting have been conducted in the U.S., leaving uncertainty whether results generalize to other countries [87]. To our knowledge we are the first to target adolescents in the ED immediately after the experience of an AAI. This approach appears promising due to a presumed “teachable moment” arising from the potentially life-threatening experience of AAI leading to hospitalization. This experience provides a window of opportunity for initiating behavior change in minors who have elevated risks for repeated AAI episodes.
if untreated [4] and who are in a developmental stage in which risk behaviors are normative which may limit responsiveness to MI or brief advice in other settings [88].

Another strength is the integration of additional evaluative components via a comprehensive process evaluation which qualifies HalT-Hamburg as a pragmatic trial [89,90] and raises external validity. In the considerations guiding our study we aimed at minimally interfering with “real world” conditions, as indicated by applying rather unrestricted inclusion (access-to-care) criteria, unobtrusive measures for intervention fidelity monitoring, employing facilitators who will continue working in the project after data collection has ceased (as opposed to research assistants) and a number of other aspects associated with implementation and intervention delivery. For example, while intervention, telephone booster and training sessions are manual-based and replicable, facilitators are left with a certain leeway in intervention delivery to allow tailoring of the intervention to the patient’s needs in order to adhere to MI spirit [64]. This may pose a limiting factor for internal validity. However, we included measures for manual adherence and MI-fidelity as well as clients’ ratings of perceived facilitator’s MI skills. A second possible limiting factor is that our data are based on self-reports. However, this approach is widely used in comparable studies [24] and previous studies indicate that adolescent self-reports on substance use are reasonably valid [91,92].

Implications for practice

As mentioned above, our study addresses a number of practical aspects. Importantly, actions for setting up organizational structures to implementation involving relevant stakeholders have been considered from the beginning of the project. This way, funding of ED external trained facilitators could be assured by partnering health insurance during the study period and with a clear perspective of further funding if our intervention proves effective. Moreover, our study is embedded in psychenet: the Hamburg Network for Mental Health [93] with over 60 partners from research, health care, health industry and government in the Free and Hanseatic City of Hamburg. This network provides a strong structural resource for further implementation. HalT-Hamburg is thus well embedded and supported by communal structures, is implemented under “real world” clinical conditions and is therefore suited to reveal important information on possible barriers and resources for practical implementation [60,94] in addition to insights on effectiveness and conditions influencing effectiveness of the HalT-Hamburg BMI.

Conclusion

Our study addresses a highly relevant target group and contributes to the current literature on brief interventions by filling apparent gaps. The study will provide insights about effectiveness of the HalT-Hamburg intervention and hence about a promising approach of targeted interventions for adolescents experiencing AAI. Moreover, we integrated the evaluation of practical implications and address important elements of translational research as well as actions needed to sustainably implement BI’s under practical conditions, an issue often neglected in prior research.

Additional file

Additional file 1: CONSORT checklist.

Abbreviations

AAI: Acute alcohol intoxication; BI: Brief intervention; BMI: Brief motivational intervention; ED: Emergency department; MI: Motivational interviewing; TAU: Treatment as usual.

Competing interests

The authors declare that they have no competing interests.

Authors’ contributions

SD and NA drafted the manuscript. PMS and RT obtained funding. SD, PMS and RT designed the intervention and developed the study methodology in close cooperation with AD. AD calculated the sample size and established the randomization plan. SD developed the training and intervention manual. NA and RT coordinate the study. LW and SD are responsible for carrying through its organizational processes. All authors read and approved the final manuscript.

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References


60. Kypri K: A survey on alcohol intoxicated children and youths up to the age of 21 in Hamburg using a postcard registration system (E-AK21). Final report to the Office of Health of the Free and Hanseatic City of Hamburg.


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**Publication II.** Brief In Person Interventions for Adolescents and Young Adults following Alcohol-related Events in Emergency Care: A Systematic Review and European Evidence Synthesis


**Format.** published article
Brief in Person Interventions for Adolescents and Young Adults Following Alcohol-Related Events in Emergency Care: A Systematic Review and European Evidence Synthesis

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Key Words
Emergency department · Adolescents · Young adults · Brief intervention · Alcohol-related event · Systematic review · Evidence synthesis

Abstract
Background: Increasing numbers of youth in need of emergency medical treatment following alcohol intoxication have been a major public health concern in Europe in recent years. Brief interventions (BIs) in the emergency department (ED) could prevent future risky drinking. However, effectiveness and feasibility of this approach are currently unclear. Method: A systematic literature search on controlled trials including participants aged 12–25 years treated in an ED following an alcohol-related event was conducted. Additionally, a grey literature search was conducted to support findings from the systematic review with evidence from practice projects and uncontrolled trials. Data on effectiveness, acceptance, implementation and reach were extracted. Results: Seven randomised controlled trials (RCT), 6 practice projects, 1 non-randomised pilot study and 1 observational study were identified. Six RCTs found reductions of alcohol use for all participants. Four RCTs found effects on alcohol consumption, alcohol-related risk-behaviour or referral to treatment. Participation and referral rates varied strongly, whereas data on acceptance and implementation were rarely assessed. Conclusion: Heterogeneity of study designs and effects limit conclusions on effectiveness of BIs for young ED patients following an alcohol-related event. However, the number of practice projects in Europe indicates a need perceived by practitioners to address this population.

Introduction

Adolescents in Europe start alcohol use and heavy use at an early age with 47% of European students report having been drunk at least once in their lifetime before the age of 15 to 16 [1]. Episodes of heavy drinking, that is, consumption of 5 (4 for girls) or more standard drinks on one occasion (binge drinking) [2], in the past 30 days are reported by 39% of 15- to 16-year-old European school children [1], a considerably higher prevalence than in the United States with 16% in the equivalent age group [3]. Recently, rising numbers of adolescents in need of emergency medical treatment due to acute alcohol intoxication (AAI) have attracted public attention in a number of European countries including Germany [4], the United Kingdom [5], Austria [6], Switzerland [7], the Netherlands [8], Croatia [9], Bulgaria [10] and the Slovak Republic.
Heavy episodic drinking at a young age is related to a number of negative short-term consequences such as violence (as a victim or perpetrator), unwanted or regretted sexual activities, drinking and driving as well as engagement in other risk behaviours increasing the likelihood of serious injuries [12–14]. Conflicts with parents, peers, teachers and police are often observed if heavy episodic alcohol consumption persists [15, 16]. Apart from short-term consequences repeated binge drinking episodes at an early age are associated with an increased risk of experiencing alcohol-related problems [12], impairments of neurocognitive functions [17, 18] and the development of an alcohol-related disorder later in life [19, 20].

In order to address the rising numbers of adolescent AAI patients in ED, some EDs in Europe have introduced brief interventions (BI) delivered before discharge from hospital [6, 7]. In Germany, the alcohol prevention project HaLT-Hart am Limit (‘Stop – close to the limit’) was developed to address the target population of underage AAI patients and 1 element of this project is the delivery of BIs in ED. The project is currently implemented at more than 170 locations nationwide [21]. However, effectiveness and feasibility of this approach are currently unclear.

Although a number of systematic reviews have addressed the effectiveness of BIs in the ED with mixed to positive results [22–24], only little is known about the effectiveness of BIs in ED for adolescents and young adults. Wachtel and Stanford [25] conducted a critical literature review on the effectiveness of BIs for adolescents in the clinical setting with inconclusive results. However, of the 14 studies included in the review only 4 were conducted in an ED. A systematic review by Yuma-Guerrero and colleagues [26] reviewed trials on BIs in ED targeting adolescent at-risk drinkers identified through screening. Four of the 7 included studies found significant intervention effects on at least 1 outcome related to alcohol consumption or consequences of alcohol use. However, the authors conclude that evidence is not clearly supporting effectiveness of screening, brief intervention and referral to treatment for this target population.

A first attempt to review evidence for effectiveness of BIs specifically targeting adolescents in the ED following an alcohol-related event was realized by Ahmed [27]. The rationale behind addressing patients following an alcohol-related event is that enhanced effectiveness of alcohol interventions was found for patients who attributed the need for ED treatment to their preceding alcohol consumption [28, 29]. The alcohol-related hospitalisation is assumed to create a teachable moment for alcohol interventions [29, 30]. Ahmed and Mackway-Jones [27] reported findings of 2 US-American [31, 32] and 1 Australian trial [33]. The author interpreted findings as generally supporting effectiveness of BIs in this context. A recent systematic review by Newton et al. [34] analysed a subset of 4 trials evaluating ‘targeted’ interventions (i.e. addressing adolescents whose ED visit was preceded by alcohol use) for adolescents in the ED. The authors conclude that targeted BIs did not yield clear benefits with regard to a reduction of alcohol use or alcohol-related problems. However, the small number of randomized-controlled trials (RCT) examined in these reviews limit conclusions that can be drawn. From a European perspective, it is also problematic that existing evidence is exclusively derived from US-American trials and one Australian trial [27, 34]. Different drinking patterns in adolescence as well as differences in health care systems and cultural contexts impose considerable concern as to whether results can be generalized to the European situation [1, 35].

Therefore, the aim of this literature review is to broaden the evidence base for BIs targeting adolescents and young adults following an alcohol-related event by including non-Anglo-Saxon evidence and evidence going beyond effectiveness such as parameters indicative of acceptance, participation and implementation. In doing so, we aim at providing an overview over the effectiveness, feasibility and current practice of BI delivery to adolescent and young adult ED patients following alcohol-related events in Europe. We used 2 strategies to achieve this. First, in contrast to existing reviews [26, 34], we conducted a systematic literature search on controlled trials addressing this population without applying language restrictions, thereby allowing identification of studies published in European languages other than English. In order to broaden the evidence base for BIs for this target group, we also included non-randomised controlled trials with other allocation methods (e.g. investigator assigns participants to groups) in the search. At the same time, we addressed the problem of methodological heterogeneity as reported in previous reviews [26, 34] by focusing our
search on BIs delivered in person. The problem of heterogeneity in study populations was addressed by focusing the search on BIs targeting adolescents in the presumed teachable moment of hospitalisation as a result of an alcohol-related event. Second, additional European evidence was sought stemming from other sources such as best practice reports, government documents or reports of uncontrolled trials. This approach follows the concept of a rapid evidence synthesis [36]. Originally developed as a tool for supporting policy makers’ decision making, rapid evidence synthesis is an emerging method synthesizing a broad spectrum of evidence on a specific topic allowing for nonintervention studies to be included [36]. As a result, information on feasibility, implementation, process of intervention delivery, acceptance and receipt by patients and involved stakeholders are considered in order to support evidence from systematic reviews and meta-analyses [5, 37]. In order to provide an overview over effectiveness, feasibility and current implementation of this approach from a European perspective, it is useful to combine these 2 strategies. While the systematic review mainly provides evidence regarding effectiveness, the additional European evidence synthesis informs on feasibility and current implementation and therefore adds important dimensions for programme evaluation [38].

Method

First, we conducted a systematic review following the standards for reporting systematic reviews as put forward in the PRISMA statement [39]. In a second step, a grey literature search was conducted.

Systematic Review

Search Strategy

The literature search was conducted between May 5 and May 29, 2012 and was updated by e-mail alerts (Medline, CINAHL, Web of Science) up until October 20, 2014. The databases Medline, EMBASE, PubMed, Science Citation Index Expanded and Social Sciences Citation Index (Web of Science), PsycInfo, Database of Abstracts of Reviews and Effects (DARE), CINAHL, Cochrane Clinical Trials and Cochrane Database of Systematic Reviews, Psycindex and Current Controlled Trials were searched for relevant records. The searches were not limited to a specific range of publication years and no language restrictions were applied.

Search terms for the study population were ‘adolescence’*, ‘child’*, ‘youth’ and ‘young’ each combined by the Boolean operator ‘OR’. The intervention was focused on alcohol use and was delivered in hospital department and ‘emergency services, psychiatric’ combined by ‘OR’. In a final step, all search results for the searches ‘population’, ‘intervention’, ‘outcome’ and ‘setting’ were combined by ‘AND’ to retrieve the relevant list of records.

In addition, we reviewed reference lists of relevant studies and systematic reviews to identify relevant publications that could have been missed in the systematic search process. Moreover, we reviewed conference proceedings to identify unpublished studies and the Current Controlled Trials database for trials with unpublished results.

Inclusion Criteria and Study Selection

We considered studies as relevant, if a BI was delivered to patients aged 25 years and younger treated for an alcohol-related event in the ED. The age range was chosen to cover the periods of adolescence and emerging adulthood as described by Arnett [40]. Records identified in the database searches and hand searches were screened for the following inclusion criteria:

- Study participants are aged between 12 and 25 years and are treated in an emergency care setting (inpatient or outpatient) following an alcohol-related event;
- The intervention is a brief intervention (maximum 60 min) consisting of a maximum of 3 sessions with a minimum of 1 session delivered in the ED;
- The intervention is focused on alcohol use and is delivered in person;
- The control condition consists either of no treatment, standard care, an intervention other than a BI or a BI of different intensity;
- Outcome measures address 1 or more of the following: alcohol consumption, alcohol-related risk behaviours, alcohol-related negative consequences and/or seeking of further alcohol treatment or counselling;
- The study design is a controlled trial with 1 or more follow-up assessments.

Two reviewers (SD, MD) independently screened titles and abstracts with regard to inclusion criteria and rated records whether they were clearly relevant (i.e. met all inclusion criteria) or clearly not relevant. If raters were indecisive or had reached different conclusions, consensus was obtained by discussion involving all authors. Where necessary, authors were contacted to provide additional information to aid the selection process.

Data Extraction and Quality Assessment

Two reviewers (SD, MD) independently conducted the extraction of data from the selected studies using a checklist that was developed on the basis of the Cochrane EPOC Data Collection Checklist [41]. Data were extracted with regard to the following aspects:

- Sample characteristics: sample size, age range, mean age, gender;
- Inclusion criteria for study participation;
- Study design and follow-up assessment points;
- Elements and duration of intervention and control condition;
- Interventionists’ professional background, training and supervision;
- Outcomes;
- Participation rates, loss to follow-up, acceptance, implementation.
Any disagreement between raters was discussed and resolved by consensus. The methodological quality of the selected studies was assessed using the Cochrane Collaboration’s tools for assessing risk of bias [42]. Two independent reviewers (SD, MD) conducted data extraction and again any disagreements were discussed and resolved by consensus involving all authors.

Additional Evidence Synthesis

Search Strategy

In order to collect additional evidence for effectiveness and feasibility of BIs in this context stemming from uncontrolled trials, best practice reports, government documents or press releases, web-based searches with the search engine ‘google’ were conducted using the keywords ‘alcohol’, ‘alcohol intoxication’, ‘adolescents’, ‘underage’, ‘minor’, ‘emergency department’, ‘brief intervention’ in combination with names of European countries. This search was repeated with keywords translated into the four most-spoken languages in the EU next to English, that is, German, French, Spanish and Italian. The first 10 pages of results of each search were screened for records meeting the inclusion criteria. Additionally, in order to collect information on projects not represented on the Internet or taking place in a country with a language not covered in our web search, researchers from 9 European countries (Sweden, the Netherlands, Czech Republic, Ireland, Catalonia, Great Britain, Switzerland, Croatia, France) who had published on relevant topics were contacted in person or by e-mail and asked if they could provide information on research or practice projects regarding ED-based BIs targeting adolescents following alcohol-related events in their respective countries. Additionally, search results of the systematic literature search were screened for relevant publications such as BI studies not conducted in a controlled design or reports on practice projects.

Inclusion Criteria

Records were included if they met the following criteria:

• Patients are aged between 12 and 25 years and are treated in an emergency care setting (inpatient or outpatient) following an alcohol-related event;
• The intervention is a brief intervention (maximum 60 min) consisting of a maximum of 3 sessions with a minimum of 1 session delivered in the ED;
• The intervention is focussed on alcohol use and is delivered in person;
• Reported information addresses 1 or more of the following: participation rates, acceptance, implementation and intervention effects on alcohol use, alcohol-related harm and referral to treatment.

Data screening and consensus procedures were equivalent to the procedure described earlier. Where necessary, authors were contacted to provide additional information to aid the selection process.

Data Extraction

Data were extracted on participation rates, acceptance, implementation, intervention content, facilitator’s vocational background and intervention effects on alcohol use, alcohol-related harm and referral to treatment. Two independent reviewers (SD, MD) conducted data extraction and again any disagreements were resolved by consensus.

Results

Search Results Systematic Review

A total of 1,846 records were retrieved through database searches and an additional 9 records were identified through hand searches. The inclusion process is displayed in a flow chart according to the PRISMA statement [39] (fig. 1). Two reviewers (SD, MD) independently screened abstracts with an inter-rater agreement of 94.5%. A total of 1,445 records were excluded after screening of the abstracts, because they were clearly irrelevant. After removal of duplicates, a total of 236 full texts were retrieved. Records were excluded if they did not report on a controlled trial (n = 83), study participants did not meet the age range of 12–25 years (n = 70), the study did not take place in an ED (n = 50), the intervention was not focussed on alcohol use (n = 17) or study participants were not hospitalised as a result of an alcohol-related event (but for instance, identified through a positive alcohol screening) (n = 46). Another 16 records were excluded because they were secondary analyses of data reported in another publication. One of the 9 records identified through hand search was a conference abstract [43] describing a relevant study that could be retrieved online through a ‘google’ search [44]. A total of 7 studies met all inclusion criteria [31–33, 44, 46–48].

Description of Included Studies

The 7 included studies were all randomized controlled trials of which 4 were conducted in the United States, 1 in Australia, 1 in Brazil and 1 in Germany.

Participants. Included studies represented a total sample size of 1,125, ranging from a minimum of 94 [32] to a maximum of 254 [44] participants. All except one study showed similar patterns of gender distribution with a weighted mean of 60.2% of participants being male. The study sample in Segatto et al. [46] represented an exception with 90.3% male participants (table 1).

Inclusion Criteria. All studies required self-reported alcohol use within 6 h prior to hospitalisation or alcohol use having led to hospitalisation as the central inclusion criteria. One study [47] additionally included individuals who screened 8 or higher on the Alcohol Use Disorders Identification Test (AUDIT) (23.7% of the total sample). Another study also included adolescents who presented to the ED following a drug-related event [43]. However,

1 Data for [33] were also extracted from Tait et al. [45] where 4 months outcomes for the same trial were reported.
the majority (77%) of the sample reported having used alcohol prior to the ED visit.

**Intervention Conditions.** All interventions took place in the ED before discharge and lasted between 30 and 60 minutes. One study delivered 2 additional sessions, 1 addressing adolescents and parents together and 1 addressing parents only [48]. Of the remaining 6 studies, 1 reported offering counselling to parents in addition to the BI for the patients [44]. Six studies [31, 32, 44, 46–48] tested the effectiveness of a brief motivational intervention (BMI), thereby applying an approach based on the principles of motivational interviewing (MI) [49]. In 6 of the 7 studies, the primary intervention goal was harm reduction with regard to alcohol use, whereas 1 study [33] primarily targeted motivating patients to seek further alcohol-related treatment. Interventionists were either trained counsellors and psychologists [44, 46–48] or research staff [31–33] most of whom had received special training in MI [31, 32, 44, 46–48] with durations ranging from 15 h [48] to 30 h [47]. In 4 studies, interventionists additionally attended regular clinical supervisions [31, 32, 47, 48]. Some studies provided additional booster sessions by telephone [33, 47], online [44] or in person [48]. Frequency and durations varied from one booster with a duration not recorded [33] to two 20–30 min telephone boosters including assessment and counselling [47] to 3 weekly web-based boosters lasting 10 min each [44].

**Control Conditions.** Five studies had minimal active control groups such as standard care [31–33], educational brochures [46] or feedback only [47]. Two studies compared a BI with an enhanced BI, that is, with an individual-level intervention plus family intervention [48] and an individual-level intervention plus computer-delivered exercises based on drinking motives, respectively [44].

**Methodological Quality of Included Studies**

The methodological quality of included studies assessed according to the Cochrane Collaboration’s tools for assessing risk of bias [42] indicated reasonable to good quality (table 2).

**Search Results Additional Evidence Synthesis**

A total of 8 publications were identified containing additional information on BIs delivered to adolescent ED patients following an alcohol-related event of which 5 reported on projects or studies conducted in Germany, 2 in Austria and 1 in Switzerland (table 3). Four publications were retrieved from screening publications excluded from the systematic review. Three of those reported on practice projects [6, 7, 50] and 1 on the evaluation of a...
Table 1. Characteristics of studies included in systematic review

<table>
<thead>
<tr>
<th>Author, year, country</th>
<th>Sample size (% male); age range (mean age)</th>
<th>Study inclusion criteria</th>
<th>Study design; follow-ups</th>
<th>Intervention</th>
<th>Control condition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trials with minimal active control condition</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monti et al. (1999), USA</td>
<td>n = 94 (64); 18–19 (18.4)</td>
<td>Positive BAC or self-reported alcohol consumption that caused hospitalisation</td>
<td>RCT; 3, 6 months</td>
<td>MI (35–40 min) plus standard care (handout on drinking and driving, list of treatment agencies)</td>
<td>Standard care (5 min), handout on drinking and driving, list of treatment agencies</td>
</tr>
<tr>
<td>Segatto et al. (2011), Brazil</td>
<td>n = 175 (90.3); 16–25 (21.8)</td>
<td>Self-reported alcohol consumption related to the ED visit in the 6 h prior to hospitalisation</td>
<td>RCT; 3 months</td>
<td>MI plus educational brochure (45 min)</td>
<td>Educational brochure (5 min)</td>
</tr>
<tr>
<td>Monti et al. (2007), USA</td>
<td>n = 198 (67.7); 18–24 (20.5)</td>
<td>BAC &gt;0.01%, or self-reported alcohol consumption in the 6 h prior to the event that caused hospitalisation or AUDIT score 8+</td>
<td>RCT; 6, 12 months</td>
<td>BMI (30–45 min), handouts on alcohol risks and treatment facilities, 5 monthly brochures for parents</td>
<td>Feedback only (1–3 min) handouts on alcohol risks and treatment facilities, 5 monthly brochures for parents</td>
</tr>
<tr>
<td>Tait et al. (2005), Australia</td>
<td>n = 127 (55); 12–19 (16.7)</td>
<td>ED presentation involving AOD use. Identification 'through the ED information system and liaison with medical staff' (quote)</td>
<td>RCT; 4, 8, 12 months</td>
<td>BI (duration not recorded) focussed on enhancing motivation for taking up further substance use treatment, 1 telephone booster</td>
<td>Standard care (duration not recorded)</td>
</tr>
<tr>
<td>Spirito et al. (2004), USA</td>
<td>n = 152 (63.8); 13–17 (15.6)</td>
<td>Positive BAC or self-reported alcohol use in the 6 h prior to ED visit</td>
<td>RCT; 3, 6, 12 months</td>
<td>BMI (35–45 min)</td>
<td>Standard care (5 min)</td>
</tr>
<tr>
<td><strong>Trials with enhanced intervention control condition</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spirito et al. (2011), USA</td>
<td>n = 125 (46); 13–17 (15.4)</td>
<td>Positive BAC or self-reported drinking of alcohol in the 6 h before ED visit</td>
<td>RCT; 3, 6, 12 months</td>
<td>Individual BMI (45–60 min) plus family BMI (60 min family assessment, 60 min parent feedback), handout on substance use treatment agencies, 5 monthly brochures for parents</td>
<td>Individual BMI (45–60 min), handout on substance use treatment agencies, 5 monthly brochures for parents</td>
</tr>
<tr>
<td>Wurdak and Wolstein (2012), Germany</td>
<td>n = 254 (57.5); 14–17 (15.56)</td>
<td>Hospitalisation following alcohol intoxication</td>
<td>RCT; 1 month</td>
<td>Individual BMI plus drinking-motive based exercises on a tablet computer (10 min), parent counselling, 3 weekly drinking-motive based web-boosters (10 min each)</td>
<td>Individual BMI plus alcohol knowledge exercises on a tablet computer (10 min), parent counselling, 3 weekly alcohol knowledge web-boosters (10 min each)</td>
</tr>
</tbody>
</table>

*BI = Enhanced BI (i.e. individual plus family brief intervention); BAC = blood alcohol concentration.
*a Information obtained from written communication with author.
Table 2. Risk of bias assessed using the Cochrane Collaboration’s tools for assessing risk of bias (Higgins and Green, 2011)

<table>
<thead>
<tr>
<th>Bias</th>
<th>Author, year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Random sequence generation</td>
<td>Monti et al., 1999</td>
</tr>
<tr>
<td>generation (selection bias)</td>
<td>Low-risk</td>
</tr>
<tr>
<td></td>
<td>Patients randomly assigned to groups</td>
</tr>
<tr>
<td>Allocation concealment (selection bias)</td>
<td>Unclear</td>
</tr>
<tr>
<td></td>
<td>No information provided</td>
</tr>
<tr>
<td>Blinding of participants and personnel (performance bias)</td>
<td>Unclear</td>
</tr>
<tr>
<td></td>
<td>No information provided</td>
</tr>
<tr>
<td>Blinding of outcome assessment (detection bias)</td>
<td>Low-risk</td>
</tr>
<tr>
<td></td>
<td>Quote: ‘by research assistants who were unaware of treatment condition’</td>
</tr>
<tr>
<td>Incomplete outcome data (attrition bias)</td>
<td>Unclear</td>
</tr>
<tr>
<td></td>
<td>Completion rates: 93% (3-month), 89% (6-month), quote: ‘no differential follow-up rates between groups or by gender’; ITT analysis; no information on balance of reasons for missing data across groups</td>
</tr>
<tr>
<td></td>
<td>Low-risk</td>
</tr>
<tr>
<td></td>
<td>Completion rates: BI: 93% (3-month), eBI: 74% (12-month); significantly different follow-up rates at 6-month follow-up (not significant at 3 and 12-month); no information on balance of reasons for missing data across groups: BI 63%, CG 73%; balanced reasons for missing data across groups; ITT analysis</td>
</tr>
</tbody>
</table>
A project combining ED-based BIs with community-based prevention strategies [51]. The "google" web search identified additional 3 publications. Two final reports to government bodies, 1 evaluating the dissemination of an alcohol prevention programme combining BIs in ED with community-based prevention [52] and 1 reporting on BIs in paediatric EDs in Berlin, Germany [53]. A press release on a practice project in an Austrian ED was also identified. After contacting project staff we were provided with an unpublished manuscript describing the project and its evaluation [54]. One additional publication was identified through personal communication with researchers, that is, a publication reporting on a pilot study not indexed in the 10 databases searched for the systematic review [55].

### Description of Included Publications

With the exception of Stolle et al. [55], all publications report on BIs in the ED targeting those under 18 years and delivering a BI before discharge from hospital. Six publications reported on BIs for adolescents following acute alcohol intoxication (AAI) [6, 7, 50–54]. One publication reported on a BI study with follow-up assessment at 6 months post-intervention [55]. The remaining publication reported on a pilot BI study with follow-up assessment at 6 months post-intervention [55] and the remaining publication combined BIs in ED with community-based prevention [55].

#### Key Findings of Systematic Review and Additional Evidence Synthesis

**Alcohol Consumption**

All except one study [33] with follow-up assessments observed reductions of alcohol consumption following the ED visit regardless of the form of care [table 4]. Two studies found significant differences across conditions for alcohol consumption-based outcomes. Monti and colleagues [47] observed significantly greater reductions in the intervention group in the number of past-month drinking days at 6 (F = 6.34; p = 0.01) and 12-month follow-up (F = 11.02; p ≤ 0.001) as well as the number of past-month heavy drinking days [31, 32, 44, 46–48, 55].

### Table 2. (continued)

<table>
<thead>
<tr>
<th>Bias</th>
<th>Author, year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selective reporting (reporting bias)</td>
<td>Low-risk published report includes all expected outcomes</td>
</tr>
<tr>
<td>Low-risk published report includes all expected outcomes</td>
<td></td>
</tr>
<tr>
<td>Low-risk published report includes all expected outcomes</td>
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</tr>
<tr>
<td>Low-risk published report includes all expected outcomes</td>
<td></td>
</tr>
<tr>
<td>Other biases (other bias)</td>
<td>Intervention effect and therapist effect cannot be differentiated as only 1 therapist conducted interventions</td>
</tr>
</tbody>
</table>

**eBI = Enhanced BI (i.e. individual plus family brief intervention); ITT = intent-to-treat.**

*Information obtained from written communication with author.*

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**Table 2.** (continued)

<table>
<thead>
<tr>
<th>Bias</th>
<th>Author, year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selective reporting (reporting bias)</td>
<td>Low-risk published report includes all expected outcomes</td>
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<tr>
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</table>

**Key Findings of Systematic Review and Additional Evidence Synthesis**

**Alcohol Consumption**

All except one study [33] with follow-up assessments observed reductions of alcohol consumption following the ED visit regardless of the form of care [table 4]. Two studies found significant differences across conditions for alcohol consumption-based outcomes. Monti and colleagues [47] observed significantly greater reductions in the intervention group in the number of past-month drinking days at 6 (F = 6.34; p = 0.01) and 12-month follow-up (F = 11.02; p ≤ 0.001). A detailed description of publications is depicted in table 3.
### Table 3. Characteristics and key findings of additional evidence synthesis

<table>
<thead>
<tr>
<th>Author, year, country</th>
<th>Sample size (% male; age range (mean age))</th>
<th>Publication type; study design/content of publication</th>
<th>Study/project inclusion criteria</th>
<th>Follow-ups; loss to follow-up</th>
<th>Intervention; interventionists</th>
<th>Intervention effects on alcohol-related outcomes; referral rate</th>
<th>Participation rate; acceptance; implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fandler et al. (2008), Austria</td>
<td>&lt;18 (15.5)</td>
<td>Journal article; cross-sectional access-to-care sample characterisation and project description</td>
<td>Treatment in a paediatric ED following acute alcohol intoxication</td>
<td>No follow-up</td>
<td>BI addresses youth and caregivers, informs about consequences of underage alcohol use, AAI and youth protection law. Psychosocial risk factors are addressed in order to determine need for further treatment; psychologist (weekdays), medical doctor (weekends)</td>
<td>-; -</td>
<td>-; -</td>
</tr>
<tr>
<td>Callisch et al. (2013), Switzerland</td>
<td>356 (42%); 9.2–17.4* (14.9)*</td>
<td>Journal article; cross-sectional access-to-care sample characterisation and project description</td>
<td>Treatment in a paediatric ED following acute alcohol intoxication</td>
<td>No follow-up</td>
<td>BI with adolescents in ED and BI (30–45 min) with adolescent and caregivers within 10 days after ED visit addressing context and risks of AAI, drinking patterns, consequences of underage drinking, parenting, goal setting, strategies for achieving drinking goals. Referral to youth-specific substance use counselling or psychiatric services if indicated; –</td>
<td>-; 88%</td>
<td>82.8%; -; -</td>
</tr>
<tr>
<td>Müller et al. (2009), Germany</td>
<td>128 (55.5%); &lt;18 (15.5)</td>
<td>Journal article; cross-sectional access-to-care sample characterisation and project description</td>
<td>Treatment in an ED following acute alcohol intoxication</td>
<td>No follow-up</td>
<td>Youth and caregivers receive standardized BI (45 min), at-risk alcohol consuming youth are referred to a youth specific group programme; trained youth- and substance use counsellors</td>
<td>-; -</td>
<td>88.3%; -; -</td>
</tr>
<tr>
<td>Reis et al. (2009), Germany</td>
<td>182 (59%); &lt;18 (15.3)</td>
<td>Journal article; evaluation of a project combining BIs in ED with community-based alcohol prevention strategies by comparing AAI prevalence in 2 regions (experimental vs. control)</td>
<td>Treatment in an ED following acute alcohol intoxication</td>
<td>No follow-up</td>
<td>BI including MI elements addressing context and risks of AAI, drinking patterns, consequences of underage drinking, goal setting, strategies for achieving drinking goals. Standardized psychiatric and substance use assessment resulting in referral to either detoxification, inpatient treatment, sociotherapy or experience-oriented group programme; child and adolescent psychiatrist</td>
<td>12-month AAI prevalence dropped by 20% in the experimental region and increased by 33% in the control region; –</td>
<td>83.1%; -; -</td>
</tr>
<tr>
<td>Fenzl et al. (submitted), Austria</td>
<td>175 (58%); &lt;18 (15.9)</td>
<td>Journal article; cross-sectional access-to-care sample characterisation and project description</td>
<td>Treatment in a paediatric ED following acute alcohol intoxication</td>
<td>3–4 months follow-up; -</td>
<td>BI for adolescents and caregivers addressing consequences of underage alcohol use, aiming at motivating to take up further treatment; ED staff members</td>
<td>-; 25.1%</td>
<td>21.7%; -; -</td>
</tr>
</tbody>
</table>
### Table 3. (continued)

<table>
<thead>
<tr>
<th>Author, year, country</th>
<th>Sample size (% male); age range (mean age)</th>
<th>Publication type; study design/ content of publication</th>
<th>Study/project inclusion criteria</th>
<th>Follow-ups; loss to follow-up</th>
<th>Intervention; interventionists</th>
<th>Intervention effects on alcohol-related outcomes; referral rate</th>
<th>Participation rate; acceptance; implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stolle et al. (2013), Germany</td>
<td>88 (48.9); &lt;21 (16.4)</td>
<td>Journal article; pilot study with one intervention group, no control group</td>
<td>Treatment in an ED following acute alcohol intoxication</td>
<td>6-month follow-up; 11.4%</td>
<td>Semi-structured 40 min brief motivational intervention; external advanced medical students</td>
<td>Quantity of alcohol use (g/l in past 30 days) significantly reduced at 6-month follow-up ($M = 544$ (SE = 102) vs. $M = 358$ (SE = 108), $p &lt; 0.05$); 17%</td>
<td>–; –; –</td>
</tr>
<tr>
<td>Prognos AG (2008), Germany</td>
<td>764 (59); &lt;18 (15.5)</td>
<td>Final report to government body; cross-sectional access-to-care sample characterisation and project description</td>
<td>Treatment in an ED following acute alcohol intoxication</td>
<td>No follow-up</td>
<td>BI addresses youth and caregivers, is based on MI and aims at supporting youth to reflect upon at-risk alcohol use and consequences and referring them to an experience-oriented group programme especially developed for this target group; trained external facilitators with different vocational backgrounds</td>
<td>–; –</td>
<td>–; –; project implementation (BI in ED and community-based alcohol prevention) was strongly dependent on support from relevant opinion leaders in the community</td>
</tr>
<tr>
<td>Delphi (2010), Germany</td>
<td>339 (44.9); &lt;18 (15.6)</td>
<td>Final report to government body; cross-sectional assessment of post intervention data and comparison with representative reference sample</td>
<td>Treatment in an ED following acute alcohol intoxication</td>
<td>One overall assessment point resulting in varying individual assessment points (1–18 months post intervention); 60.9%</td>
<td>BI addresses youth and caregivers, is based on MI and provides information on consequences of alcohol use, promotes sensible drinking and refers to an experience-oriented group programme and further treatment if indicated; –</td>
<td>In BI group lower alcohol abstinence rates (53.8 vs. 71.4% for &lt;16 year-olds, 14.7 vs. 23.8% for &gt;16 year-olds) and higher 30-day binge-drinking prevalence (60 vs. 20%); 20% took part in experience-oriented group programme/18.3% took up further medical or psychiatric treatment</td>
<td>–; 77.5% participants would recommend the BI to a friend, staff in 6 of 10 clinics rated BI implementation a valuable addition to TAU; –</td>
</tr>
</tbody>
</table>

* '-' = Indicates 'no information provided'; TAU = treatment as usual.

* Information obtained from written communication with author.
Table 4. Measures, key findings and potential limitations of studies included in systematic review

<table>
<thead>
<tr>
<th>Trials with minimal active control condition</th>
<th>Drinking quantity</th>
<th>Drinking frequency</th>
<th>Frequency of high volume drinking</th>
<th>Alcohol-related problems</th>
<th>Drinking and driving</th>
<th>Alcohol-related injuries</th>
<th>Referral to treatment</th>
<th>Summary of intervention effects on alcohol-related outcomes; referral rate</th>
<th>Between-group difference; effect size (Cohen’s d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monti et al., 1999</td>
<td>Measure</td>
<td>ADQ</td>
<td>ADQ</td>
<td>ADQ</td>
<td>5 items from HBQ</td>
<td>YADDQ</td>
<td>AIC</td>
<td>Yes/no</td>
<td>Drinking and driving declined significantly in BI group, participants in BI group were less likely to experience alcohol-related injury, significantly fewer alcohol-related problems were reported in BI group, alcohol consumption (ADQ total score) declined in both groups with no inter-group differences; no differences in seeking additional treatment</td>
</tr>
<tr>
<td></td>
<td>Between-group difference; effect size</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>6 months</td>
<td>6 months</td>
<td>6 months</td>
<td>n.s.; 6 months:</td>
</tr>
<tr>
<td></td>
<td>Effect size (Cohen’s d)</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>6 months</td>
<td>6 months</td>
<td>6 months</td>
<td>n.s.; 6 months:</td>
</tr>
<tr>
<td>Segatto et al., 2011</td>
<td>Measure</td>
<td>ACQ</td>
<td>ACQ</td>
<td>ACQ</td>
<td>RAPI</td>
<td>ACRQ</td>
<td>–</td>
<td>–</td>
<td>Significant reduction in alcohol consumption (ACQ total score) in both groups, no inter-group differences, significant reductions of negative alcohol-related harm in both groups with no inter-group differences; –</td>
</tr>
<tr>
<td></td>
<td>Between-group difference; effect size (Cohen’s d)</td>
<td>n.s.; 3 months: d = 0.13</td>
<td>n.s.; 3 months: d = 0.27</td>
<td>n.s.; 3 months: d = 0.04</td>
<td>n.s.; 3 months: d = 0.31</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>Significant reduction in alcohol consumption in both groups, no inter-group differences, significant reductions of negative alcohol-related harm in both groups with no inter-group differences; –</td>
</tr>
<tr>
<td>Monti et al., 2007</td>
<td>Measure</td>
<td>TLFB</td>
<td>TLFB</td>
<td>TLFB</td>
<td>RAPI</td>
<td>Frequency of driving within 1 hour after drinking</td>
<td>AIC</td>
<td>Yes/no</td>
<td>BI group reduced number of drinking days, heavy drinking days and drinks per week significantly stronger at 6 and 12 months follow-up; significant increase of referral to treatment at 12-month follow-up in both groups with no between-group effect</td>
</tr>
<tr>
<td></td>
<td>Between-group difference; effect size (Cohen’s d)</td>
<td>6 months: p = 0.01, d = 0.24</td>
<td>6 months: p = 0.01, d = 0.24</td>
<td>6 months: p = 0.01, d = 0.17</td>
<td>6 months: p = 0.01, d = 0.18</td>
<td>12 months: d = 0.02</td>
<td>12 months: d = 0.03</td>
<td>12 months: d = 0.08</td>
<td>12 months: d = 0.23</td>
</tr>
<tr>
<td></td>
<td>Effect size (Cohen’s d)</td>
<td>6 months: p = 0.01, d = 0.24</td>
<td>6 months: p = 0.01, d = 0.24</td>
<td>6 months: p = 0.01, d = 0.17</td>
<td>6 months: p = 0.01, d = 0.18</td>
<td>12 months: d = 0.02</td>
<td>12 months: d = 0.03</td>
<td>12 months: d = 0.08</td>
<td>12 months: d = 0.23</td>
</tr>
</tbody>
</table>

67%; not assessed systematically, but ‘findings clearly demonstrate the intervention’s acceptability and feasibility’ (p 992); drop-outs differed from follow-up completers in drinking days and frequency of heavy drinking, high number of study participants who generally consumed low levels of alcohol, which made it difficult to detect effects.
<table>
<thead>
<tr>
<th>Measure</th>
<th>ADQ</th>
<th>ADQ</th>
<th>ADQ</th>
<th>5 items from HBQ</th>
<th>YADDQ</th>
<th>AIC</th>
<th>Yes/no</th>
<th>Summary of intervention effects on alcohol-related outcomes; referral rate</th>
<th>Between-group difference; effect size (Cohen's d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tait et al., 2005</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n/a</td>
<td>n/a</td>
<td>n.s/no</td>
<td>Yes/no</td>
<td>4 months: p &lt; 0.001, d = 0.70</td>
</tr>
<tr>
<td>Between-group difference; effect size (Cohen's d)</td>
<td>3 months: d = 0.19</td>
<td>3 months: d = 0.21</td>
<td>3 months: d = 0.35</td>
<td>n.s.; n/a</td>
<td>n.s.; n/a</td>
<td>n.s.; n/a</td>
<td>69%; –; –; significant differences in hazardous alcohol use between groups at baseline</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trials with enhanced intervention control condition</th>
<th>ADQ</th>
<th>ADQ</th>
<th>ADQ</th>
<th>5 items from HBQ</th>
<th>YADDQ</th>
<th>AIC</th>
<th>Yes/no</th>
<th>Summary of intervention effects on alcohol-related outcomes; referral rate</th>
<th>Between-group difference; effect size (Cohen's d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spirito et al., 2011</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n.s.</td>
<td>n/a</td>
<td>n/a</td>
<td>n.s/no</td>
<td>Both groups significantly reduced quantity of drinking at 3, 6 and 12-month follow-ups; a subgroup of participants who scored above the cut-off for referral for alcohol treatment at baseline reported lower drinking frequency and lower frequency of heavy drinking in the BI group than in CG at 3, 6 and 12 months follow-ups; –</td>
<td>53.1%; participants rated facilitators’ competency (rapport, empathy, self-efficacy enhancement) as high; –; school drop outs were less likely to complete 6-month follow-up; rates of follow-up alcohol-related problems were relatively low making it difficult to detect effects</td>
</tr>
<tr>
<td>Between-group difference; effect size (Cohen’s d)</td>
<td>3 months: d = 0.28</td>
<td>3 months: d = 0.25</td>
<td>3 months: d = 0.48</td>
<td>3 months: p = 0.48</td>
<td>3 months: d = 0.19</td>
<td>3 months: d = 0.12</td>
<td>47.3%; –; return visits to complete eBI proved problematic for 20% of families, 'the addition of the family component is more challenging logistically' (p 273); no 'no intervention' control group, low completion rates at 12-month follow-up (BI: 58%, eBI: 74%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Participation rate; acceptance; implementation; limitations | |

- n.s.; n/a
### Table 4. (continued)

<table>
<thead>
<tr>
<th>Measure and Wolstein, 2012b</th>
<th>‘Items derived from Kraus et al., 2008’</th>
<th>‘Items derived from Kraus et al., 2008’</th>
<th>‘Items derived from Kraus et al., 2008’</th>
<th>Between-group difference; effect size (Cohen’s d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wurdak Measure</td>
<td>Drinking quantity</td>
<td>Drinking frequency</td>
<td>Frequency of high volume drinking</td>
<td>Alcohol-related problems</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----------------</td>
<td>------------------</td>
<td>-------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Betwe en-group difference; effect size</td>
<td>n.s.; n/a</td>
<td>n.s.; n/a</td>
<td>n.s.; n/a</td>
<td>Both groups significantly reduced drinking frequency and binge drinking frequency at 1-month follow-up. Females in the eBI group reduced drinking frequency and binge drinking frequency significantly stronger than in BI group at 1-month follow-up. –</td>
</tr>
</tbody>
</table>

ADQ = Adolescent drinking questionnaire; HBQ = health behaviour questionnaire; YADDQ = young adult drinking and driving questionnaire; AIC = adolescent injury checklist; CG = control group; ACQ = alcohol consumption questionnaire; RAPI = rutgers alcohol problem index; ACRQ = alcohol consumption risk questionnaire; TLFB = time-line follow-back; AUDIT-3 = first 3 questions from the alcohol use disorder identification test; eBI = enhanced brief intervention, i.e. individual plus family brief intervention; GHQ = general health questionnaire; n.s. = not significant.

* Effect size calculation not possible from published data; b data from 3- and 6-month follow-up were added to analyse group differences.
at 6 (F = 9.49; p = 0.01) and 12-month follow-up (F = 8.20; p = 0.01). Significant between-group differences were also observed on past-month average number of drinks per week at 6- (F = 7.98; p = 0.01) and 12-month follow-up (F = 10.35; p < 0.01). Spirito et al. [48] observed a significant effect of the enhanced BI (eBI) on high-volume drinking days, defined as consuming more than 5 drinks per occasion, at 3-month follow-up (14.6 vs. 32.1%; p = 0.048). Two studies found significant between-group differences in reductions of alcohol use for subgroups. Spirito and colleagues [31] found a significant effect of the intervention on drinking days per month (F(1, 120) = 7.05; p < 0.01) and frequency of high-volume drinking at 3-, 6- and 12-month follow-up (F(1, 120) = 10.04; p < 0.01) for patients who screened positive for referral to alcohol treatment at baseline. Wurdak and Wolstein [44] found significantly stronger reductions in drinking frequency (F = 7.85; p = 0.009) and high-volume drinking frequency (F = 7.08; p = 0.012) for females in the eBI group. Both studies [31, 44] did not find significant between-group difference in alcohol use in the overall sample. In addition to the effect sizes reported in table 4, we calculated combined effects for the 3 alcohol consumption outcomes drinking quantity, drinking frequency and frequency of high-volume drinking. Relevant data for effect size calculation were published in 4 of the 7 RCTs and combined effects on alcohol consumption ranged from 0.19 [31, 48] to 0.20 [46] and 0.25 [47].

Alcohol-Related Harm

Of the 4 studies that assessed differences in reductions of alcohol-related problems in BI and control groups [31, 32, 46, 47], only 1 [32] reported significantly stronger reductions in the BI group at 6-month follow-up compared to the standard care group (F(1, 78) = 4.10; p < 0.05). Four studies assessed intervention effects on drinking and driving. One study [32] found a significant effect favouring the intervention group (χ²(1, n = 73) = 5.82; p < 0.05). The effect of the BI on alcohol-related injury was assessed in 3 studies [31, 32, 47]. Again, only 1 study [32] reported a significant effect of the intervention on the quantity of alcohol-related injuries (χ²(1, n = 82) = 7.72; p < 0.01). In this study, a significant decline in moving violations in the intervention group at 6-month (χ²(1, n = 62) = 5.17; p < 0.05) was also observed.

Referral to Treatment

Seven of the 15 publications identified in the systematic literature and additional evidence search assessed whether study participants accessed alcohol treatment or counselling following the BI [7, 32, 33, 47, 53–55]. Referral rates in BI groups ranged from 17% [54] to 88% [7] with a mean referral rate of 35.4%. Only 1 of 4 studies comparing referral rates in a BI group with a control group reported significant intervention effects with patients in the intervention group reporting higher numbers in referral to treatment (χ²(1) = 22.3; p < 0.001) at 4-month follow-up [33].

Participation Rates

Of the 15 publications a total of 11 reported data on the ratio of those eligible and youth receiving a BI. On average, 68.8% of eligible youth agreed to take part in the BI. Participation rates ranged from 21.7% [54] to 97.8% [46].

Acceptance

Acceptance of the BI by patients or clinic staff was systematically assessed in 3 studies [31, 44, 53]. In Wurdak and Wolstein [44], 75.9% of participants rated their overall impression of the intervention as ‘very good’, ‘good’ or ‘satisfactory’ when asked immediately following the BI. Furthermore, participants rated the BI on a 5-point scale (1 = agree, 5 = not agree) as ‘helpful’ (M = 4.21, SD = 1.01) and felt being taken seriously (M = 4.04, SD = 1.20) at 1-month follow-up, ratings were slightly lower with M = 3.67 (SD = 1.29) for perceiving the BI as ‘helpful’. In another study [53], 77.5% of participants reported they would recommend the BI to a friend in a similar situation and 60% of clinic staff rated the BI programme as being a valuable addition to ED standard care. Spirito et al. [31] asked study participants to rate counselor’s perceived empathy, rapport and self-efficacy enhancement with generally positive ratings of 3.7–3.8 on a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree). Originally introduced as a measure for protocol adherence, these ratings also reflect patients’ acceptance of the intervention. Authors of 5 publications [6, 7, 50, 52, 54] reported that the BI programmes were initiated by clinic staff as a result of a perceived increase in numbers and symptom severity of those under 18 years treated for AAI, which indicates high motivation of clinic staff to implement and support BI programmes.

Implementation

Data on implementation were reported in 3 of the 15 publications [44, 48, 52]. Facilitators rated the feasibility of BI delivery as ‘good’ to ‘satisfactory’ (M = 2.76, SD = 1.33) on a 6-point scale ranging from 1 = very good to 6 = very bad in 1 study [44]. Qualitative interviews in another publication [52] revealed that the implementation of a project combining BIs in ED with community-based al-
coerl prevention was strongly dependent on the support of relevant stakeholders in the community. Another study [48] reported that return visits including patients’ family members were problematic for 20% of participants.

Booster Sessions

Four studies included BIs with booster sessions [33, 44, 47, 48]. Spirito et al. [48] found a significant effect at 3-month follow-up in reducing high-volume drinking when a booster session with parents and a parent feedback session were added to the BI. Monti et al. [47] compared a BI including two booster sessions by telephone with standard care and found significant reductions in the BI group on all assessed alcohol consumption measures at 6- and 12-month follow-up. Tait et al. [33] compared a BI including a telephone booster with standard care and found a significant effect of the intervention on the target outcome, which was taking up further treatment. Wurdak and Wolstein [44] applied 3 weekly web-based boosters focusing on drinking motives (enhanced BI) or alcohol knowledge (control condition) and found reductions on frequency of alcohol use and heavy use in both groups with females in the enhanced BI condition reporting significantly stronger reductions on these outcomes. The three studies that did not add booster sessions to the interventions yielded either no between-group effects [46], significant effects on alcohol-related harm only [32] or significant intervention effects only for a subgroup of patients with problematic alcohol consumption at baseline [31].

Discussion

This review identified seven RCTs evaluating effectiveness of alcohol BIs in ED for adolescents and young adults following an alcohol-related event and eight additional publications on practice programmes or uncontrolled trials. In contrast to existing reviews [26, 34], this is the first review to identify European evidence for this approach. It is also the first review to support evidence on effectiveness with data on implementation, acceptance and reach of BIs for this target population, essential dimensions for programme evaluation according to the RE-AIM framework [38]. Although a considerably higher number of RCTs than in previous reviews was included [27, 34], evidence of effectiveness of BIs for this target population remains inconclusive. Four of the 7 RCTs found beneficial effects of BIs on alcohol consumption or alcohol-related harm for the overall sample or for subgroups reporting small to medium effect sizes. However, effects relate to heterogeneous outcomes and are limited to a small share in assessed outcomes. None of the studies found effects on both alcohol consumption and alcohol-related harm. Only one of four trials provided evidence supporting effectiveness of BIs in increasing rates of referral to further treatment. The heterogeneity of study methodologies, particularly with regard to control conditions (minimal active vs. enhanced BI) and booster delivery modes (in person including parents [48] vs. telephone [47] vs. web-based [44]) and frequencies (1 [45, 48], 2 [47] or 3 [44]) precluded combining effects with a meta-analysis.

Participation rates as assessed in 11 publications varied strongly, a finding that underlines the importance of systematic process evaluation in order to identify factors contributing to variations in participation rates. Measures on acceptance revealed generally favourable appraisals, but were rarely assessed (n = 3), mainly focussing on acceptance by patients and only in one case by clinic staff. Few publications contained information on BI implementation (n = 3). Reported measures focussed on heterogeneous aspects of implementation such as feasibility of BI delivery rated by facilitators [44], structural prerequisites of BI implementation from a community perspective [52] and feasibility of return visits with family members [48], limiting generalisability of findings and highlighting the need for a more standardized and comprehensive approach to implementation evaluation.

Overall, it has to be noted that there are substantial activities under way in Europe to provide BIs in EDs to children and adolescents following an alcohol-related event. The majority of publications on such programmes originate from Germany, followed by Austria and Switzerland. This finding is likely due to varying degrees of programme implementation in European countries, among which Germany takes on a special role with project ‘HaLT-Hart am Limit’ (‘Stop – close to the limit’) implemented at more than 170 locations across the country. Many of the identified practice projects were initiated by hospital staff [6, 7, 50, 52, 54] as a reaction to rising numbers of alcohol-intoxicated minors treated in EDs, a fact that reflects the articulate need perceived by practitioners to address this target group with appropriate support. In addition to these programmes which provide BIs in ED, a number of programmes exist in Europe, which cater to adolescents with alcohol intoxication with different support, for example, the Dutch programme ‘Jeugd en Alcohol’, which offers adolescents with AAi a counselling and educational session at a scheduled re-visit a couple of weeks after hospitalisation [56, 57] or the Swedish Maria Ungdom, which offers treatment for adolescents with AAi in a specialised
clinic for adolescents with problematic alcohol and other drug use [58], again underlining the need perceived by practitioners to address this target group.

Several reasons may account for the inconclusive findings of this review regarding the effectiveness of BIs in this context. The fact that none of the studies found effects on both alcohol consumption and alcohol-related harm could be due to different contents of the BIs. Monti et al. [32] for example, stated that the BI applied in their study did not emphasize a reduction in alcohol consumption, but focussed on promoting behaviours to reduce alcohol-related harm. The same applies for Tait et al. [33] who tested an intervention that primarily focussed on enhancing motivation for further treatment instead of a reduction in alcohol consumption. Heterogeneity of study methodologies due to different control conditions as well as different numbers and modes of booster sessions also limits comparability of findings. Albeit focussing on studies and programmes targeting adolescents following an alcohol-related event, it needs to be noted that some heterogeneity in the study populations remained, for example, Wurdak and Wolstein [44] only included adolescents treated for an AAI, while other studies generally included adolescents who consumed alcohol prior to the ED visit. It remains unclear if adolescent patients treated for an alcohol-related injury respond differently to the BI. Small sample sizes in some RCTs made it difficult to detect intervention effects for variables with low rates of baseline manifestation as reported, for example, by Spirito et al. [31] for alcohol-related problems and by Monti et al. [32] for alcohol consumption. BMIs have proven to be effective in adolescent populations also for other health behaviours such as smoking and peer violence; however, it has to be taken into account that effects are typically small [59–61]. Small effects may partly be explained by a finding by Mallett et al. [62], who found college students who have experienced negative consequences from alcohol use to be at an increased risk of experiencing similar consequences in the future, indicating that they did not learn from their mistakes.

All except one RCT [33] found reductions in alcohol consumption in both intervention and control groups following the ED visit. Changes in drinking in control groups are often observed in BI studies and factors such as assessment reactivity, research participation effects, regression to the mean and maturation have been identified to contribute to this finding [63, 64]. Furthermore, due to ethical considerations control group participants received some kind of an active intervention in all studies included in this review, potentially contributing to a systematic underestimation of effects under real-world conditions. On the other hand, it is also possible that the ED visit itself represents an event that triggers behaviour change [65] in a way that BIs do not add a significant additional effect, potentially even more so for young individuals treated following an alcohol-related event. Segatto et al. [46] reported the only RCT that did not find positive effects of the BI on any outcome. In this study, the sample differed strongly from those in the other RCTs with a high percentage (37.9% in BI, 35.2% in control group), screening positive for alcohol dependence. BIs for alcohol-dependent patients have been found to be not as effective as for non-dependents [66–68].

Against the background of typical alcohol consumption patterns in adolescence, that is, infrequent heavy drinking [69, 70] it can be questioned whether average quantity of alcoholic drinks consumed over a given period of time and consumption frequency of any quantity of alcohol are appropriate main outcomes to capture intervention effectiveness in this context. Taking into account the harm-reduction approach applied by most BIs in this context, the frequency of high-volume drinking and quantity of alcohol consumption on a typical drinking occasion as well as experience of negative alcohol-related harm could be more appropriate outcome measures to depict risky adolescent drinking.

All RCTs in this review included patients who received ED treatment following the consumption of alcohol. However, none of the studies assessed whether or to what extent patients actually attributed their ED visit to the preceding alcohol use, a fact that could provide additional information contributing to the understanding of differential intervention effects [28].

Conclusions that can be drawn from the current review are limited in several ways. Because of the small number of relevant RCTs it was not feasible to determine publication bias with a funnel plot. However, unpublished studies were sought through a trials registration database, by screening conference proceedings and reference lists, and additional evidence was sought in a grey literature search. The grey literature search cannot meet the claim of completeness and it can only describe programmes published in some kind of a report. Expert contacts for this review were restricted to authors who had published on relevant topics. Furthermore, the age group addressed in this review was 12–25 years, resulting in the inclusion of young people in different developmental stages. Although alcohol BMIs with college-aged participants have a strong evidence base [67], doubts have been expressed whether the MI approach is effective for young...
teenagers [34, 71]. In order to determine differential effectiveness of BMIs for different age groups in this setting, further studies investigating larger samples including children, adolescents and young adults are needed.

Future European research into effectiveness and feasibility of BIs targeting adolescent ED patients following an alcohol-related event is needed, because rising numbers of adolescent AAI patients pose a major public health concern in Europe and numerous practice projects initiated by clinicians reflect the perceived need for effective interventions addressing this population. Replications of successful RCTs would be desirable in order to establish a pool of studies with comparable designs that allow synthesizing of results. Furthermore, research with minimal assessment would be desirable in order to minimize assessment reactivity and evaluate effects under ‘real-world’ conditions. Additionally, the investigation of potential moderators and mediators of effectiveness would be desirable in order to shed light on factors contributing to differential effectiveness of alcohol BIs targeting adolescents after alcohol-related events and thereby contributing to understanding the heterogeneity of existing findings.

Conclusion

Through the unique combination of a systematic review and additional evidence synthesis, this review provided an overview over evidence for BIs in ED for adolescents and young adults following an alcohol-related event that goes beyond effectiveness by including evidence on current implementation, acceptance and reach. In Europe to date, a number of BI programmes targeting adolescents in EDs following alcohol-related events are implemented in clinical practice, whereas evidence regarding their effectiveness and feasibility is limited. The identified gap between current implementation and clinicians’ perceived need for programmes addressing this population on the one hand and the inconsistent evidence for effectiveness and feasibility on the other hand needs to be addressed by future research.

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Disclosure Statement

The authors have no conflict of interest to disclose.

References

25 Wachtel T, Staniford M: The effectiveness of
27 Ahmed M, Mackway-Jones K: Towards evi-
17 Heffernan T, Clark R, Bartholomew J, Ling J,
23 D’Onofrio G, Degutis LC: Preventive care in
24 Havard A, Shakeshaft A, Sanson-Fisher R:
19 Viner RM, Taylor B: Adult outcomes of binge
18 McQueeny T, Schweinsburg BC, Schweins-
20 Grant BF, Stinson FS, Harford TC: Age at on-
14 Sindelar HA, Barnett NP, Spirito A: Adoles-
15 Miller JW, Naimi TS, Brewer RD, Jones SE:
128.
130.
139.
145:
134:
165:
1101–1105.
34 Reis O, Papke M, Haesler F: Ergebnisse eines
projektes zur kombinierten prävention ju-
35 Delphi: Evaluation des ‘NachHaLT’-Projek-
tes in Berlin – Ergebnisbericht. Evaluation of the project ‘NachHaLT’ in Berlin – final re-
36 Diestelkamp/Drechsel/Baldus/Wartberg/
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**Publication III.** Riskanter Alkoholkonsum bei Jugendlichen. Manual zur Durchführung einer motivierenden Kurzintervention


**Format.** published book

*Note: Due to copyright issues publication no III is published in a shortened version (pages 1 – 20 only) in the published version of this dissertation.*
Silke Diestelkamp · Rainer Thomasius

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Manual zur Durchführung einer motivierenden Kurzintervention

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Fachabteilung Drogen und Sucht


Das HaLT-Programm wird im Rahmen der Qualitätssicherung kontinuierlich wissenschaftlich begleitet und weiterentwickelt. Dies wird seit November 2014 durch das eigens gegründete und von der Schöpflin Stiftung finanzierte HaLT Service Center gewährleistet. Das Service Center koordiniert bundesweit zentrale Aktivitäten im HaLT-Netzwerk, garantiert regelmäßige Fachkräfteschulungen, stellt dem Netzwerk aktuelle Materialien und Informationen zur Verfügung und vertritt das Programm auf politischer Ebene.


Susanne Schmitt
HaLT Service Center der Schöpflin Stiftung
Vorwort der Autoren


Deshalb ist das vom Suchtpräventionszentrum Villa Schöpflin entwickelte Präventionsprogramm HaLT – Hart am LimiT so wichtig, da es sich nicht nur an die kleine Gruppe von Jugendlichen mit einer möglichen Suchtgefährdung richtet, sondern auch an die große Gruppe von Jugendlichen, die sich und andere durch episodisch exzessiven Alkoholkonsum potenziell in Gefahr bringen. Der „reaktive Baustein“ dieses Projektes richtet sich an Kinder und Jugendliche, die aufgrund einer akuten Alkoholintoxikation in einer Klinik behandelt werden, und hat das Ziel, diese besonders gefährdeten Kinder und Jugendlichen in einem Gespräch zu einem risikoarmen Konsum bzw. zur Abstinenz zu motivieren.


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Silke Diestelkamp
Prof. Dr. Rainer Thomasius
Deutsches Zentrum für Suchtfragen des Kindes- und Jugendarls
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Einleitung


Dieses Manual richtet sich an Sozialpädagogen, Psychologen, Pädagogen, Erziehungswissenschaftler und Ärzte, die mit Kindern und Jugendlichen mit riskantem Alkoholkonsum arbeiten. Im Speziellen richtet es sich an Fachkräfte, die mit Kindern und Jugendlichen nach akuter Alkoholintoxikation eine motivierende Kurzintervention durchführen möchten.
Theoretischer Hintergrund

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2.12 Abgrenzungen der motivierenden Gesprächsführung zu anderen therapeutischen Ansätzen – 30
Im folgenden Kapitel werden relevante Hintergrundinformationen zu Alkoholkonsum im Jugendalter vorgestellt sowie die theoretischen Annahmen und die Konzeptualisierung des Motivational Interviewing dargelegt.

2.1 Riskanter Alkoholkonsum bei Jugendlichen

2.1.1 Konsum und Verbreitung


Als Rauschtrinken wird der Konsum von 5 alkoholischen Standardgetränken bei einer Trinkgelegenheit für Männer und 4 alkoholischen Standardgetränken für Frauen bezeichnet.

Die Zahl der Jugendlichen bis zum Alter von 20 Jahren, die in Deutschland aufgrund einer akuten Alkoholintoxikation (AAI) stationär behandelt wurden, ist von 9.500 im Jahr 2000 auf 22.250 im Jahr 2014 gestiegen, was einer Steigerung um 136% entspricht (Gesundheitsberichterstattung des Bundes, 2016; Abb. 2.2). Steigende Prävalenzraten von Jugendlichen, die aufgrund einer akuten Alkoholintoxikation (Diagnose F10.0, ICD 10) notfallmedizinisch behandelt werden müssen, wurden in den letzten Jahren aus verschiedenen europäischen Ländern berichtet (Healey et al., 2014; Fandler et al., 2008; Caflisch et al., 2013; Van Hoof et al., 2010; Bitunjac et al., 2009; Loukova, 2011; Kuzelová et al., 2009).


2.1.2 Minderjährige mit akuter Alkoholintoxikation

Es ist wahrscheinlich, dass dieser Anstieg der Behandlungszahlen zum Teil auch auf eine Sensibilisierung in der Bevölkerung zurückzuführen ist, die sich darin ausdrückt, dass schon bei weniger stark intoxikierten Jugendlichen ein Krankenwagen angefordert wird. Eine Studie dazu von Wurdak et al. (2013) fand, dass in einer Gemeinde mit besonders hohen stationären Behandlungszahlen für Minderjährige mit AAI die durchschnittliche Blutalkoholkonzentration der behandelten Jugendlichen geringer und die Bereitschaft der Bevölkerung einen Krankenwagen anzufordern höher war als in einer Vergleichsgemeinde mit niedrigeren Behandlungszahlen. Dennoch ist zu beachten, dass unter den Minderjährigen, die aufgrund einer Alkoholintoxikation
Kapitel 2 · Theoretischer Hintergrund

Abb. 2.1  Anteile der 12- bis 17-Jährigen, die mindestens einmal pro Woche Alkohol konsumieren bundesweit (Orth u. Töppich, 2015)

notfallmedizinisch behandelt werden müssen, im Vergleich zur Allgemeinbevölkerung ein höherer Anteil von Kindern und Jugendlichen zu beobachten ist, der riskant Substanzen konsumiert und weiteren Entwicklungsgefährdungen ausgesetzt ist. So wurden z.B. unter Kindern und Jugendlichen mit einer AAI höhere Prävalenzen von Alkoholmissbrauch, Alkoholabhängigkeit, Binge Drinking, Tabakkonsum und dem Konsum illegaler Substanzen beobachtet als in der Allgemeinbevölkerung (Groß et al., 2016a). In der HaLT-Hamburg-Stichprobe wurde ein sehr hoher Anteil (63,6%) an Kindern und Jugendlichen beobachtet, die ein positives Screeningergebnis
2.2 Risiken und Folgen

Der Konsum von Alkohol stellt einen der drei bedeutendsten Risikofaktoren dar, die zu der globalen Krankheitsbelastung beitragen (Lim et al., 2012). Für Kinder und Jugendliche mit episodisch exzessivem Alkoholkonsum stellen insbesondere die unmittelbaren und mittelfristigen Folgen riskanten Alkoholkonsums eine große Gefährdung dar (Stolle et al., 2009). Jugendliche, die riskante Mengen Alkohol konsumieren, haben ein erhöhtes Risiko Gewalt handlungen zu erfahren, sowohl als Täter als auch als Opfer (Swahn et al., 2004). Neben psychischen Folgen wie Traumatisierungen sind Verletzungen und Konflikte mit der Polizei eine häufige Folge alkoholisierter Gewalt. Im alkoholisierten Zustand kommt es vermehrt auch zu anderen Risikoverhaltensweisen, wie z.B. alkoholisiertem Autofahren (Sindelar et al., 2004). In Verbindung mit depressiven Störungen und kritischen Lebensereignissen erhöht episodisch exzessives Trinken darüber hinaus das Risiko für Suizidversuche bei Jugendlichen (Windle et al., 1992). Verlieren Jugendliche aufgrund des exzessiven Alkoholkonsums das Bewusstsein, kann es durch Unterkühlung oder Aspiration von Erbrochenem zu schwerwiegenden somatischen Komplikationen kommen. Besonders für Mädchen stellen darüber hinaus ungewollte und/oder ungeschützte sexuelle Kontakte im alkoholisierten Zustand eine Gefährdung dar, die zu ungewollten Schwangerschaften und Geschlechtskrankheiten bis hin zu Traumatisierungen durch Vergewaltigungserlebnisse führen können (Champion et al., 2004). Mädchen, die Rauschtrinken praktizieren, haben ein 3-fach erhöhtes Risiko, Opfer ungewollter sexueller Handlungen zu werden (Champion et al., 2004). Früher und häufiger episodisch exzessiver Alkoholkonsum steht im Zusammenhang mit einem


2.3 Konsummotive und Wirkerwartungen


Exzessiver Alkoholkonsum kann aber auch Folge von Unerfahrenheit und Unwissenheit sein oder als Coping Strategie für Stress, Ängste oder andere emotionale Probleme dienen. Nicht zuletzt ist die enthemmende Wirkung von Alkohol oft ein Konsummotiv, da z.B. die Kontakt- und die Initiierung romantischer Beziehungen erleichtert ist. Diese sozialen Motive werden von Jugendlichen am häufigsten als Grund für den Konsum von Alkohol genannt, deutlich häufiger als die Verstärkung positiven Affektes („drinking to enhance“; Cooper et al., 1995) oder die Vermeidung negativen Affektes („drinking to cope“; Cooper et al., 1995; Kuntsche et al., 2005).
Modelle jugendlichen Alkoholkonsums

Alkoholkonsum im Jugendalter kann Funktionen bei der Bewältigung von Entwicklungsaufgaben erfüllen, z. B. im Hinblick auf Identitätsentwicklung und Peergruppenzugehörigkeit.

Während Konsummotive die Gründe für den Konsum widerspiegeln, d. h. die Absicht, ein bestimmtes erwünschtes Ergebnis herbeizuführen (Cox u. Klinger, 1988), spiegeln Wirkерwartungen persönliche Überzeugungen in Bezug auf positive oder negative (d. h. beabsichtigte und unbeabsichtigte) Effekte des Konsums wider (Kuntsche et al., 2005). Alkoholwirkerwartungen beeinflussen das Einstiegsalter in den Alkoholkonsum (Jester et al., 2015), den Konsum selbst und die Wirksamkeit von Alkoholinterventionen (Black et al., 2012).

In einer repräsentativen Befragung unter Schülerinnen und Schülern in Deutschland im Alter von 15 bis 16 Jahren gaben zwei Drittel der Jugendlichen „Spaß haben“ als die am häufigsten erwartete Wirkung von Alkoholkonsum an (Hibell et al., 2012; Tab. 2.2). Nur ca. ein Drittel der Jugendlichen erwarteten durch Alkoholkonsum ihre Gesundheit zu gefährden, lediglich ein Viertel der Befragten gab an, Bedenken zu haben, dass sie unter Alkoholeinfluss Dinge tun könnten, die sie später bereuen könnten.

Die Mehrheit der Jugendlichen konsumiert Alkohol aus sozialen Motiven und hat eine gering ausgeprägte Wahrnehmung potenzieller negativer Folgen des Konsums.

2.4 Modelle jugendlichen Alkoholkonsums

Der Konsum von Alkohol erfüllt im Jugendalter deutlich andere Funktionen als im Erwachsenenalter und ist in der präventiven Arbeit stets vor diesem jugendspezifischen Hintergrund zu verstehen. Alkoholkonsum im Jugendalter wird daher vielfach als Risikoverhalten konzeptionalisiert (Jessor et al., 1987, 1991; Wiers et al., 2007, 2010; Gibbons et al., 2003); im

<table>
<thead>
<tr>
<th>Habe viel Spaß</th>
<th>Gesamt</th>
<th>Jungen</th>
<th>Mädchen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empfinde mich kontaktfreudiger</td>
<td>65</td>
<td>64</td>
<td>66</td>
</tr>
<tr>
<td>Fühle mich entspannt</td>
<td>55</td>
<td>63</td>
<td>49</td>
</tr>
<tr>
<td>Fühle mich glücklich</td>
<td>55</td>
<td>57</td>
<td>53</td>
</tr>
<tr>
<td>Vergesse meine Probleme</td>
<td>48</td>
<td>49</td>
<td>47</td>
</tr>
<tr>
<td>Gefährde meine Gesundheit</td>
<td>37</td>
<td>36</td>
<td>38</td>
</tr>
<tr>
<td>Tue Dinge, die ich später bereue</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Bekomme einen Kater</td>
<td>28</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>Kann nicht aufhören zu trinken</td>
<td>12</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Probleme mit der Polizei</td>
<td>10</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>Fühle mich krank</td>
<td>11</td>
<td>11</td>
<td>11</td>
</tr>
</tbody>
</table>

Tab. 2.2 Alkoholwirkerwartungen 15- bis 16-Jähriger in ausgewählten deutschen Bundesländern (Angaben in Prozent). (Hibell et al., 2012)

Im Folgenden werden drei Modelle mit direktem Anwendungsbezug zur Entstehung und Aufrechterhaltung jugendlichen Alkoholkonsums vorgestellt, die unterschiedliche relevante Schwerpunkte setzen.

1. das **Motivational Model of Alcohol Use** (Cox u. Klinger, 1988, 2004, 2011) mit besonderem Fokus auf der Rolle der Motivation,
2. das **Social Reaction Model of Adolescent Health Risk** (Gibbons et al., 2003), welches einen besonderen Fokus auf die jugendspezifische soziale Einbettung des Alkoholkonsums legt und damit auf die Bedeutung des Konsums für die Identitätsentwicklung als zentraler Entwicklungsaufgabe im Jugendalter,
3. das **Dual Process Model of Adolescent Risk Taking** (Wiers et al., 2007, 2010), welches die Dialektik von reflektierten, kontrollierten und automatischen, impulsiven Prozessen in der Entstehung und Aufrechterhaltung riskanten Alkoholkonsums im Jugendalter hervorhebt.

### 2.4.1 Motivational Model of Alcohol Use


Dieses Modell veranschaulicht, wie eine Motivation zum Alkoholkonsum oder zum Verzicht auf Konsum entstehen kann und bietet daher eine Grundlage für die Ableitung einer Interventionsstrategie. Insbesondere werden in diesem Modell die Bedeutung von Wirkerwartungen und alternativen Belohnungsquellen hervorgehoben, zwei Elementen, die vielversprechende Ansätze für Interventionen bieten.

2.4 · Modelle jugendlichen Alkoholkonsums


Abb. 2.3 Das Motivational Model of Alcohol Use. (Cox u. Klinger, 2011, mit freundlicher Genehmigung von John Wiley & Sons)

### 2.4.2 Social Reaction Model of Adolescent Health Risk


Die zentrale Annahme des Modells ist demzufolge, dass Risikoverhalten im Jugendalter oft eine Reaktion auf soziale Situationen ist, das zu einem solchen Verhalten „verführt“. Die zweite Annahme des Modells betrifft den Kontext und die Funktion jugendlichen Risikoverhaltens. Wie in Abschn. 2.3 beschrieben, kann Alkoholkonsum im Jugendalter Funktionen zur Erreichung verschiedener Entwicklungsaufgaben erfüllen, insbesondere Funktionen im Zusammenhang mit der Identitätsentwicklung, der zentralen Entwicklungsaufgabe im Jugendalter (Havighurst, 1948).


2.4.3 Das duale Prozessmodell jugendlichen Risikoverhaltens


Für die praktische Arbeit mit riskant Alkohol konsumierenden Jugendlichen sind insbesondere die Effekte akuten Alkoholkonsums auf das Risikoverhalten (z.B. weiteren Alkoholkonsum oder andere Risikoverhaltensweisen), wie auch der Einfluss impulsiver Prozesse auf das Risikoverhalten von Bedeutung. Die in dem Modell formulierte moderierende Wirkung von reflektiven Prozessen auf den Einfluss impulsiver Prozesse (Abb. 2.5, Pfeil a) ist außerdem ein wichtiger Ansatzpunkt für die präventive Arbeit.
Kapitel 2 · Theoretischer Hintergrund

2.5 Risiko- und Schutzfaktoren für eine spätere Schädigung durch Alkoholkonsum

Risikant Alkohol konsumierende Minderjährige sind bei jeder einzelnen Konsumgelegenheit einem hohen Risiko ausgesetzt, eine oder mehrere der zum Teil schwerwiegenden akuten Folgen riskanten Konsums zu erleben. Ein Teil dieser Jugendlichen ist darüber hinaus gefährdet, eine alkoholbezogene Störung im Erwachsenenalter zu entwickeln. In einer Studie an 277 jungen Erwachsenen, die 5-13 Jahre nach einer Behandlung aufgrund einer Alkoholintoxikation befragt wurden, erfüllten 12,6% die Kriterien für Alkoholmissbrauch nach DSM-IV und 19,9% die Kriterien für eine Alkoholabhängigkeit, ein deutlich höherer Prozentsatz als in der Allgemeinbevölkerung (Groß et al., 2016a).


- genetische Prädisposition,
- niedriger sozioökonomischer Status der Herkunftsfamilie,
- Geschlecht des Jugendlichen „männlich“,
- problematischer Alkoholkonsum durch andere Familienmitglieder (v.a. der Eltern),
- Vernachlässigung und Misshandlung in der Kindheit,
- frühes Schulversagen,
- Aggressivität,
Erkennen riskanten Alkoholkonsums

Zugehörigkeit zu alkoholkonsumierender Peergroup in später Kindheit und Adoleszenz,
externalisierende Verhaltensstörungen (Störung des Sozialverhaltens, unbehandelte ADHS),
Delinquenz in der Frühadoleszenz,
Impulsivität und Neugier ("sensation/novelty seeking") in der Adoleszenz.

Als Schutzfaktoren für eine spätere Schädigung durch Alkoholkonsum identifizierten Jordan und Sack (2008):
ausgeglichenes Temperament,
soziale und emotionale Kompetenzen,
wenige Konflikte mit den Eltern,
positive Eltern-Kind-Kommunikation,
Religiosität/Spiritualität in der Adoleszenz.

In der Arbeit mit riskant Alkohol konsumierenden Kindern und Jugendlichen geht es daher immer auch um das Erkennen von Risikofaktoren als Indikatoren für eine mögliche Gefährdung und die Stärkung von Schutzfaktoren als mögliche Ressourcen zur Prävention späterer Schädigungen durch Alkoholkonsum.

2.6 Erkennen riskanten Alkoholkonsums


Kriterien für das Abhängigkeitssyndrom nach ICD-10 (Dilling u. Freyberger, 2001)
Drei oder mehr der folgenden Kriterien müssen innerhalb des letzten Jahres gleichzeitig erfüllt gewesen sein:
1. Ein starker Wunsch oder eine Art Zwang, Substanzen oder Alkohol zu konsumieren
2. Verminderte Kontrollfähigkeit bezüglich des Beginns, der Beendigung und der Menge des Substanzkonsums
3. Ein körperliches Entzugssyndrom
4. Nachweis einer Toleranz
5. Fortschreitende Vernachlässigung anderer Interessen zugunsten des Substanzkonsums
6. Anhaltender Substanzkonsum trotz Nachweises eindeutiger schädlicher Folgen

Kriterien für den schädlichen Gebrauch nach ICD-10 (Dilling u. Freyberger, 2001)
Für die Diagnose müssen alle folgenden Kriterien zutreffen:
1. Die Diagnose erfordert eine tatsächliche Schädigung der physischen oder psychischen Gesundheit.
2. Schädliches Konsumverhalten wird häufig von anderen kritisiert und hat unterschiedliche negative soziale Folgen.


- **Konsumumstände**
  - Hinweise auf Alkoholmissbrauch liegen vor, wenn über einen längeren Zeitraum exzessiv konsumiert wird oder der Alkoholkonsum in unangemessenen Situationen (z.B. Schule) auftritt. Es werden also sowohl Konsummenge und -dauer als auch Konsumumstände berücksichtigt.

- **Person**
  - Ist die altersgerechte Entwicklung des Jugendlichen durch den Alkoholkonsum gefährdet oder kann der Jugendliche entwicklungsbedingt das durch den Alkoholkonsum verursachte Risiko nicht adäquat einschätzen, so besteht Verdacht auf Alkoholmissbrauch.

- **Reaktion**
  - Beeinträchtigungen in der Alltagsbewältigung, Entzugssymptome und andere Anzeichen einer physischen Abhängigkeit weisen auf einen Missbrauch hin.

- **Konsequenzen**
  - Anzeichen für einen Missbrauch bestehen bei Beeinträchtigungen der sozialen Beziehungen, der Gesundheit und bei Auftreten gesetzeswidriger Handlungen, die im Zusammenhang mit dem Alkoholkonsum stehen.

Zur Unterstützung der Erkennung riskanten Alkoholkonsums wird der Einsatz von kurzen Scree ningstests empfohlen. In dem einleitenden Interview der HaLT-Hamburg-Intervention wird standardmäßig der Screeningtest CRAFFT-d (Tossmann et al., 2009) eingesetzt, der sich als valides Instrument zur Erkennung riskanten Konsums bewährt hat (Wartberg et al., 2016; Abb. 5.2). Beantwortet ein Jugendlicher 2 oder mehr Fragen mit Ja, so besteht begründeter Verdacht auf riskanten Alkoholkonsum.

2.7 Wirksamkeit von Motivierenden Kurzinterventionen


2.8 Motivierende Gesprächsführung nach Miller und Rollnick


Miller und Rollnick verweisen in diesem Zusammenhang auf den sog. Korrekturreflex (Miller u. Rollnick, 2013). Professionelle in den helfenden Berufen sehen sich oft Personen...
gegenüber, die ein schädigendes Verhalten, wie z.B. exzessiven Alkoholkonsum, mit schwerwiegenden negativen Folgen für sich selbst und ihr Umfeld ausüben. Der Blick auf die schwerwiegenden negativen Konsequenzen, wie z.B. Gesundheitsschädigungen oder im Falle jugendlichen Alkoholkonsums die mit dem Rauschtrinken verbundenen akuten Gefahren durch Kontrollverlust oder Gewalthandlungen, verleiten Helfer oft zu dem Bedürfnis, dem Klienten „die Augen öffnen“ zu wollen, damit dieser endlich die entscheidenden Schritte unternimmt, das Risikoverhalten zu ändern.


**Definitonen für das Motivational Interviewing (nach Miller u. Rollnick, 2015, S. 473)**

**Allgemeine Definition:**
Ein kooperativer Gesprächsstil, der darauf gerichtet ist, die Eigenmotivation einer Person und ihre Selbstverpflichtung zur Veränderung zu stärken.

**Therapeutische Definition:**
Ein personenzentrierter Beratungsstil, der an dem häufigen Problem der Ambivalenz gegenüber einer anstehenden Veränderung ansetzt.

**Technische Definition:**
Ein kooperativer, zielorientierter Kommunikationsstil, bei dem die Aufmerksamkeit in besonderem Maße auf das Sprechen über Veränderung gerichtet ist. Er ist darauf ausgelegt, die Motivation und Selbstverpflichtung einer Person zur Erreichung eines bestimmten Ziels zu stärken, indem in einer von Akzeptanz und Mitgefühl geprägten Atmosphäre die eigenen Gründe der Person, aus denen eine Veränderung gut für sie wäre, herausgearbeitet und erkundet werden.
2.8.1 Die therapeutische Grundhaltung im MI


Die vier Kernaspekte der MI Grundhaltung sind
1. Partnerschaftlichkeit/Kooperation,
2. Akzeptanz,
3. Mitgefühl und
4. Evokation.


Der vierte Aspekt der MI-Grundhaltung ist die sog. Evokation. Unter Evokation wird die Annahme verstanden, dass Klienten Expertenwissen über sich selbst und daher auch Lösungsansätze für ihre Probleme in sich tragen und die Aufgabe des Beraters daher darin besteht, den Klienten dabei zu unterstützen, diese Lösungen hervorzubringen („evozieren“).
**Publication IV.** Short- to Midterm Effectiveness of a Brief Motivational Intervention to Reduce Alcohol Use and Related Problems for Alcohol Intoxicated Children and Adolescents in Pediatric Emergency Departments: A Randomized Controlled Trial.


**Format.** published article
Short- to Midterm Effectiveness of a Brief Motivational Intervention to Reduce Alcohol Use and Related Problems for Alcohol Intoxicated Children and Adolescents in Pediatric Emergency Departments: A Randomized Controlled Trial

Nicolas Arnaud, PhD, Silke Diestelkamp, MSc, Lutz Wartberg, PhD, Peter-Michael Sack, PhD, Anne Daubmann, MSc, and Rainer Thomasius, MD

ABSTRACT

Objectives: The proportion of children and adolescents receiving emergency care for acute alcohol intoxication (AAI) in Germany has sharply increased over the past years. Despite this, no randomized controlled trials (RCTs) have studied guideline- and evidence-based interventions to prevent future alcohol misuse within this population. The objective of our investigation was to evaluate the effectiveness of a brief motivational intervention (b-MI) to reduce drinking and associated problems within pediatric emergency departments (PED) in Hamburg, Germany.

Methods: This stratified cluster-RCT compared a widely established but modified targeted b-MI and treatment as usual (TAU) for patients recruited and treated on Fridays, Saturdays, or Sundays from July 2011 to January 2014 for AAI in EDs of six pediatric hospitals in Hamburg, Germany. Patients under the age of 18 years and their caregivers were included in the study. Intervention was delivered by trained hospital-external staff. The intervention group (n = 141) received a single-session b-MI with a telephone booster after 6 weeks and a brief consultation for caregivers. All intervention material was manual-based. The TAU control group (n = 175) received youth-specific written information on alcohol use and contact information for community resources. Primary outcomes were changes in binge drinking frequency, number of alcoholic drinks on a typical occasion, and alcohol-related problems using the brief Rutgers Alcohol Problem Index. Outcomes were measured by research assistants not involved in intervention delivery. Baseline data were collected in person at the PED, and follow-up data were collected via telephone 3 and 6 months after baseline. Secondary outcome was postenrollment health service utilization. Analyses were based on linear mixed models and intent to treat.

Results: A total of 86.1% (87.5%) of patients in the b-MI group and 82.4% (86.9%) in the TAU group provided valid outcome data after 3 (6) months, respectively. The differences between groups for all outcomes were statistically nonsignificant at both follow-ups (p > 0.05). After 3 months the mean change in binge drinking frequency was –1.36 (95% confidence interval [CI] = –1.81 to –0.91), a reduction of 62.1% in the b-MI group, and...
Germany belongs to the countries with the highest per-capita consumption of alcohol in the world.\textsuperscript{1,2} Drinking typically starts at the age of 13 years, which is comparable, for instance, to the United States,\textsuperscript{3} even though the minimum legal age for purchasing and consuming alcohol is low in Germany (16 years for beer and 18 years for spirits compared to 21 years in the US). Serious at-risk drinking as indicated by AUDIT-C scores in a national representative sample\textsuperscript{4} is prevalent among 16% of 11- to 17-year-old adolescents in Germany and episodic heavy ("binge") drinking (i.e., five drinks or more consumed on one occasion) among school-aged teenagers is high compared to other regions in the world such as the United States.\textsuperscript{5,6} Associated negative effects of early excessive drinking can severely impact on physical, psychological, and social functioning and prevention and early intervention of future harms from drinking is an important public health goal.\textsuperscript{7,8}

In Germany, overall alcohol use in youth has decreased in the past 15 years.\textsuperscript{9} However, this period has been marked by a sharp increase in the number of children and adolescents who received emergency medical treatment for acute alcohol intoxication (AAI). Annual hospital admissions for AAI as primary diagnosis total 119,000 patients in Germany with 22,400 individuals aged 19 years or younger,\textsuperscript{10} a number that is close to the estimated 3% 12-month prevalence in Europe.\textsuperscript{6} Substantial proportions of this population are at risk for ongoing and further alcohol misuse that warrants appropriate treatment,\textsuperscript{11-13} yet the implementation of evidence-based interventions is not standard practice in pediatric emergency departments (PEDs) across Europe thus far.\textsuperscript{14}

However, emergency care in Europe has initiated practice projects to address this particular patient population (see Diestelkamp et al.\textsuperscript{14} for an overview). In Germany the targeted alcohol prevention project HaLT-Hart am Limit\textsuperscript{15} involves a brief single counseling session based on motivational interviewing (MI) for AAI patients in PEDs. This practice project has established a broad national network of cooperating institutions and is one of the most widely disseminated youth alcohol prevention projects in Germany but to date it has not been tested in randomized controlled trials (RCTs).

Overall the literature on brief alcohol interventions in ED settings targeting children and adolescents is relatively sparse compared to the evidence base for adults.\textsuperscript{16} Nevertheless the HaLT approach draws on prior research, which in summary indicates several things: first, brief collaborative and strength-based motivational enhancement interventions such as MI can encourage motivation and commitment for health-related behavior change among nonactively treatment-seeking youth.\textsuperscript{17-20} Second, such interventions can effectively be transported to the constrained and time-limited ED context where interventions need to be brief (i.e., single session).\textsuperscript{21,22} Third, hospitalization can be associated with a state of increased responsiveness to alcohol-related interventions (i.e., “teachable moment” [TM]).\textsuperscript{23,24} Fourth, brief motivational interventions (b-MIs) have the potential to be effective when they directly follow a negative alcohol-related event (such as alcohol intoxication or alcohol-induced injury)\textsuperscript{25-27} and, fifth, awareness of alcohol having prompted PED hospitalization, booster sessions, and parental engagement influence b-MI outcomes.\textsuperscript{28}

These results hold promise for b-MI delivered to adolescent patients treated primarily for alcohol intoxication; however, to date no randomized clinical studies have examined effects in this population.\textsuperscript{14,29,30} Therefore, the primary purpose of this trial was to determine the effectiveness of a single session b-MI (HaLT-Hamburg) for children and adolescents with AAI at PED discharge with a telephone booster and parental component in comparison to treatment as usual (TAU). We hypothesized that the b-MI would be more effective than TAU with respect to a decrease in alcohol use and related problems. Furthermore, we expected higher rates of postenrollment health service utilization in the b-MI group. If b-MI is effective in
improving these outcomes this would provide an evidence base for an established but thus far not rigorously tested brief intervention model (HaLT- Hart am LimiT project) with available resources for broad dissemination that could be used to bridge the gap between current knowledge and clinical practice.\(^\text{31,32}\)

**METHODS**

**Study Design**

This was a stratified cluster-RCT of a targeted b-MI for youth under the age of 18 years presenting at PED for AAI. The study was part of a larger network for mental health promotion and health services research (psychenet: the Hamburg Network for Mental Health\(^\text{33}\)) and was implemented within a network of researchers, community administrators, service providers, and health insurers.\(^\text{31}\) Written informed consent was obtained from all participants. Written parental consent was obtained if parents were present; if not, a consent form to opt out was given. Study procedures were approved by the ethics committee of the Chamber of Psychotherapists Hamburg, Germany. The trial design was published\(^\text{34}\) and no content or major methodologic modifications were made after trial commencement.

**Study Setting and Population**

The study took place in six PEDs spanning the metropolitan area of the City of Hamburg, Germany, with an average annual inpatient treatment demand for AAI of 216 patients (48% female) under the age of 18, for the years 2011 through 2013.\(^\text{35}\) At project launch PED directors were invited to a network conference, informed about the aims and procedures of the project, and asked to participate. Funding of PED-external intervention facilitators was obtained from public health insurers and managed by the Hamburg authorities for Health and Consumer Safety (BGV). The BGV also issued an official instruction for the city’s rescue coordination center to transfer youth with AAI to one of the participating PEDs. b-MIs were delivered in the PED during the morning before discharge by trained and supervised counselors with at least a masters’ degree in psychology, social education work or related fields, and experience in working with youth and their parents.

Eligible for study participation were patients under the age of 18 years with AAI as primary diagnosis (ICD-10 diagnosis F10.0) and their caregivers. Youth enrolled in the study were those who had sufficiently recovered from the event, were fluent in German language, were not critically injured and mentally or physically not impaired, and provided informed consent (including detailed information on the study procedures and content, confidentiality and data security, voluntariness of participation, and right to withdraw consent at any time). Criteria for eligibility were broad, reflecting clinical practice and requirements for enrollment in the national HaLT-project. Participants were enrolled from July 2011 through January 2014 in the participating PEDs in Hamburg, Germany, and restricted to Fridays through Sundays, which was determined adequate to reach a majority of patients in a pilot study.\(^\text{36}\) Participants received shopping vouchers for completing baseline and follow-up data.

**Study Protocol**

**Procedure.** Coordination of attendance and resource availability was managed by a standardized operation schedule for each weekend during the recruitment period.\(^\text{34,37}\) Each Friday at 7 A.M. trained research assistants (RAs) contacted PED staff to determine whether eligible patients had presented for AAI. If this was the case and the patient had neither been discharged in the same night nor left the PED against medical advice, the RA contacted one of the stand-by counselors that were available for this weekend. RAs then visited the PED and conducted baseline interviews in privacy from accompanying parents or caregivers with those patients who gave informed consent and met the initial study eligibility criteria.

**Randomization.** Because of a potentially clustered data structure (patients nested in PEDs) and a planning demand for intervention delivery at each weekend, individual random assignment was not appropriate. Instead random assignment was based on stratified clusters with PEDs on a weekend as unit of randomization and weekend over the 30-month enrollment period as stratum. The total amount of possible combinations between strata and hospitals was balanced in a way that each clinic acted equally often as TAU and b-MI condition and assured that all clinics were either TAU or b-MI condition at each weekend. This procedure led to a high amount of possible clusters.

**Data Collection and Measures.** All assessment instruments were based on self-reports. At baseline we collected basic demographic data on age, sex, school
status (currently in school, yes/no) and migration background. To characterize the level of clinical risk associated with the sample, we also included a screening for alcohol use-related risk using the German version of the CRAFFT (car, relax, alone, forget, friends, trouble; six items, e.g., “Do you ever use alcohol to relax, feel better, or fit in?” “Do you ever use alcohol or drugs while you are by yourself, alone?”; yes/no response format with scores > 2 indicating high risk; Cronbach’s α = 0.53) and a validated screening for psychosocial problems using the Screening for Mental Disorders in Adolescence subscales (each eight items) for internalizing (anxiety/depression, Cronbach’s α = 0.89; and self-esteem, Cronbach’s α = 0.71) and externalizing (aggressive-dissocial behavior, Cronbach’s α = 0.78; and anger control problems, Cronbach’s α = 0.75). Baseline data collection was done at the PED (“at bedside”) prior to discharge by RAs not involved in intervention delivery. Follow-up outcome assessments were conducted by RAs via telephone 3 and 6 months postenrollment respectively.

**Outcome Measures.** Primary trial outcomes were changes from baseline to follow-up (3 and 6 months) in binge drinking frequency, number of alcoholic drinks on a typical drinking occasion and alcohol-related problems. Binge drinking was specified as the first of the ordered primary outcomes because it increases the risk for and often precedes AAI and was assessed for the past month using a single question (“How often did you have 5 (4 for girls) or more drinks on one occasion?”). Additional primary outcome was the number of alcoholic drinks consumed on a typical drinking occasion. For both outcomes, we considered 1 unit of alcohol (standard drink) to include 10 g of ethanol, and we used a graphical overview of various types of drinks to help respondents answer the question, ensuring standardized responses. To assess alcohol-related problems we used the youth-specific brief version of the Rutgers Alcohol Problems Index (brief RAPI), with 16 items assessing whether the individual has experienced negative consequences from drinking alcohol (e.g., “got into a fight with other people [friends, relatives, strangers]”, “Neglected your responsibilities”; “never” to “more than 10 times”; Cronbach’s α = 0.87), in the past 3 months. Secondary outcome was the proportion of patients reporting health service utilization postenrollment (yes/no), as treatment seeking is a strong indicator for change motivation. We counted whether patients have received any treatment or community-based youth or family service (alcohol-, mental health-, youth-, or family-related treatment, service, or support organization or other). To examine counselors’ MI skills, patients in the b-MI group rated counselors’ empathy, affirmation, competence, and congruency using the short version of the index of basic therapeutic skills (BIS) on a 4-point Likert scale (e.g., “counselor respects me and cares for me”; 1 = “totally disagree”, 4 = “totally agree”; Cronbach’s α = 0.91).

**Intervention Conditions and Implementation**

The intervention group received a manual-guided b-MI of approximately 45 minutes’ duration which was modeled on the original HaLT-HaRT am LImiT counseling session and brief ED alcohol interventions based on principles of MI, motivational enhancement interventions, and directive counseling. Intervention development involved extensive participatory work with cooperating clinical and counseling experts to promote a balance between structured delivery and practitioners’ needs for flexibility and client-focused implementation. The goal of the intervention was to stimulate and provide resources for the adolescent’s abilities, capacities, and motivation to reflect and regulate alcohol-related behavior and goal attainment. It formalizes principles of reflective listening and empathic feedback; nonconfronting and nonjudgmental assessment of the circumstances associated with the intoxication and alcohol-related risk behaviors; exercises for exploration of drinking-related attitudes, norms and goals, and goal attainment strategies (including decisional balance and goal-setting exercises); a reflective summary emphasizing personal responsibility for behavior and behavior change; and finally a written agreement on behavior goals and provision of relevant contact information of youth-specific services (see Diestelkamp et al. for a more detailed description; a flowchart of the intervention is provided in Data Supplement S1, available as supporting information in the online version of this paper). Caregivers received a brief consultation by the same counselor who delivered the b-MI to youth, including general information on youth alcohol use and related risks and encouragement to reflect on the AAI episode of their child and that developed strategies to prevent future risky alcohol use and/or to seek further family- and/or substance use–related services if required. Afterward parents, counselor, and adolescent
reunited for a summary statement that focused on supporting the adolescent’s self-efficacy regarding their alcohol-related goals. All counselors were initially trained by experienced MI-trainers (12 h of training) and supervised on a bimonthly basis to discuss problems and experiences of implementation, engage in role-plays, and receive retraining if required. Participants were contacted by telephone 6 weeks postenrollment to reinforce motivation toward goal attainment outlined during the b-MI session and discuss perceived barriers encountered in reaching these goals (5 to 10 min). Participants in the TAU control group were approached by a RA and received an information leaflet on negative consequences of alcohol misuse, as well as contact details of the cooperating youth substance use counseling service, with a recommendation for contact.

Data Analysis
Study eligibility and enrollment were summarized according to Consolidated Standards of Reporting Trials (CONSORT) statement extensions for cluster-randomized trials and analyses were based on intent to treat. We compared baseline characteristics for all randomized participants by intervention arm and examined factors associated with loss to follow-up. Multiple imputation (10 imputations; fully conditional specification method) was used to account for missing follow-up outcome data and single missing values.

The sample size was calculated for the three primary outcomes: binge-drinking frequency, number of alcoholic drinks on a typical occasion, and alcohol-related problems at 3-month follow-up. To detect an anticipated effect size of $d = 0.26$, with a power of 80% and a type I error of 5% for each of these outcomes, 306 patients (153 patients per group) had to be included, if randomization had occurred at patient level. With an assumed intra-cluster correlation of 0.05 and an average of 1.264 patients per cluster, we calculated a design effect for cluster randomization of 1.013, which increased the required sample size to 312 patients (156 patients per group).

The hypothesis that the b-MI is superior to TAU after 3 and 6 months, respectively, was tested for the three primary outcomes (binge drinking frequency, number of alcoholic drinks on a typical occasion, and alcohol-related problems) using mixed-effects analysis of covariance (ANCOVA) models, with changes from baseline in outcome scores as the dependent variable; group, time, interaction between group, and time as fixed effects; respective baseline values as covariate; cluster and counselor as random effects; and time as repeated effect. We checked the assumptions of the ANCOVA models using graphical methods like histograms. We report adjusted means with corresponding 95% confidence intervals (CIs), $p$-values, and Cohen’s $d$ effect sizes, which were calculated for each outcome by dividing the difference in mean change between intervention groups by the pooled baseline standard deviation.

Service utilization was estimated using a mixed logistic regression model, with group as fixed effect, and cluster and counselor as random effects. We report group differences in proportions of participants reporting service utilization at both follow-ups with corresponding odds ratios (OR), 95% CIs, and $p$-values. In these models, an OR of $>1$ indicates that the b-MI group was more likely to respond with “yes” than the TAU group; an OR of $<1$ indicates the opposite.

Additionally, we analyzed versions of these models adjusting for possible confounders. Covariates were included in the adjusted model if they correlated significantly with change in outcome from baseline to follow-up or were significant predictors for missing follow-up data (significance threshold $p < 0.05$). For all analyses the two-sided $\alpha$ level was set to 0.05.

Counselors’ perceived MI skills are reported descriptively as an indicator for b-MI delivery in a MI-consistent spirit. All analyses were performed using SPSS statistical software package (version 22). The trial is registered in a public database (ISRCTN31234060); the sponsors of the study had no role in the study design, data collection, analysis or interpretation, writing the report, or decision to submit results.

RESULTS
Participant Characteristics and Attrition
During the enrollment period (July 2011 through January 2014) the six participating PEDs documented 459 patients under 18 years who had received AAI treatment at weekends and 320 (69.7%) eligible patients were enrolled in the trial (see Figure 1 for participant enrollment and retention). A total of 71 patients (15.5%) could not be assessed for eligibility because they were discharged before standby time (7–9 AM). Among those assessed for eligibility but not enrolled ($n = 58$, 13%) the primary reason for nonenrollment was “not interested” (31 patients, 6.8%); additionally, nine
patients (2%) stated that they were “not feeling well,” nine (2%) were not fluent in the German language, and 19 (4.1%) stated “other reasons.”

Baseline characteristics of enrolled patients are reported in Table 1. Comparisons of randomization groups at baseline indicates that both groups were similar in study variables, except for more participants in the b-MI group scoring above the cut-off for anxiety/depression. Moreover, we included more parents/caregivers of youth in the b-MI group (60.3% compared to 48.9% in the TAU group).

**Intervention Effects at 3 and 6 Months Following Baseline**

**Change in Alcohol Use and Related Problems.** Mean change in binge drinking episodes from baseline to 3 and 6 months of follow-up was statistically significant reduced for both groups with larger reductions in the b-MI group (3 months, −1.35 (95% CI = −1.73 to −0.97), p < 0.001; 6 months, −1.26 (95% CI = −1.63 to −0.88), p < 0.001) compared to the TAU group (3 months, −1.29 (95% CI = −1.77 to −0.81), p < 0.001; 6 months, −1.25 (95% CI = −1.81 to −0.70), p < 0.001). However, between-group differences were statistically not significantly different at both 3 and 6 months (p > 0.05; Table 2 and Figure 2A).

Similarly, mean change in number of alcohol drinks per typical drinking occasion from baseline to 3- and 6-month follow-up was also statistically significant reduced for both groups, again with larger reductions in the b-MI group (3 months, −2.24 (95% CI = −3.18 to −1.29), p < 0.001; 6 months, −1.86 (95% CI = −2.85 to −0.86), p < 0.001) compared to the TAU group (3 months, −1.34 (95% CI = −2.54 to −0.14), p < 0.001; 6 months, −1.61 (95% CI = −2.88 to −0.35), p < 0.01). The numerically larger reductions in the b-MI group compared to the TAU group were statistically not significantly different at both 3 and 6 months (p > 0.05; Table 2 and Figure 2B).
Mean change in alcohol-related problems from baseline to 3- and 6-month follow-up was also statistically significantly reduced for the b-MI group (3 months, −6.72 (95% CI = −7.68 to −5.76), p < 0.001; 6 months, −6.87 (95% CI = −7.81 to −5.93), p < 0.001) and the TAU group (3 months, −6.43 (95% CI = −7.37 to −5.49), p < 0.001; 6 months, −7.05 (95% CI = −7.92 to −6.18), p < 0.001). Again, between-group differences (3 months, −0.29 [95% CI = −0.95 to 1.54]; 6 months, −0.24 [95% CI = −1.48 to 1.01]) were statistically not significantly different at both 3 and 6 months (p > 0.05; Table 2 and Figure 2C).

These results are comparable to the results of models adjusted for potential confounders which correlated with outcomes (Data Supplement S2, available as supporting information in the online version of this paper). These were sex, age, school status, cutoff scores for the CRAFFT, and Screening for Mental Disorders in Adolescence (for the subscales anxiety/depression, self-esteem, aggressive-dissocial behavior, and anger control problems). For reasons of parsimony, only the results of the unadjusted analysis are reported in the main article (Data Supplement S3, available as supporting information in the online version of this paper).

**Service Utilization.** Differences in proportions of patients reporting utilization of any community service organization for mental health or substance use problems were statistically not significant between groups, neither at 3 months (OR = 1.20, 95% CI = 0.65 to 2.21, p > 0.05) nor at 6 months (OR = 1.22, 95% CI = 0.56 to 2.65, p > 0.05) postenrollment. For both groups, service utilization was lower for the second follow-up interval (b-MI group—after 3 months 39 of 141 patients [27.9%] and after 6 months 26 patients [18.1%]; TAU group—after 3 months 45 of 175 patients [25.5%] and after 6 months 27 patients [15.1%]; Table 3).

**Intervention Fidelity: Patient Ratings of b-MI-counselors.** Patient ratings (n_p = 144) of counselor (n_c = 8) empathy, affirmation, competence, and congruency indicate intervention delivery was in accordance with important MI principles. Ratings ranged from 97.8% “total agree” and “agree” for the item “the counselor accepts me” to 85.1% “total agree” and “agree” for the item “the counselor appears empathic to me.” The average “total agreement” and “agreement” of the eight items was high (94.3%; Figure 3).

**DISCUSSION**

The literature on brief ED-based interventions for children and adolescents is underdeveloped compared to the evidence base on brief interventions in adults. Thus, studies targeting adolescents are important, given the prevalence of high-risk health-related behavior such as excessive drinking in this age group. Moreover, existing evidence mainly comes from U. S.–American and Australian trials with unclear implications for high-volume drinking countries in Europe such as Germany. RCTs involving the important group of intoxicated adolescents are missing even though these patients are regarded as a
Table 2
Changes in Primary Outcomes by Study Arm to Baseline versus 3- and 6-month Follow-Up

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>b-MI Group (n = 141)</th>
<th>TAU Group (n = 175)</th>
<th>Between-group Differences (b-MI vs. TAU)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (95% CI)</td>
<td>Adjusted Mean (95% CI)</td>
<td>Change, %</td>
</tr>
<tr>
<td>Binge drinking frequency (past month)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>2.69 (2.22 to 3.15)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>After 3 months</td>
<td>1.21 (0.77 to 1.72)</td>
<td>−1.36 (−1.81 to −0.91)**</td>
<td>−62.1</td>
</tr>
<tr>
<td>After 6 months</td>
<td>0.84 (0.10 to 1.51)</td>
<td>−1.13 (−1.70 to −0.86)**</td>
<td>−55.0</td>
</tr>
<tr>
<td>Number of alcohol drinks at a typical occasion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>6.69 (6.09 to 7.28)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>After 3 months</td>
<td>4.18 (3.51 to 4.84)</td>
<td>−2.24 (−3.18 to −1.29)**</td>
<td>−37.5</td>
</tr>
<tr>
<td>After 6 months</td>
<td>4.45 (3.92 to 4.96)</td>
<td>−1.86 (−2.85 to −0.86)**</td>
<td>−33.5</td>
</tr>
<tr>
<td>Alcohol-related problems (RAPI)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>11.28 (10.04 to 12.48)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>After 3 months</td>
<td>4.45 (3.65 to 5.25)</td>
<td>−6.72 (−7.68 to −5.76)**</td>
<td>−60.5</td>
</tr>
<tr>
<td>After 6 months</td>
<td>3.75 (3.11 to 4.39)</td>
<td>−6.87 (−7.81 to −5.93)**</td>
<td>−66.7</td>
</tr>
</tbody>
</table>

Primary outcomes based on linear mixed-effects analysis of covariance with baseline adjustment and multiple imputation (10 imputations), intervention group as fixed effect, participant, cluster, and counselor as random effects. Effect size = Cohen’s d, which were calculated for each outcome by dividing the difference in mean change between intervention groups by the pooled baseline SD.

b-MI = brief motivational intervention; TAU = treatment as usual.

*p < 0.01, **p < 0.001.
Figure 2. (A) Change in binge drinking frequency. Means are shown as raw means and adjusted for random effects (cluster, counselor) and repeated effect (time). (B) Change in number of alcohol drinks at a typical occasion. Means are shown as raw means and adjusted for random effects (cluster, counselor) and repeated effect (time). (C) Change in alcohol-related problems. Means are shown as raw means and adjusted for random effects (cluster, counselor) and repeated effect (time). b-MI = brief motivational intervention; TAU = treatment as usual.
high-priority group for preventive health services in Germany, and the alcohol-related PED visit is considered a window for opportunity to reach adolescents for interventions and preventive measures for long-term problems.

Previous studies that involve b-MIs in ED settings typically apply screening methods to identify eligible patients for brief intervention among all PED patients, irrespective of whether the ED visit was preceded by an alcohol-related event such as injury or acute intoxication. Taken together these studies find modest effects of brief interventions among young people screening positive for risky drinking with regard to drinking, related problems, and referral to further health services. Although our study sets the focus on adolescents admitted for alcohol intoxication, thus a subsample of patients addressed in previous studies the central finding that youth across both trial conditions reduced their alcohol use and/or related problems significantly is consistent with previous findings of no effects on outcomes beyond the common improvement in both groups over time.

One main implication of current literature reviews of ED-based alcohol interventions is that generalization of findings is limited by substantial heterogeneity across studies and populations. Importantly, heterogeneity of ED-based intervention effects among young people has been attributed to individual differences in severity of baseline drinking and associated problems, as well as salient perceptions of alcohol as a major reason that has caused the ED visit. For example, prior studies found significant effects only among those patients who attributed their ED visit to their alcohol use, which led to our hypothesis of improved outcomes due to the specific timing and context of the present study (i.e., alcohol intoxication directly caused the PED visit).

Inherent to this reasoning is the presence of a TM, a popular concept that describes a "window of opportunity" (p. 29) for health- and alcohol-related intervention. The mechanism of action underlying this concept has been considered to be created by a motivating clinician–patient interaction in the hospital context. However, our finding of improvements in both

### Table 3

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>b-MI Group (n = 141)*</th>
<th>TAU Group (n = 175)*</th>
<th>Between-group Differences (b-MI vs. TAU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service utilization after 3 months</td>
<td>39 (27.9%)</td>
<td>45 (25.5%)</td>
<td>2.40 (–8.45 to 13.3) 0.565 1.20 (0.65 to 2.21)</td>
</tr>
<tr>
<td>Service utilization after 6 months</td>
<td>26 (18.1%)</td>
<td>27 (15.1%)</td>
<td>2.94 (–6.23 to 12.1) 0.617 1.22 (0.56 to 2.65)</td>
</tr>
</tbody>
</table>

Secondary analyses on service utilization and hospital reattendance for AAI are based on mixed logistic regression with group as fixed effect, cluster and counselor as random effects, and multiple imputation (10 imputations). An OR of >1 indicates that the b-MI group was more likely to respond with "yes" than the TAU group; an OR of <1 indicates the opposite.

AAI = acute alcohol intoxication; b-MI = brief motivational intervention; TAU = treatment as usual.

*Data are reported as n (%).

![Figure 3. Patient ratings of counselor’s empathy, affirmation, competence, and congruency. Note: 141 patients, eight counselors. High agreement indicates intervention delivery was according to MI principles.](image-url)
trial conditions suggests that the negative experience of AAI and the associated PED visit, thus the health-related event in itself has motivated drinking-related behavior change.\textsuperscript{56,57} In other words the AAI possibly functioned as a cueing event that may have overridden the impact of the relatively low-intensity brief intervention, at least for the follow-up periods covered in this study. Support for this interpretation is provided by one study in the Netherlands,\textsuperscript{13} showing that about half of the adolescents admitted for alcohol intoxication stopped drinking almost completely in the first 2 months after discharge without any intervention having occurred. Notably, interpretations of TM as heightened intervention responsiveness and as a cueing event for behavior change can both be derived from the current literature.\textsuperscript{24,56} If the AAI-based PED visit indeed functioned as a cueing event for behavior change, this could imply that even if our b-MI was not effective in the current study, it is possibly effective in other populations or other settings that do not include strong natural inducements for health-related behavior change. Unfortunately, the current literature is largely conceptual and lacks empirical or experimental attention. Clearly there is a need to study possible associations between cueing events and intervention outcomes for an advanced understanding of the impact these processes may have on prompting behavior change.

Other reasons also need consideration to explain the lack of significant findings. Of importance is the rather small contrast between both trial conditions in our study.\textsuperscript{41} Effects of MI interventions in young ED populations are typically small and tend to be non-significant in RCTs with active control group designs that use information brochures and contact information for community resources similar to the TAU group in this study.\textsuperscript{44} Additionally, assessment reactivity is of important concern in explaining brief intervention effectiveness\textsuperscript{21,58,30} as assessment of health-related data often resembles elements of the clinician–patient interaction in brief interventions. Whether the above-described considerations around the teachable moment concept have played an additional role in assessment reactivity remains a speculation in this study, but the present results may again underscore the need for more research on the dynamics of this concept in the realm of brief alcohol interventions.

Notwithstanding the nonsignificant trial results, from an implementation perspective\textsuperscript{31,33} it is important to note acceptability and feasibility of intervention delivery by external counselors in an urban PED context, which is designed for fast, often intense and expensive care and long-term prevention or health promotion activities are usually not prioritized.\textsuperscript{60,61} Refusal rates of eligible patients to participate in this study was low, and the mobile intervention delivery team was able to ensure privacy and confidentiality as well as MI principles during interviews in a potentially stressful situation with patients, PED staff, and accompanying parents.

Despite these favorable conditions, reliance on external counselors results in additional health service costs and needs to be justified by convincing evidence. Given the limited results of this study and the mixed evidence for brief intervention programs in acute health care settings so far, more research is clearly needed to strengthen brief intervention programs and to improve individual and public health outcomes regarding risky drinking and other maladaptive behaviors. While brief interventions based on MI are at least as effective as other brief intervention models regarding alcohol use for young populations in emergency care and beyond,\textsuperscript{17,44} there are currently only few alternative intervention models for the time-limited ED context available and studies directly comparing different intervention approaches are largely missing. We are aware of only one trial that compares brief MI with brief interventions targeting personality-specific risk factors with results on the way.\textsuperscript{62}

With regard to Germany, work around the established HaLT-Hart am LimiT intervention model is currently directed at individualizing the intervention approach through identification of differential treatment demands and referral to appropriate community services.\textsuperscript{63} This approach acknowledges heterogeneity in alcohol misuse, psychosocial problems, and developmental risks in the patient population.\textsuperscript{11,64} However, given the limited postenrollment service utilization rate found in this study, lower threshold access to health services should be developed.

One promising strategy toward this aim, and for increasing the effectiveness of interventions in general, may be the utilization of Web and smartphone technology, which is currently developing at a fast pace.\textsuperscript{65–67} Future research should examine the usefulness of incorporating credible and effective technology-based supplements to in-person interventions, for example, to prolong the contact with patients after the initial encounter or to even replace in-person intervention
delivery by stand-alone computer-based b-MI versions, which can be equally as effective.53

LIMITATIONS

Several limitations need to be noted. First, due to limited resources we restricted enrollment to weekends (Friday to Sunday) and to selected hospitals. However, weekends are the peak time for AAI36 and our results should be generalizable to the entire city as there were few exclusion criteria; treatment recordings for citywide AAI during the enrollment period15 indicate that we were able to reach a majority of patients.

Second, we have not included an objective measure for assessing intervention fidelity, such as the Motivational Interviewing Treatment Integrity (MITI) scale.68 Instead, a self-report for rating counselors’ MI-related competencies was applied as a patient-oriented measure for perceived MI spirit. Moreover, training and supervision of counselors were moderate compared to more formal and intense brief intervention models in ED settings tested in several prior studies.21,69 However, given the role of external validity considerations in this effectiveness trial31 and an apparent lack of high-intensity training and supervision structures for counselors in the national HaLT project, counselor training was conceptualized in a way that implementation in nonresearch settings would be feasible.

Third, we cannot rule out that assessment reactivity, research participation effects, and/or regression to the mean had an impact on the results, thereby confounding intervention effects.59 If such influences have indeed occurred, this study could be interpreted as an underestimation of b-MI effects.41

Fourth, participants were not blinded to the assigned trial conditions and underreporting of alcohol use may have been an issue,70 although interviews were conducted in confidentiality and in a nonjudgmental and nonconfronting way. Fifth, enrollment of parents in this study was moderate at most, which may limit the conclusions. Moreover, while adding family components is considered useful,71 introduction of the parents or other authority figures after alcohol-related hospitalization may hold the potential for confusing “ownership” of the adolescents’ drinking20 (p. 65), which could compromise central tenets of MI such as acceptance and avoiding confrontation.18

Sixth, the study only employed a follow-up at 6 months, whereas a previous study reported significant effects after 12 months that were not present at the 6-month follow-up.53 However, and in contrast to our findings, the same study also found significant effects at the 3-month follow-up. Given that effects of b-MIs usually decrease with time17,44 longer follow-up intervals in our study thus may not have resulted in different results.

Finally, precision of intervention effects is largely dependent on measurement accuracy.72 Future studies should consider using mobile technology to collect follow-up outcome measurements in ecologically valid situations (i.e., by means of ecological momentary assessment).

CONCLUSIONS

This randomized-controlled study is the first to examine brief motivational intervention effects among adolescents following acute alcohol intoxication, and strengthens the knowledge base for this relevant patient population. Over time, reported binge drinking episodes, numbers of alcoholic drinks at a typical occasion, and alcohol-related problems decreased significantly in both trial conditions alike. However, there is no evidence that these reductions were positively influenced by the intervention. Additionally, there was no evidence for increased postenrollment service utilization in this study. Notwithstanding these limitations, the study adds evidence that the time-limited patient contact during the pediatric ED offers an opportunity for reaching youth with alcohol misuse, a population that is otherwise hard to reach through available service and treatment programs. Future research should further examine the potentials of brief motivational interventions in different patient populations, including adolescents admitted for acute alcohol intoxication; focus on an advanced understanding of the “teachable moment” concept in this context; and explore feasible ways to improve outcomes.

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References


10. Patients Discharged from Hospital after Inpatient Treatment (Including Deaths and Hour Cases) 2005 to 2014:10.0 - Psychic and Behavior Disorders by Alcohol Acute Alcohol Intoxication. Wiesbaden, Germany: Federal Statistical Office. Available at: https://www.destatis.de/EN/Fac


40. Earleywine M, LaBrie JW, Pedersen ER. A brief Rutgers Alcohol Problem Index with less potential for bias. Addict Behav 2008;33:1249–53.


51. Wachtel T, Staniford M. The effectiveness of brief interventions in the clinical setting in reducing alcohol misuse...


Supporting Information

The following supporting information is available in the online version of this paper:

Data Supplement S1. Flowchart of the brief motivational intervention (b-MI).

Data Supplement S2. Intercorrelations among study variables.

Data Supplement S3. Changes in primary outcomes by study arm versus 3- and 6-month follow-up adjusted for potential confounders.
Publication V. Drinking patterns of alcohol intoxicated adolescents in the emergency department: a latent class analysis


Format. published article
Drinking patterns of alcohol intoxicated adolescents in the emergency department: A latent class analysis

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HIGHLIGHTS
• We examined drinking patterns in adolescents treated for alcohol intoxication
• Latent class analysis revealed 5 classes with distinct drinking patterns
• 1 low-risk class, 2 risky drinking classes and 2 high-risk classes were identified
• High-risk drinking was associated with most severe psychosocial problems
• Findings may help practitioners to better target interventions to patients’ needs

Abstract
Introduction: The increasing number of children and adolescents in need of emergency medical treatment following acute alcohol intoxication has been a major public health concern in Europe in recent years. However, little is known about drinking habits and associated risks in this population. To our knowledge, this is the first study to examine drinking patterns and associated risks in adolescent emergency department patients following alcohol intoxication. The aim of this study is to establish a classification system for admitted adolescents
Methods: Latent class analysis was used to identify subgroups of adolescents with distinct patterns of habitual drinking as defined by the quantity of consumed alcohol on a typical drinking occasion, frequency of binge drinking and drunkenness, alcohol-related problems, prior alcohol-related hospitalizations and alcohol-related risk behaviors. Subgroup characteristics were examined with regard to sociodemographics, other substance use and psychosocial problems using analysis of variance (ANOVA) and chi-square tests.
Results: A total of 316 adolescents aged 12–17 treated in 6 urban emergency departments in Germany were analyzed. Five classes of drinking patterns were identified: one class representing low-risk drinking (class 1 “low-risk” (61.2%)), two classes representing risky drinking (class 2 “moderate-risk” (5.7%) and class 3 “frequent drunk” (15.8%)), as well as two classes representing high-risk drinking (class 4 “alcohol-related problems” (11.4%) and class 5 “excessive drinking” (5.1%)). Membership of classes 4 and 5 was associated with the most severe psychosocial problems, especially with regard to aggressive-dissocial behaviors. The CRAFFT-d and brief RAPI screening tools allowed identifying the two risky drinking classes and two high-risk drinking classes.
Conclusions: Our findings provide the first in-depth analysis of habitual drinking in this study population and may help practitioners to better tailor interventions to patients’ needs by using the identified classes as a form of classification system for admitted adolescents.

Abbreviations: AAI, Acute alcohol intoxication; BI, Brief intervention; ED, Emergency department; LCA, Latent class analysis; AIC, Akaike Information Criterion; BIC, Bayesian Information Criterion.

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1. Introduction

Heavy episodic underage drinking is a growing public health concern in many European countries. Episodes of heavy drinking, i.e. consumption of 5 (4 for girls) or more standard drinks (defined as .36 liters of beer or .12 liters of wine or .037 liters of liquor) on one occasion (binge drinking) (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994) in the past 30 days are reported by 39% of 15–16-year-old students in Europe (Hibell et al., 2012). Underage binge drinking is associated with an increased risk of violent behaviors (Swahn, Simon, Hammig, & Guerrero, 2004), victimization (Shepherd, Sutherland, & Newcombe, 2006), injuries (Sindelar, Barnett, & Spriito, 2004), and unwanted or regretted sexual activities (Champion et al., 2004). Repeated binge drinking episodes are associated with an increased risk of developing an alcohol-related disorder later in life (Viner & Taylor, 2007).

Recently, rising numbers of adolescents in need of emergency medical treatment due to acute alcohol intoxication (AAI) have attracted public attention in a number of European countries (Bitunjac & Saraga, 2009; Gesundheitsberichterstattung des Bundes: Diagnosedaten der Bundesländer ab, 2014; Healey, Rahmana, Faizal, & Kinderman, 2009; Loukova, 2011; Van Hoof, Van Der Lely, Krankenhäuser ab, 2014; Healey, Rahmana, Faizal, & Kinderman, 2009). Whether rising numbers of AAI treatment reflect an increase in risky drinking has been the subject of much debate (Fandler, Scheer, Rödl, & Müller, 2008; Kraus et al., 2012). Recent research has found that (a) an emergency department (ED) admission due to an AAI is not unconditionally implying frequent excessive drinking (Kraus et al., 2012) and (b) higher public awareness of risks associated with underage drinking is associated with higher numbers of ED admissions (Wudak et al., 2013). However, little is known about habitual drinking of adolescent AAI patients and characteristics of potential subgroups. Therefore, the aim of this study was to close this gap in current research by examining subgroups with distinct habitual drinking patterns in an undergraduate sample of AAI patients in ED.

Previous efforts of measuring risky underage drinking found approaches solely applying quantity and frequency measures to fail in identifying adolescents who experience negative consequences of their alcohol use. Ellickson, McGuigan, Adams, Bell, and Hays (1996) found in their study with 4390 high school students that high alcohol consumption only identifies half of the students labeled as “at-risk misusers” and conclude that teenage alcohol misuse needs to include the three dimensions: “high-risk drinking,” “alcohol-related problems,” and “high consumption.” Furthermore, regular alcohol use was found to be less common in adolescents (Deas, Riggs, Langenbusher, Goldman, & Brown, 2000; Wechsler, Kuo, Lee, & Dowdall, 2000) and to not be useful for identification of risky drinkers in this age group (Reboussin, Song, Shrestha, Lohman, & Wolfson, 2006). In general, measures commonly used to identify adult alcohol misuse such as one-dimensional quantity and frequency measures were found not to be applicable for adolescent populations, because adolescent problem drinking is better captured by drinking patterns (Ellickson et al., 1996; Townshend & Duka, 2002). One characteristic pattern is infrequent but heavy alcohol consumption, a pattern often observed among adolescents and identified as causing most alcohol-related harm (Sindelar et al., 2004; Viner & Taylor, 2007). A study by Kraus et al. (2012) found infrequent heavy drinking to be even more prevalent in adolescent AAI patients compared to adolescents in the general population. Therefore, we used a combination of indicators depicting quantity of drinking, frequency of heavy drinking, alcohol-related problems, and alcohol-related risk behaviors to capture underage drinking and to define subgroups.

Because isolated unidimensional measures were found to fail in capturing adolescent problem drinking (Ellickson et al., 1996; Stewart & Power, 2002; Townshend & Duka, 2002), we used latent class analysis (LCA) to identify subgroups with distinct drinking patterns (McCutcheon, 1987). Similar approaches have recently been used in a number of studies examining drinking patterns and associated behaviors in college students (Beseler, Taylor, Kraemer, & Leeman, 2012; Chiauzzi, DasMahapatra, & Black, 2013; Ray, Stapleton, Turrisi, & Philion, 2012), an adolescent community sample (Reboussin et al., 2006) and adolescent patients presenting to a primary care health clinic (Bohnert et al., 2014). Chiauzzi et al. (2013) identified 4 classes of college students with varying degrees of risky drinking and drug use with one class (20.2%) representing high-risk drinking, one class (13.6%) representing moderate-risk drinking, and two classes (46.0% and 20.2%) representing low-risk drinking with varying degrees of drug use. Ray et al. (2012) identified three classes of risky student drinkers as defined by the use of drinking-related protective and risk behaviors. 30% of students exhibited high-risk behaviors (e.g. competitive drinking) combined with low protective behaviors (e.g. setting limits), 10% reported low-risk behaviors in combination with high protective behaviors, and the remaining 60% reported mixed drinking-related risk and protective behaviors. Drinking behaviors and alcohol-related problems were used by Reboussin et al. (2006) in order to identify classes of risky drinker in a community sample of 16–20 year olds. In this sample, 43% of adolescents were classified as “non-problem drinkers,” 30% as “risky problem drinkers” due to high prevalences of social problems from drinking and a high frequency of getting drunk, and 27% as “regular problem drinkers” due to very high prevalences of binge drinking and getting drunk as well as high prevalences of driving after drinking and social problems from drinking. A clinical sample of adolescents was recently assessed by Bohnert et al. (2014) with the focus on identifying classes with distinct patterns of polysubstance use. One class (10.9%) with highest probabilities of polysubstance use was also characterized by a high probability of heavy episodic drinking.

The ability to identify underlying structures of variable endorsement, LCA has a number of methodological strengths including control of Type I error rates and high statistical power (Lanza & Rhoades, 2015). In the present study, we aimed at answering the following questions: (1) How many subgroups based on distinct habitual drinking patterns can be identified in our sample of underage AAI patients? (2) What percentages of the sample are represented in each subgroup? (3) What is the average endorsement of indicators of risky drinking in the subgroups? (4) Is subgroup membership associated with distinct endorsements of other risk factors? As risk factors, sociodemographic variables were examined first. Second, subgroups were compared regarding other substance use, where age at first use as a known risk factor for problem drinking was examined in particular (Clark, Cornelius, Kirisci, & Tarter, 2005; Grant, Stinson, & Harford, 2001), as were concurrent substance use and drug-related risk behaviors (Merline, Jager, & Schulenberg, 2008). Third, psychosocial problems were examined such as aggressive-dissocial behavior and anger-control problems which were found to be strongly correlated with risky substance use in adolescence (Iacono, Malone, & McCabe, 2008; Schuckit, Smith, & Kalmijn, 2014), as were internalizing tendencies such as depression and self-esteem problems (Camatta & Nagoshi, 1995; Pardini, White, & Southamer-Loeber, 2007). We chose an exploratory approach to these research questions, because prior research with this patient population is limited and the generalizability of results of drinking pattern analyses in adolescent populations in other settings is questionable.

2. Method

2.1. Sample and procedures

Baseline data of participants of the Halt-HT-Hamburg trial were analyzed for the present study. The Halt-HT-Hamburg trial is a randomized-controlled trial evaluating the effectiveness of a brief intervention in ED for underage AAI patients. A detailed description of the recruitment and assessment procedures is provided by Diestelkamp et al. (2014). A total of 316 adolescents aged 12–17 years admitted to an ED for AAI took part in the study. All participants provided informed consent and procedures were approved by the ethics committee of the Chamber of
Psychotherapists Hamburg. The trial is registered under Current Controlled Trials ISRCTN132134060. Table 1 provides an overview of the sample characteristics. Mean age of the sample was 15.8 (SD 1.16) with an almost balanced gender distribution (48% females). Average blood alcohol concentration (BAC) was 1.8‰ (SD 0.61; range 0.1%–4.3‰) at the time of admission.

### 2.2. Measures

#### 2.2.1. Indicator variables

Three sets of variables were used to assess underage drinking. The first set of variables represented alcohol consumption and comprised (1) number of standard drinks consumed on a typical drinking occasion, (2) frequency of subjective drunkenness in the past 3 months, and (3) past 30-day binge drinking frequency defined as consumption of 5 (4 for females) or more standard drinks on one drinking occasion (Wechsler et al., 1994). We defined a standard drink as 0.33 liter beer, 0.1 liter wine or 0.04 liter spirits (Bundeszentrale für gesundheitliche Aufklärung (BZgA), 2014). The second set of indicator variables represented alcohol-related problems and comprised (1) lifetime prevalence of previous alcohol-related hospitalizations and (2) a brief version of the Rutgers Alcohol Problem Index (brief RAPI) (Earleywine, LaBrie, & Pedersen, 2008) as a youth-specific screening measure for alcohol-related problems. Participants were asked 16 questions about the frequency of experiencing different situations in the past 3 months while they were drinking alcohol or as a result of their alcohol use (“Not able to do your homework or study for a test”; “Got into fights with other people (friends, relatives, strangers)”; “Wanted to stop drinking but you couldn’t”). Response options ranged from never to more than 10 times. Third, alcohol-related risk behaviors were assessed through the CRAFFT-d alcohol screening test in its validated German version (Tossmann, Kasten, Lang, & Stüber, 2009). This 6-item questionnaire assesses alcohol-related risk behaviors applying a binary yes/no response format (“Do you ever use alcohol to relax, feel better about yourself, or fit in?”; “Do you ever use alcohol or drugs while you are by yourself?”). Two or more positive answers indicate risky alcohol use. All measures were based on self-reports.

#### 2.2.2. Sociodemographic variables

We examined age, gender, school status, and migration background. Participants were considered to have a migration background if both father and mother were born in a country other than Germany.

### 2.2.3. Substance use

Age of first use of alcohol, nicotine, cannabis, and ecstasy was assessed. Frequency of use was assessed through number of days of substance use in the past 30 days. Additionally, we used the validated German version of the RAFFT drug use screening test (Laging, 2005) to assess risky drug use. This 6-item-questionnaire applies a yes/no response format. Two or more positive responses indicate risky drug use.

### 2.2.4. Psychosocial problems

Psychosocial problems were assessed with the Screening for Mental Disorders in Adolescence (Hampel & Petermann, 2005). It assesses externalizing tendencies through the subscales aggressive-dissocial behaviors and anger-control problems, and internalizing tendencies through the subscales anxiety/depression and self-esteem problems. This 32-item questionnaire was validated in a representative sample of German adolescents.

### 2.3. Statistical analysis

Latent class analysis (LCA) was applied to examine drinking patterns. In a first step, the model with the optimal number of latent classes was determined by examining model fit indices. The Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) inform about global model fit taking into account parsimony and goodness of fit. Likelihood ratio tests were used to test whether a given model fits the data better than the model with one class less. Entropy values indicate how well classes are separated with values >0.8 indicating good separation (Tein, Coxe, & Cham, 2013). Model selection was based on fit indices as well as practical interpretability and research objective as recommended (Jung & Wickrama, 2008; Kriston et al., 2011; Muthén & Muthén, 2000). Models with 1 through 9 classes were tested using MPlus Version 5 (Muthén & Muthén, 2011). In a second step, means and standard deviations of continuous indicator variables were computed for each class. Indicator variables representing frequencies showed skewed distributions with high frequencies of the lowest value (“0”). Therefore, these variables were modeled as zero-inflated count variables using a zero-inflated Poisson model as frequently recommended for this kind of data (Afifi, Kotlerman, Ettner, & Cowan, 2007; Atkins & Gallop, 2007; Gardner, Mulvey, & Shaw, 1995). Two statistics will be reported: (1) percentage of subjects not endorsing the lowest value (“at least one”), and (2) median and interquartile range (IQR) for the subgroup of subjects not endorsing the lowest value. In order to interpret the level of risk associated with a given indicator variable endorsement, we applied two risk references. First, we compared class means and prevalences with total sample means and prevalences, and second, we used external criteria as risk references, i.e. the 5/4 binge drinking criterion and a cut-off of ≥2 in the CRAFFT-d (Tossmann et al., 2009).

In a final step, we conducted cross-class comparisons on associated risk factors using chi-square tests for categorical variables and analyses of variance (ANOVA) for continuous variables applying the statistical software package SPSS 18 (IBM Corp., Armonk, NY). Significant overall ANOVAs (α ≤ 0.05) were followed by Tukey’s HSD post hoc tests. Significance levels of chi-square tests (α ≤ 0.05) were Bonferroni-Holmes adjusted in order to control for Type I error inflation as a result of multiple testing. In order to facilitate clinical interpretability of results, we used the “most likely class” approach for assigning subjects to classes. We ran an additional sensitivity analysis in which we included only subjects that were assigned with a probability of 50% or more to a certain class to verify interpretation of the class solution.

### 3. Results

The measures used showed good internal consistency (Cronbach’s α) of .87 for the brief RAPI (Earleywine et al., 2008), and for the SPS-J subscales “aggressive-dissocial behavior” (.78), “anger-control” (.75), “anxiety/depression” (.89), and “self-esteem problems” (.71) (Hampel...
3.1. Number of latent classes

Three different model solutions were recommended by different fit indices. A two-class model was suggested by the likelihood ratio tests (LR1p, LR2p) (Table 2). A 7-class model was suggested by BIC and a 9-class model by AIC. Because different statistical fit indices suggested different class solutions research objective and practical interpretability received more weight in deciding on the number of classes as recommended (Jung & Wickrama, 2008; Kriston et al., 2011; Muthén & Muthén, 2000). In the 2-class solution, 283 subjects (89.6%) were assigned to one class. Therefore, interpretation of the 2-class solution did not meet our research objective of an in-depth analysis of drinking patterns with the aim to infer practical implications for tailoring interventions according to drinking patterns and associated risks. Because of the good performance by the BIC in simulation studies and its sensitivity even to small sample sizes (Nylund, Asparouhov, & Muthén, 2007), we decided to retrieve the 7-class model instead of the 9-class model for further analyses. However, two latent classes comprised only n = 6 adolescents each, a sample size too small for further analyses. Therefore, those 5 classes representing >2% of the total sample were used for further analyses, resulting in a sample size of N = 304.

3.2. Latent class characteristics

The five classes including a sufficient number of participants for further analyses (Swanson, Lindenberg, Bauer, & Crosby, 2012; Tein et al., 2013) revealed distinct indicator response patterns as shown in Fig. 1 for continuous indicator variables. The additional sensitivity analysis in which we included only subjects that could be assigned with a probability of 50% or more to a certain class confirmed our primary findings. The characteristics of the identified classes are reported in Table 3.

Class 1 ("low-risk"; 61.2%). Adolescents in this subgroup exhibited low-risk drinking as demonstrated by endorsements below total sample means and below external risk references on all indicator variables. On average, they consumed less than 5 standard drinks on a typical drinking occasion, only 31.7% in this group reported at least one occasion of drunkenness in addition to the index episode in the past 3 months, 27.9% reported at least one binge drinking episode in the past 30 days. Class 1 was the only class with CRAFFT-d scores below the cut-off indicating risk.

Adolescents in class 2 ("moderate-risk"; 5.7%) were characterized by positive screening results for alcohol-related problems and alcohol-related risk behaviors. In contrast to class 1, a considerably higher percentage reported at least one binge drinking episode in the past 30 days (58.8% vs 27.9%) and at least one occasion of drunkenness in the past 3 months (66.7% vs 31.7%). Prevalence of prior alcohol-related hospitalization was also high in this subgroup (27.8%). Due to the positive screening results and high prevalences of binge drinking and drunkenness, this class was labeled “moderate-risk drinkers.”

Class 3 ("frequent drunk"; 15.8%). Adolescents in this class consumed on average 5.8 standard drinks, they screened positive for alcohol-related risk behaviors, and reported a brief RAPI score of 9.3. 100% of adolescents with valid data on this variable reported being drunk at least once during the past 3 months with a median of 4 occasions and 56.3% reported binge drinking at least once in the past 30 days (median = 3). This response pattern of indicator variables was most prominently characterized by the high prevalence and frequency of drunkenness and was therefore labeled “frequent drunk.”

Class 4 ("alcohol-related problems"; 11.4%) who reported experiencing a very high number of alcohol-related problems (M = 26.8) and a very high prevalence of previous hospitalizations as a result of alcohol use (32.4%). Adolescents in this class reported consuming an average of 6.6 standard drinks and screened positive for alcohol-related risk behaviors. Due to the very high endorsement of alcohol-related problems and prevalence of previous alcohol-related ED visits, we labeled this latent class “alcohol-related problems.”

Class 5 ("excessive drinking"; 5.1%). Adolescents in this class reported a mean consumption of 18.5 standard drinks on a typical drinking occasion, 100% of subjects with valid data on this variable reported being drunk at least once in the past 3 months (median frequency = 11.5). The 30-day prevalence of binge drinking at least once was 75.0% in this class with a median of 5 occasions. As expected, adolescents in this class reported a very high number and frequency of alcohol-related problems (M = 27.5) and a high prevalence of previous alcohol-related hospitalizations (18.8%). We labeled this class “excessive drinking.”

3.3. Cross-class comparisons

In a second step, we compared the classes on (1) sociodemographic variables, (2) other substance use, and (3) psychosocial problems. Detailed information on means and significance tests is given in Table 4.

3.3.1. Sociodemographics

Comparisons between classes revealed no significant differences with regard to age (p = .071), gender (p = .993), or migration background (p = .103). School status differed significantly between classes (p < .001) with class 1 reporting the highest percentage of school attendees (95.7%) and class 5 reporting the lowest percentage (68.8%).

3.3.2. Substance use

Significant cross-class differences were observed for age at first nicotine use with class 1 revealing higher age at first use than class 4 (p = .009) (Table 4). Age at first use of cannabis and alcohol did not differ between classes. Prevalence of ecstasy use was too low for cross-class analyses (Table 1). Frequency of nicotine use differed significantly between classes with class 1 reporting fewer days of nicotine use than class 3 (p = .011) and 4 (p < .001). Number of days of cannabis use did not differ between classes. Finally, class 1 was associated with significantly lower drug-related risk behaviors when compared to classes 4 (p < .001) and 5 (p = .001).

3.3.3. Psychosocial problems

The Screening for Mental Disorders in Adolescence (SPS-J) revealed significant differences between classes on all subscales (Table 4). In particular, class 1 was associated with significantly lower self-esteem problems than class 4 (p = .004). Anxiety and depression differed significantly between classes 1 and 4 (p < .001) and 3 and 4 (p = .015), with class 4 exhibiting more anxiety and depression symptoms. Adolescents in class 1 reported less aggressive-dissocial behaviors than adolescents in classes 4 (p < .001), 3 (p = .008), and 5 (p < .001). Also class 4 membership was associated with more aggressive-dissocial behaviors than classes 3 (p < .001) and 2 (p = .001). Adolescents in class 5
reported more aggressive–dissocial behavior than adolescents in class 3 ($p = .030$). Finally, anger-control problems were reported more often in class 4 than in classes 1 ($p < .001$), 3 ($p = .003$), and 2 ($p = .020$), and more often in class 5 than in class 1 ($p = .022$). Other pairwise comparisons did not differ significantly.

### 4. Discussion

#### 4.1. Drinking patterns

Five sufficiently large classes of adolescents with meaningfully distinct habitual drinking patterns were identified. 61.2% of the sample reported low risk habitual drinking (class 1) as characterized by below sample average alcohol consumption, alcohol-related problems, and alcohol-related risk behaviors. Additionally, comparison of indicator variable endorsement with age-matched general population samples or screening test cut-offs revealed “below average” or “low risk” on all indicator variables. As expected, this group did not report problematic use of other substances nor psychosocial problems. Class 2 “moderate-risk” was characterized by a relatively high proportion of adolescents reporting at least one occasion of drunkenness and binge drinking in addition to the index episode accompanied by a positive CRAFFT-d screening. While adolescents in this group exhibited risky alcohol use and experienced some alcohol-related problems, this group did not show high scores on other risk factors associated with the development of alcohol-related disorders such as other substance use or psychosocial problems. Class 3 “frequent drunk” was most prominently characterized by a very high prevalence and frequency of drunkenness. Similar to class 2, adolescents in this class screened positive for alcohol-related risk behaviors while not exhibiting frequent other substance use or psychosocial problems. Therefore, members of classes 2 and 3 (16.5% of the total sample) were classified as habitual risky drinkers. However, little other substance use and the absence of psychosocial problems may indicate good chances for maturing out of risky drinking in these two classes. Classes 4 and 5 (16.5% of the sample) were classified as high-risk drinkers. Class 4 (11.4%) comprised adolescents

![Fig. 1. Class characteristics regarding continuous indicator variables.](image-url)

**Table 3**

<table>
<thead>
<tr>
<th>Indicator variable</th>
<th>Class 1 n = 186 (61.2%)</th>
<th>Class 2 n = 18 (5.7%)</th>
<th>Class 3 n = 48 (15.8%)</th>
<th>Class 4 n = 36 (11.4%)</th>
<th>Class 5 n = 16 (5.3%)</th>
<th>Total N = 304</th>
<th>Risk reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Typical nr of standard drinks</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>4.71 (3.41)</td>
<td>5.22 (2.95)</td>
<td>5.75 (2.90)</td>
<td>6.55 (2.83)</td>
<td>18.46 (4.13)</td>
<td>5.98 (4.63)</td>
<td>M = 5.0</td>
</tr>
<tr>
<td><strong>Being drunk in the last 3 months</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valid data (n)</td>
<td>120</td>
<td>12</td>
<td>38</td>
<td>20</td>
<td>6</td>
<td>196</td>
<td></td>
</tr>
<tr>
<td>Proportion at least once; n (percent$^{a}$)</td>
<td>38 (31.7)</td>
<td>8 (66.7)</td>
<td>38 (100)</td>
<td>9 (45.0)</td>
<td>6 (100)</td>
<td>99 (50.5)</td>
<td>21.0%$^{c}$</td>
</tr>
<tr>
<td>N if at least once; median (IQR)</td>
<td>1.00 (0)</td>
<td>1.00 (0.75)</td>
<td>4.00 (3)</td>
<td>1.00 (0.5)</td>
<td>11.5 (7.75)</td>
<td>2 (3)</td>
<td></td>
</tr>
<tr>
<td><strong>Binge-drinking occasions in last 30 days</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valid data (n)</td>
<td>172</td>
<td>17</td>
<td>48</td>
<td>34</td>
<td>16</td>
<td>267</td>
<td></td>
</tr>
<tr>
<td>Proportion at least once; n (percent$^{a}$)</td>
<td>48 (27.9)</td>
<td>10 (58.8)</td>
<td>27 (56.3)</td>
<td>20 (58.8)</td>
<td>12 (75.0)</td>
<td>117 (40.8)</td>
<td>17.4%$^{d}$</td>
</tr>
<tr>
<td>N if at least once; median (IQR)</td>
<td>1.00 (1)</td>
<td>1.00 (2.25)</td>
<td>3.00 (4)</td>
<td>1.5 (2)</td>
<td>5.00 (3.75)</td>
<td>2 (2)</td>
<td></td>
</tr>
<tr>
<td><strong>Previous hospitalization</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valid data (n)</td>
<td>48</td>
<td>34</td>
<td>16</td>
<td>304</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion “yes”; n (percent$^{b}$)</td>
<td>6 (3.4)</td>
<td>5 (27.8)</td>
<td>2 (42)</td>
<td>11 (32.4)</td>
<td>3 (18.8)</td>
<td>27 (9.2)</td>
<td>2.0%$^{e}$</td>
</tr>
<tr>
<td><strong>Alcohol-related problems (brief RAPI)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>6.50 (5.71)</td>
<td>7.14 (3.82)</td>
<td>9.27 (5.58)</td>
<td>26.78 (7.74)</td>
<td>27.45 (10.25)</td>
<td>10.28 (9.57)</td>
<td></td>
</tr>
<tr>
<td><strong>Alcohol-related risk behaviors (CRAFFT-d)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>1.42 (0.96)</td>
<td>3.00 (1.50)</td>
<td>2.98 (1.26)</td>
<td>3.25 (1.34)</td>
<td>3.56 (0.89)</td>
<td>2.11 (1.38)</td>
<td>M = 2.0$^{f}$</td>
</tr>
</tbody>
</table>

---

$^{a}$ 5/4 Binge drinking criterion (Wechsler et al., 1994).

$^{b}$ Proportion in relation to valid data.

$^{c}$ 30-day prevalence of being drunk for 15-16-year-old students in Germany (Hibell et al., 2012).

$^{d}$ 30-day binge drinking prevalence for 12-17-year-olds in Germany (Bundeszentrale für gesundheitliche Aufklärung (BZgA), 2014).

$^{e}$ 12-month prevalence of alcohol-related hospitalization for 15-16-year-old students in Germany (Hibell et al., 2012).

$^{f}$ Cut-off for positive screening (Tossmann et al., 2009). SD = Standard deviation; IQR = Interquartile range.
reporting severe alcohol-related problems as indicated by a mean brief RAPI-score 4 times above that of class 1 and by the highest proportion of adolescents with previous alcohol-related hospitalizations (32.5%). Membership in this class was associated with most severe psychosocial problems, in particular aggressive-dissocial behavior and anxiety/depression, indicating clinically relevant differences from other classes. Furthermore, members of this class reported most days of nicotine use and scored high on drug-related risk behaviors. The identification of this subgroup showed that assessing drinking quantity and frequency as sole indicators of problematic alcohol consumption may result in overlooking adolescents who experience severe consequences of their alcohol use and, as found in this sample, co-occurring psychosocial problems and drug-related risk behaviors, a constellation which may lower chances of maturing out of problematic alcohol use if untreated. Class 5 (5.1%) was most strongly characterized by excessive drinking with a mean consumption of 18.46 standard drinks on a typical drinking occasion. As expected, this group also showed high prevalences and frequencies of binge drinking and drunkenness, screened positive for alcohol-related risk behaviors (RAFFT-d), and exhibited a very high average brief RAPI score indicating severe alcohol-related problems. This group also screened positive for psychosocial problems, in particular aggressive-dissocial behavioral problems, a finding relevant to address when delivering targeted interventions to this subgroup. Two additional classes were identified in the LCA. In our study, however, these classes were underrepresented (3.8% of the total sample) and could therefore not be included in further analyses. Preliminary descriptive analyses indicated that these classes may represent further subgroups of high-risk drinking with a mean of 22.2 standard drinks consumed on a typical drinking day (SD 2.98) in class 6 and a median 3-month frequency of drunkenness of 19 occasions (IQR 13) in class 7. The relatively low prevalence of regular alcohol use in this sample (20.9%) supports our approach of conceptualizing risky adolescent drinking by a set of variables depicting frequency of heavy use, quantity of use, alcohol-related problems, and alcohol-related risk behaviors.

To our knowledge, we are the first to investigate drinking patterns in a sample of adolescents treated for AAI with a LCA. Descriptive information on samples of adolescent AAI patients in ED provide little reference on subgroups of risky drinkers, since they traditionally report means of one-dimensional measures for the entire sample and hereby obscure patterns of variable endorsement relevant for identifying high risk subgroups. For example, Stolle, Sack, Bröning, Baldus, and Thomasius (2013) reported a percentage of 68.2% of 12–21 year olds treated for AAI in an ED to screen positive for risky alcohol use in the RAFFT alcohol screening test, whereas Müller et al. (2009) reported 24.2% of 11–17 year olds treated for AAI in an ED to consume 5 or more standard drinks on a typical drinking day and Reis, Pape, and Haslerr (2009) found 23.4% regular alcohol users (at least weekly) in a similar sample of 10–17 year olds. These studies all report percentages between 11.3% and 15.9% of youth with repeated hospitalizations due to AAI, a characteristic certainly indicating repeated high-risk drinking, but the data from these studies also show the difficulty of determining "risky drinking" by a single indicator.

Previous studies using LCA to examine youthful drinking have revealed 3 or 4 classes of adolescents with distinct drinking patterns (Reboussin et al., 2006; Chiauzzi et al., 2013; Beseler et al., 2012) or
patterns of behaviors associated with risky drinking (Ray et al., 2012) typically representing high-risk, moderate-risk, and low-risk drinking with one or two classes in each of these three risk categories. The 5 classes identified in this study may also be interpreted as representing 3 risk categories: 1) low risk (class 1, 61.2%), 2) moderate risk (classes 2 and 3, 21.5%), and 3) high risk (classes 4 and 5, 16.5%), however, with qualitatively distinct drinking patterns and characteristics with implications for individualized interventions. The high and moderate risk categories in our sample of AAI patients were somewhat smaller than those identified in a sample of college students with 20.2% high-risk drinkers and 13.6% moderate-risk drinkers (Chiauzzi et al., 2013) or a community sample with 27% “regular problem drinkers” and 30% “risky problem drinkers.” However, adolescents in these studies were considerably older (16–20 years in the community sample, mean age of 18.3 years (SD = 0.9) in the college student sample) than in our AAI sample with a mean age of 15.8 years (SD 1.6) possibly explaining the different percentages of the samples represented in each category.

In contrast to other studies, our findings did not replicate findings on cannabis use being strongly associated with risky drinking (Reboussin et al., 2006; Wagner & Anthony, 2002). This finding is likely due to the young age of our study sample and the associated low prevalence of cannabis use. Also contrary to previous research (Grant et al., 2001), we did not find associations between drinking patterns and age or age of onset of alcohol use. The age accumulation in our sample around age 15 with relatively small variance may have resulted in the need for a larger sample size in order to detect statistically significant age differences. Finally, often observed gender differences (Bouthoorn, van Hoof, & van der Lely, 2011; Chiauzzi et al., 2013) were not replicated in this study. However, our finding might be due to male and female adolescent drinking habits assimilating as recently observed in the UK (Healey et al., 2014).

4.2. Limitations

First, since this study took place in urban EDs, it is possible that different drinking patterns would have been found in rural ED patients. Second, all measures used in this study rely on self-report. This has, however, been found to be a valid method for drinking assessment in this population (Vitale, van de Mheen, van de Weil, & Garretsen, 2006). Third, self-report data on the number of standard drinks consumed may be imprecise due to the commonly reported drinking habit of sharing one bottle of a self-made mix of spirits among a group of adolescents. This drinking habit often implies that consumers are not aware of the quantity of spirits contained in a bottle and that they have problems indicating the number of drinks consumed. However, in order to increase quality of data, alcohol consumption data were assessed through an interview by trained research assistants. Finally, the brief RAPI was translated into German as part of this study, resulting in the use of this instrument without prior validation of the German version. However, previous translations of the RAPI into other languages revealed good reliability and validity (López-Núñez et al., 2012) and reliability in our study was good (α = .87) so that interpretation of brief RAPI scores with some caution seem acceptable.

4.3. Implications for prevention and intervention

Identification of these 5 drinking patterns provides valuable information for practitioners. First, knowledge about characteristics of these classes may facilitate individualization of interventions. In particular, interventions could be tailored to focus on characteristic drinking habits taking into account associated other substance use and psychosocial problems. Second, we identified two screening instruments that distinguish well between relevant classes. The CRAFFT-d separated well between class 1 (negative screening) and all other classes (positive screening) and may therefore be a useful tool to identify classes and plan interventions accordingly. Furthermore, the brief RAPI performed well in identifying the risky drinking classes 2 and 3 (positive screening, mean scores 7–9) and high-risk drinking classes 4 and 5 (mean scores 26–27).

4.4. Future research directions

Because this is the first analysis of drinking patterns in an adolescent ED sample of AAI patients with a LCA, study replications would be desirable in order to validate findings. Furthermore, longitudinal studies would be desirable to examine the course of development of drinking patterns, taking into account individual transitions from one drinking pattern to another and conditions under which these transitions occur. Future research should also investigate whether class membership is associated with differential intervention effectiveness, since prior research found baseline alcohol use moderating intervention effectiveness (Carey, Scott-Sheldon, Carey, & DeMartini, 2007; Spirito et al., 2004). Finally, future work is needed to evaluate whether tailoring of BS according to latent class profiles enhances effectiveness.

5. Conclusion

For the first time, drinking patterns of adolescent AAI patients in ED were examined using LCA. Findings provide insights into characteristics and size of subgroups with varying degrees of risky drinking and associated risk factors. Practical implications for latent class identification and intervention individualization can be derived from our study findings.

Role of funding source

This study was prepared as part of the research project Health network: alcohol abuse in adolescence: Improved access-to-care for children and adolescents with at-risk alcohol use (PI. R. Thomasius) which constitutes a sub-project of psychener—the Hamburg Network for Mental Health (Härter et al., 2012). The project psychenet is funded by the German Federal Ministry of Education and Research (BMBF) [grant number 01KQ1002B]. The BMBF had no role in study design, data collection, analysis or interpretation, nor in writing the manuscript or the decision to submit the paper for publication.

Contributors

SD was responsible for study conceptualization and design. IK, SD, and LW conducted the statistical analyses. All authors contributed to the interpretation of the findings. SD wrote the initial draft of the manuscript. IK, MH, NA, LW, PMS, and RT (P) provided feedback and edits on all paper sections. All authors contributed to and approved the final manuscript.

Conflict of interest

All authors declare that they have no conflict of interest to disclose.

Acknowledgements

This study was conducted as part of the research project psychenet—the Hamburg Network for Mental Health (Härter et al., 2012). Psychenet (2011–2015) aims at strengthening health care regions in Germany by establishing new transsectoral cooperations and implement and evaluate selected innovations. Further information and a list of all project partners can be found at http://www.psychenet.de. We wish to thank research assistants Victoria Winter, Kristina Wille, Sabrina Kunze-Klempert, Janina Windsor, Lina Dening, Lisa Zahn, Katharina Kroeger for conducting data collection and assisting in data management.

References


**Publication VI.** Einfluss von Berater/-innen- und Interventionsvariablen auf die Veränderungsmotivation von Kindern und Jugendlichen nach einer motivierenden Kurzintervention zur Reduktion riskanten Alkoholkonsums


**Format.** published article
Einfluss von Berater/innen- und Interventionsvariablen auf die Veränderungsmotivation nach einer motivierenden Kurzintervention zur Reduktion riskanten Alkoholkonsums

Silke Diestelkamp, Lutz Wartberg, Nicolas Arnaud und Rainer Thomasius

Summary

Influence of Counsellor- and Intervention Variables on Motivation to Change Following a Brief Motivational Intervention to Reduce Risky Alcohol Use

Brief interventions are recommended for prevention and early intervention of risky alcohol use. However, evidence of their effectiveness, in particular for children and adolescents, is heterogeneous. Analysis of counsellor and intervention variables may provide insights into mechanisms of action in brief interventions and thereby contribute to an enhanced effectiveness. We analyzed data of N = 141 children and adolescents who were treated for acute alcohol intoxication in the emergency department. Study participants received a brief motivational intervention to reduce risky alcohol use during hospitalization. We applied multiple regression analysis to examine counsellor variables (empathy, affirmation, competence, congruence) and intervention variables (readiness and confidence ruler, decisional balance, goal agreement) as predictors of motivation to change. Higher scores on the basic therapeutic skill “positive affirmation” ($R^2 = 7.1\%$; $p < .01$), finishing the intervention with a written goal agreement ($R^2 = 2.9\%$; $p < .05$) and younger age were associated with greater readiness to change ($R^2 = 10.2\%$; $p < .01$). Therefore, a special focus should be put on the counsellor skill “positive affirmation” when training new counsellors. Results also indicate that younger patients respond stronger to a brief intervention in this context.

Keywords

brief motivational intervention – children and adolescents – alcohol – mechanisms of action

Zusammenfassung


1 Die Autor/innen erklären, dass keine Interessenkonflikte vorliegen.

Schlagwörter
motivierende Kurzintervention – Kinder und Jugendliche – Alkohol – Wirkfaktoren

1 Hintergrund

1.1 Alkoholkonsum im Kindes- und Jugendalter

Bis zu ihrem 17. Lebensjahr haben 92 % der Kinder und Jugendlichen in Deutschland Alkohol konsumiert (Hibell et al., 2012). Besonders schwerwiegende gesund- heitliche und psychosoziale Folgen hat hierbei der episodisch exzessive Konsum von Alkohol. 58.7 % der 15- bis 16-jährigen Schüler/innen berichten, in den vergangenen 30 Tagen mindestens einmal fünf oder mehr (vier oder mehr für Mädchen) Getränke bei einer Trinkgelegenheit konsumiert zu haben (sog. „binge drinking“) (Kraus, Pabst, Piontek, 2008). Häufige Folgen des episodisch exzessiven Alkoholkonsums im Kindes- und Jugendalter sind (Verkehrs-)unfälle, Gewalterfahrungen als Täter oder Opfer, ungewollte sexuelle Handlungen und Konflikte im sozialen Umfeld sowie Konflikte mit der Polizei (Champion et al., 2004; Hingson, Heeren, Zakocs, Winter, 2002; Sindelar, Barnett, Spirito, 2004; Miller, Naimi, Brewer, Jones, 2007). Neben den unmittelbaren Auswirkungen ist episodisch exzessiver Alkoholkonsum mit neurokognitiven Beeinträchtigungen, Beeinträchtigungen in der sozialen und akademischen Entwicklung sowie einem erhöhten Risiko der Entwicklung einer alkoholbezogenen Störung im Erwachsenenalter assoziiert (McQueeny et al., 2009; Heffernan, Clark, Bartholomew, Ling, Stephens, 2010; Grant u. Dawson, 1997; Miller et al., 2007).

1.2 Alkoholbezogene Kurzinterventionen


1.3 Therapeutische Grundhaltung als Wirkfaktor


Veränderungsmotivation nach einer motivierenden Kurzintervention

erschwert wurde, dass die Varianz in den betrachteten Variablen der MI Umsetzung oft gering war.

1.4 MI-tools als Wirkfaktor


Kurzintervention mit einer Zielvereinbarung auch als Endpunkt einer erfolgreichen Intervention interpretiert werden kann, im Gegensatz zu der von Lee et al. (2010) vorgeschlagenen Interpretation als Wirkfaktor.


1.5 Fragestellung

2 Stichprobe und Methoden

2.1 Datenerhebung


2.2 Intervention


2.3 Auswahl der Berater/innen

Als Berater/innen kamen Psycholog/innen (n = 4) und Sozialpädagog/innen (n = 1) zum Einsatz, die in einer zwölfstündigen Schulung in motivierender Gesprächsführung und in der Anwendung des Interventionsmanuals geschult wurden. Während der Studienlaufzeit nahmen die Berater/innen alle zwei Monate an einer Supervisionen teil. In der vorliegenden Studie wurden Daten derjenigen Berater/innen ausgewertet, die während der Studienlaufzeit mehr als fünf Interventionen durchgeführt haben.

2.4 Messinstrumente

Studienteilnehmer/innen füllten im Anschluss an die Intervention einen circa 20-minütigen Fragebogen aus, der unter anderem Daten zur Soziodemografie (Alter, Geschlecht, Schulbildung, Migrationshintergrund) und zum Substanzkonsum erfasste. Eine detaillierte Beschreibung der Messinstrumente findet sich in Diestelkamp, Arnaud, Sack et al. (2014).


2.5 Auswertungsstrategie


3 Ergebnisse

3.1 Stichprobe

N = 141 Jugendliche (50.4 % männlich) im Alter zwischen 12 und 17 Jahren (M = 15.7, SD = 1.16) erhielten eine motivierende Kurzintervention am Krankenbett und nahmen an der Befragung teil (vgl. Tab. 1, folgende Seite). Die Teilnehmer/innen gaben nach der Intervention eine mittlere Veränderungsmotivation von M = 2.56 (SD = .62) an. Davon ordneten sich 5.7 % der Phase der Absichtslosigkeit zu, 22.7 % der Phase der Absichtsbildung und 64.5 % der Phase der Vorbereitung.

3.2 Berater/innen- und Interventionsmerkmale

Im Rahmen dieser Studie wurden die Daten von N = 5 Berater/innen ausgewertet, von denen drei weiblich und zwei männlich waren mit einem mittleren Alter von 41.6 Jahren (SD = 9.7) (Tab. 2). Die Umsetzung der therapeutischen Basiskompetenzen durch die Berater/innen wurde von den Jugendlichen im Mittel mit 2.5 (Empathie) bis 2.8 (Kongruenz und Positive Wertschätzung) eingeschätzt. Für die Gesamtskala „therapeutische Basiskompetenzen“ ergab sich eine sehr gute Reliabilität von Cronbachs α = .908. Für die eingesetzten Subskalen ergaben sich für die Dimensionen Empathie (Cronbachs α = .712), Kongruenz (Cronbachs α = .694), Expertise (Cronbachs α = .762) und positive Wertschätzung (Cronbachs α = .825) akzeptable Reliabilitäten.

Am häufigsten setzten die Berater/innen die Wichtigkeits- und Zuversichtsskalen ein (in 64.5 % der durchgeführten Interventionen), gefolgt von der schriftlichen Formulierung einer Zielvereinbarung (58.9 %) und dem Einsatz der Motivationswaage (39.7 %). Bivariate Korrelationen ergaben statistisch signifikante Zusammenhänge zwischen höheren Ausprägungen der vier therapeutischen Basiskompetenzen mit einer höheren Veränderungsmotivation sowie zwischen dem Einsatz der Zuversichtsskala und dem
Formulieren einer schriftlichen Zielvereinbarung mit einer höheren Veränderungsmotivation (Tab. 2, folgende Seite).

Tabelle 1: Deskriptive Daten zur Beschreibung der Stichprobe (N = 141)

<table>
<thead>
<tr>
<th></th>
<th>Mittelwert/Häufigkeit</th>
<th>Standardabweichung/%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alter</td>
<td>15.71</td>
<td>1.16</td>
</tr>
<tr>
<td>Geschlecht</td>
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<td></td>
</tr>
<tr>
<td>weiblich</td>
<td>70</td>
<td>49.6 %</td>
</tr>
<tr>
<td>männlich</td>
<td>71</td>
<td>50.4 %</td>
</tr>
<tr>
<td>Schulbesuch (ja)</td>
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<tr>
<td>Gymnasium</td>
<td>41</td>
<td>29.1 %</td>
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<tr>
<td>Fachoberschule</td>
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</tr>
<tr>
<td>Gesamtschule/Stadtteilschule</td>
<td>48</td>
<td>34 %</td>
</tr>
<tr>
<td>Realschule</td>
<td>11</td>
<td>7.8 %</td>
</tr>
<tr>
<td>Haupt-/Volksschule</td>
<td>6</td>
<td>4.3 %</td>
</tr>
<tr>
<td>Förderschule</td>
<td>6</td>
<td>4.3 %</td>
</tr>
<tr>
<td>Migrationshintergrund</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vater in einem anderen Land geboren</td>
<td>46</td>
<td>32.6 %</td>
</tr>
<tr>
<td>Mutter in einem anderen Land geboren</td>
<td>36</td>
<td>25.5 %</td>
</tr>
<tr>
<td>Positives Screening für riskanten Alkoholkonsum (CRAFFT-d ≥ 2)</td>
<td>83</td>
<td>58.8 %</td>
</tr>
<tr>
<td>Substanzkonsum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Monats Prävalenz Nikotinkonsum</td>
<td>96</td>
<td>68.1 %</td>
</tr>
<tr>
<td>3-Monats Prävalenz Cannabiskonsum</td>
<td>49</td>
<td>34.8 %</td>
</tr>
<tr>
<td>3-Monats Prävalenz andere illegale Drogen</td>
<td>5</td>
<td>3.5 %</td>
</tr>
<tr>
<td>Veränderungsmotivation</td>
<td>2.56</td>
<td>.62</td>
</tr>
</tbody>
</table>

*a* Deskriptive Statistiken für intervallskalierte Variablen sind Mittelwert (Standardabweichung); *(b)* Deskriptive Statistiken für kategoriale Variablen sind Häuigkeiten (%); *(c)* Tossmann et al. (2009)

3.3 Einflüsse von Berater/innen- und Interventionsmerkmalen auf die Veränderungsmotivation

Die multivariate Analyse des Einflusses der erhobenen Variablen auf die Veränderungsmotivation der Jugendlichen in einem Regressionsmodell ergab statistisch signifikante Einflüsse der therapeutischen Basiskompetenz „Positive Wertschätzung“ mit einer Varianzaufklärung von 7.1 % und des MI-tools „schriftliche Zielvereinbarung“ mit einer Varianzaufklärung von 2.9 % (Tab. 3, folgende Seite). Außerdem zeigte sich, dass ein geringeres Alter der Jugendlichen mit einer höheren Veränderungsbereitschaft einherging (Varianzaufklärung 10.2 %). Insgesamt konnte durch die im Modell eingeschlossenen Variablen eine Varianz von 20.2 % aufgeklärt werden (R² = .202, F = 9.34, p < .001). Multikollinearität zwischen den drei im Modell eingeschlossenen Variablen war niedrig mit Varianzinfationsfaktoren (VIF) zwischen 1.00-1.05 und Toleranzwerten (T) zwischen .95 - .99 (Kutner, Nachtsheim, Neter, 2004). Das Geschlecht

Tabelle 2: Deskriptive Daten und Korrelationen der Berater/innen- und Interventionsmerkmale mit der Veränderungsmotivation

<table>
<thead>
<tr>
<th>Berater/innenmerkmale</th>
<th>Deskriptive Mittelwert (SD)/ N (%)</th>
<th>Korrelationen Veränderungsmotivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geschlecht Berater/innen(^a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weiblich</td>
<td>3 (60 %)</td>
<td>.07</td>
</tr>
<tr>
<td>Männlich</td>
<td>2 (40 %)</td>
<td></td>
</tr>
<tr>
<td>Alter Berater/innen</td>
<td>41.6 (9.7)</td>
<td>-.08</td>
</tr>
<tr>
<td>Empathie(^a)</td>
<td>2.5 (0.6)</td>
<td>.24**</td>
</tr>
<tr>
<td>Kongruenz(^a)</td>
<td>2.8 (0.4)</td>
<td>.16*</td>
</tr>
<tr>
<td>Expertise(^a)</td>
<td>2.7 (0.5)</td>
<td>.22**</td>
</tr>
<tr>
<td>Positive Wertschätzung(^a)</td>
<td>2.8 (0.4)</td>
<td>.27**</td>
</tr>
</tbody>
</table>

| Interventionsmerkmale |  |  |
|-----------------------|  |  |
| Einsatz der Motivationswaage\(^b\) | 56 (39.7 %) | -.11 |
| Einsatz der Zuversichtsskala\(^b\) | 91 (64.5 %) | -.17* |
| Einsatz der Wichtigkeitsskala\(^b\) | 91 (64.5 %) | -.04 |
| Schriftliche Zielvereinbarung\(^b\) | 83 (58.9 %) | -.23** |

\(^a\) Deskriptive Statistiken für intervallskalierte Variablen sind Mittelwert (Standardabweichung); 
\(^b\) Deskriptive Statistiken für kategoriale Variablen sind Häufigkeiten (%) Signifikanzniveaus: \(*p < .05; **p < .01; ***p < .001\)

Tabelle 3: Einfluss der Berater/innen- und Interventionsmerkmale auf die Veränderungsmotivation

<table>
<thead>
<tr>
<th>Berater/innenmerkmale</th>
<th>(\beta_i)</th>
<th>P</th>
<th>Änderung R(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empathie</td>
<td>.14</td>
<td>.18</td>
<td>-</td>
</tr>
<tr>
<td>Kongruenz</td>
<td>.00</td>
<td>.99</td>
<td>-</td>
</tr>
<tr>
<td>Expertise</td>
<td>.14</td>
<td>.17</td>
<td>-</td>
</tr>
<tr>
<td>Positive Wertschätzung</td>
<td>.27</td>
<td>.002**</td>
<td>.071</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interventionsmerkmale</th>
<th>(\beta_i)</th>
<th>P</th>
<th>Änderung R(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Einsatz der Motivationswaage</td>
<td>-.08</td>
<td>.37</td>
<td>-</td>
</tr>
<tr>
<td>Einsatz der Zuversichtsskala</td>
<td>-.10</td>
<td>.28</td>
<td>-</td>
</tr>
<tr>
<td>Einsatz der Wichtigkeitsskala</td>
<td>.01</td>
<td>.95</td>
<td>-</td>
</tr>
<tr>
<td>Schriftliche Zielvereinbarung</td>
<td>-.17</td>
<td>.048*</td>
<td>.029</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Kontrollvariablen</th>
<th>(\beta_i)</th>
<th>P</th>
<th>Änderung R(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alter Jugendliche/r</td>
<td>-.28</td>
<td>.002**</td>
<td>.102</td>
</tr>
<tr>
<td>Geschlecht Jugendliche/r</td>
<td>.06</td>
<td>.50</td>
<td>-</td>
</tr>
<tr>
<td>Alter Berater/in</td>
<td>-.09</td>
<td>.30</td>
<td>-</td>
</tr>
<tr>
<td>Geschlecht Berater/in</td>
<td>.13</td>
<td>.14</td>
<td>-</td>
</tr>
</tbody>
</table>

Multiple lineare Regression; Signifikanzniveaus: \(*p < .05; **p < .01; ***p < .001\)
der/der Beraters/in hatte in der vorliegenden Studie keinen statistisch signifikanten Einfluss auf die Veränderungsbereitschaft zur Reduktion des Alkoholkonsums.

4 Diskussion


Interessanterweise war die positive Wertschätzung in der multivariaten Auswertung ein signifikanter Prädiktor für die Veränderungsbereitschaft, während die Empathie des/der Beraters/in aus Patientensicht entgegen der formulierten Erwartungen keinen Einfluss hatte. Auch der Befund, dass das Beenden der Intervention mit einer Zielvereinbarung ein Prädiktor für eine höhere Veränderungsmotivation war, steht im Einklang mit Befunden vorangegangener Studien (Lee et al., 2010). Allerdings klärt diese Variable in der multivariaten Betrachtung lediglich 2.9 % der Gesamtvarianz auf, und es ist zu beachten, dass dieses Element der Intervention auch als Indikator für eine Veränderungsmotivation gesehen werden kann, im Gegensatz zu der Annahme, dass es sich hierbei um einen Wirkfaktor handelt. Das Alter der Kinder und Jugendlichen zum Zeitpunkt der Intervention war korreliert mit der Veränderungsmotivation, in dem Sinne, dass jüngere Patienten/innen eine höhere Veränderungsmotivation berichteten. Das Alter der Kinder und Jugendlichen blieb auch in der multivariaten Analyse mit 10.2 % Varianzaufklärung der stärkste Prädiktor für eine höhere Veränderungsmotivation. Dieser
Veränderungsmotivation nach einer motivierenden Kurzintervention


Fazit für die Praxis

Literatur


Korrespondenzanschrift: Silke Diestelkamp, Deutsches Zentrum für Suchtfragen des Kindes- und Jugendalters, Universitätsklinikum Hamburg-Eppendorf, 20246 Hamburg; E-Mail: s.diestelkamp@uke.de

Silke Diestelkamp, Lutz Wartberg, Nicolas Arnaud und Rainer Thomasius, Deutsches Zentrum für Suchtfragen des Kindes- und Jugendalters, Universitätsklinikum Hamburg-Eppendorf
APPENDIX II

Complete list of author’s publications

Note: Citations are listed in chronological order, beginning with the most recent publication. Publications which are part of this dissertation are marked in grey.

Publications in peer-reviewed journals


**Book publications and chapters in books**


**Conferences – oral presentations and poster presentations**


APPENDIX III

Curriculum Vitae

since 10/2010  German Center for Addiction Research in Childhood and Adolescence, University Medical Center Hamburg-Eppendorf
Research Associate

Project „Health network ‘alcohol abuse in adolescence’: Improved access-to-care for children and adolescents with at-risk alcohol use ("HaLT-Hamburg")

Psychologist
Vocational training for adolescents with special psychosocial needs


10/2007 – 02/2009 Festina Lente Foundation, Bray, Republic of Ireland
Psychologist
Rehabilitation programme and vocational training for adolescents with special psychosocial needs

01/2006 – 09/2007 Parental leave

10/1999 – 12/2005 University of Trier
Psychology

Degree: Diplom-Psychologin (grade 1,3)
Supervisor: Prof. Dr. phil. Claudia Quaiser-Pohl

Diploma thesis entitled: „Identity development after the birth of the first child – an empirical study of first-time mothers in the Republic of Ireland“. (grade: 1.0)

10/2002 – 12/2002 Grupo Medico Carracci, Mexico City, Mexico
Institute for Psychotherapy und Research
Research Internship

RAISED THIRD-PARTY FUNDING

10/2016  Project Localize it! – Local Strategies to Reduce Underage and Heavy Episodic Drinking (Workpackage 3 “Evaluation”)

3rd EU Health Programme (30 months, 101.000,-€)
(Coordinating investigator: Landschaftsverband Westphalen-Lippe, Koordinationsstelle Sucht)
INTERNATIONAL RESEARCH COOPERATIONS

03/2014 – 01/2016 Initialising of a joint proposal in the EU funding programme Horizon2020 in cooperation with 12 partners from 8 European countries

(King's College London, UK; Karolinska Institut Stockholm, SE; Hospital Clinic de Barcelona, ES; Laboratoří pro léčbu závislostí Psychiatrického centra Praha, CZ; Generalitat de Catalunya, ES; Warsaw Institute of Psychiatry and Neurology, PL; Trimbos Institute Amsterdam, NL; University of Kent, UK; University of Newcastle upon Tyne, UK).

TEACHING

since 03/2014 Lecturer in the "2nd Track Preventive Medicine", module Addiction Prevention, for medical students at the University Medical Center Hamburg-Eppendorf

Seminar „Introduction to Addiction Prevention“ (2., 3., 4. Fachsemester)
Seminar „Motivational Counselling“ (8. Fachsemester)
Seminar „Scientific writing“ (5. Fachsemester)

since 11/2015 Lecturer at the Training Academy of the German Society for Behavioural Therapy (Ausbildungsakademie der Deutschen Gesellschaft für Verhaltenstherapie) (DGVT) e.V., Hamburg, Germany

Seminar "Motivational counselling" (Motivierende Gesprächstechniken)

REVIEWER IN PEER-REVIEWED JOURNALS

since 06/2015 Reviewer for Addictive Behaviors (IF 2.44)