

Alcohol-Related Knowledge and Alcohol-Related Norms in 4- to 6-Year-Olds—Evidence from the Dutch Electronic Appropriate Beverage Task

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Background: Limited research is available on children's alcohol-related knowledge and alcohol-related norms, yet a better comprehension of these factors may be crucial in explaining alcohol use later in life. This study provides insights into alcohol-related knowledge and alcohol-related norms in 4- to 6-year-olds.

Methods: Participating children ($N = 329$; 48.9% boys) were shown, on a tablet, 18 drawings depicting 72 male and female adults and/or children in various situations, and were asked to indicate what the depicted persons drank by touching 1 of 12 depicted beverages (4 alcoholic; 8 nonalcoholic). Subsequently, the children were asked to name the beverages and indicate whether they contained alcohol.

Results: Children identified 30.7% of the alcoholic beverages (i.e., beer, champagne, red wine, and white wine) correctly by name, and they identified 41.6% of the alcoholic beverages correctly as alcohol containing. Children more often correctly identified the name and nonalcoholic content of nonalcoholic beverages compared to the name and alcoholic content of alcoholic beverages. No sex differences emerged in the correct identification of the name and the content of both alcoholic beverages and nonalcoholic beverages. However, alcohol-related knowledge was age graded. Alcoholic beverages were more often assigned to male adults (39.2%) than to female adults (24.8%) or to children (13.2%). Additionally, alcoholic beverages were more often assigned to adults depicted in the presumably more appropriate situations (e.g., "when having an indoor party": 37.0%) than to those depicted in the presumably more inappropriate situations (e.g., "when driving a car": 28.6%).

Conclusions: Four- to 6-year-olds already have knowledge about alcohol and its norms in adult culture. Insight into the development of children's alcohol-related knowledge and alcohol-related norms over time is required to investigate the transitions to alcohol expectancies, drinking motives, and alcohol initiation often occurring in adolescence.

Key Words: Alcohol-Related Knowledge, Alcohol-Related Norms, Electronic Appropriate Beverage Task, Children, The Netherlands.

AMPLE EVIDENCE INDICATES various factors that determine alcohol use and risky alcohol use in adolescence and beyond (Ham and Hope, 2003; Kuntsche et al., 2004). Yet, the factors shaping these behaviors are likely to be rooted earlier in life, namely, in childhood (Schulenberg

and Maggs, 2008). Unfortunately, very little is known about children's alcohol-related knowledge and alcohol-related norms.

A recent literature review that summarizes the evidence from the past 40 years (1976 to 2016) on children's alcohol-related cognitions in the developmental period from age 2 to 10 showed that children already have some knowledge about alcohol and that they comprehend the norms surrounding alcohol use in adult culture (Voogt et al., 2017). For instance, already at age 2, children start to acquire knowledge about alcohol, as they are able to distinguish alcoholic from nonalcoholic beverages based on smell (Fossey, 1993a; Greenberg et al., 1985; Mennella and Garcia, 2000; Noll et al., 1990; Valentine et al., 2014), photographs (Austin and Nach-Ferguson, 1995; Hahn et al., 2000; Jahoda et al., 1980; Kuntsche et al., 2016; Zucker et al., 1995), or a role-playing scenario involving grocery shopping (Dalton et al., 2005). From age 5, children can distinguish factual and negative alcohol information (Fossey, 1993b); describe alcohol effects (Casswell et al., 1988; Flett et al., 1987; Tennant, 1979); and name drinking motives, places, and amounts of alcohol use

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(Gaines et al., 1988). Additionally, from age 4, children start to understand that alcohol is usually restricted to adults and consumed in specific situations (Jahoda et al., 1980; Kuntsche et al., 2016; Noll et al., 1990; Spiegler, 1983; Zucker et al., 1995). More importantly, children's alcohol-related norms have been found to predict alcohol use years later (Andrews et al., 2011; Donovan et al., 2004; Windle et al., 2008).

Research on children's alcohol-related knowledge and alcohol-related norms is currently underdeveloped, as evidence is limited and mostly outdated. For example, only 3 of the 17 studies included in a recent review have been conducted after the year 2000 (Voogt et al., 2017). Additionally, most of these studies (i.e., 65%) were conducted in the United States. Therefore, the degree to which these findings still apply in a broader cultural context today is unclear. Furthermore, the review also reveals that most of these 17 studies have used relatively small samples recruited using a convenience sampling strategy. Specifically, only 6 studies used a random sampling strategy and only 6 studies had a sample size of more than 200 participants (Voogt et al., 2017). Using small convenience samples might have affected the results, which undermines the generalizability, thereby restricting the conclusions about what children actually know about alcohol and its use in adult culture.

Methodological challenges encountered when studying this population may explain the underdeveloped evidence on children's alcohol-related knowledge and alcohol-related norms. Preschool age children cannot read or write, and their language skills are not fully developed. Moreover, they can be easily influenced by the researcher or by the ways in which questions are phrased (Dalton et al., 2005). Additionally, age-appropriate electronic assessment procedures for children tend to be costly as well as time and labor intensive (Kuntsche et al., 2016). To meet these methodological challenges, Kuntsche and colleagues (2016) devised and validated the electronic version of the Appropriate Beverage Task (eABT) originally developed by Zucker and colleagues (1995), albeit not in electronic form, for the use with 3- to 6-year-old children in Switzerland. The authors concluded that the eABT is an age-appropriate, convenient, and easy to use validated instrument to measure alcohol-related knowledge and alcohol-related norms in young children. Their results revealed that children aged 3 to 6 years identified 68.1% of the beverages as alcohol containing and 83.2% as non-alcohol containing. Children knew 46.6% and 73.1% of the alcoholic and nonalcoholic beverages by name. They more often correctly identified the name and nonalcoholic content of nonalcoholic beverages compared to the name and alcoholic content of alcoholic beverages. No sex differences emerged for the correct identification of the name and the alcoholic content of alcoholic beverages, yet girls more often correctly identified the name and the nonalcoholic content of nonalcoholic beverages compared to

boys. Furthermore, alcohol-related knowledge increased across age groups. Additionally, children assigned alcoholic beverages more often to males (42.2%) compared to females (28.7%) or children (12.7%), and adults were more often assigned alcoholic beverages at a party (39.4%) rather than when playing outdoors (34.7%) (Kuntsche et al., 2016).

The aim of this study was 2-fold. First, we aimed to develop a Dutch version of the eABT to measure alcohol-related knowledge and alcohol-related norms among 4- to 6-year-old children in the Netherlands. Second, we aimed to provide evidence on alcohol-related knowledge and alcohol-related norms in 4- to 6-year-old children in the Netherlands using a large nationwide sample. It is essential to gather knowledge on children's alcohol-related knowledge and alcohol-related norms, as they are supposed to constitute the basis for alcohol expectancies (e.g., "I expect that alcohol makes me sociable") and the transition to drinking motives (e.g., "I drank [for the first time] to enjoy a party"). These factors form the final pathway toward alcohol initiation (Kuntsche and Müller, 2012) and the prediction of subsequent detrimental use patterns (e.g., binge drinking) (Andrews et al., 2011; Donovan et al., 2004; Windle et al., 2008).

Based on prior research, 5 hypotheses were tested in this study. Concerning alcohol-related knowledge, it was expected that (i) 4- to 6-year-olds will more often correctly identify the name and nonalcoholic content of nonalcoholic beverages compared to the name and alcoholic content of alcoholic beverages because they are expected to have experience with nonalcoholic beverages (Kuntsche et al., 2016); (ii) sex differences among 4- to 6-year-olds in the correct identification of the name and the alcoholic content of alcoholic beverages will be nonsignificant (Hahn et al., 2000; Jahoda et al., 1980; Kuntsche et al., 2016; Noll et al., 1990). However, girls compared to boys will more often correctly identify the name and the nonalcoholic content of nonalcoholic beverages (Kuntsche et al., 2016) because girls are biologically and socioculturally more mature compared to boys, and they surpass the boys in early language development (Berk, 2013; Gaines et al., 1988); and (iii) older children will more often correctly identify the name and the alcoholic content of alcoholic beverages as well as the name and the nonalcoholic content of nonalcoholic beverages compared to younger children (Jahoda et al., 1980; Kuntsche et al., 2016; Zucker et al., 1995) due to increased cognitive and language abilities (Berk, 2013; Dalton et al., 2005). Concerning alcohol-related norms, it was expected that (iv) 4- to 6-year-olds will assign male adults alcoholic beverages (Silva et al., 2017) more often compared to female adults (Lang and Stritzke, 1993; Zucker et al., 1995) and children (Kuntsche et al., 2016; Zucker et al., 1995); and (v) 4- to 6-year-olds will assign adults depicted in the presumably more appropriate situations (e.g., "when having an indoor party") alcoholic beverages more often compared to adults in the presumably more inappropriate situations (e.g., "when driving a car") (Kuntsche et al., 2016).

MATERIALS AND METHODS

Sample

Four- to 6-year-old children and their parents were recruited via primary schools that were randomly selected from a list of all primary schools in the Netherlands in the 2014 to 2015 school year. The children's age range was chosen to resemble the age range of the sample used in the most recent study conducted in Switzerland on children's alcohol-related knowledge and alcohol-related norms (i.e., 3 to 6 years old) (Kuntsche et al., 2016). According to the Dutch school system, children attend primary school from the age of 4. Children aged 3 years and 10 months can attend school for a couple of (half) days to become familiar with it. From the age of 4, children attend school full-time, that is, 5 days a week. School attendance is compulsory at age 5 (Rijksoverheid, 2017).

Following a standard procedure to obtain a large nationwide sample in the Netherlands (Stone et al., 2015), Groningen (north), Gelderland (east), Zeeland (south), Zuid-Holland (west), and Flevoland (middle) were randomly selected to represent all Dutch provinces. All schools in these 5 provinces received an invitation letter to participate in the study. After 2 weeks, schools were contacted via telephone to ask whether they were willing to participate in the study. Schools that agreed were requested to distribute invitation letters to parents of first- and second-grade students. Parents of 4- to 6-year-old children were required to provide active informed consent either via a secured website (www.volonderzoek.nl) or on paper. Parents and their children could withdraw from the study at any time.

Of 831 schools contacted, 92 schools (11.1% of total; Gelderland: 8.6%; Flevoland: 7.3%; Groningen: 14.1%; Zeeland: 17.4%; Zuid-Holland: 7.8%) agreed to participate. Furthermore, of these 92 schools, 329 children (7.8% of total; Gelderland: 16.2%; Flevoland: 5.9%; Groningen: 7.2%; Zeeland: 7.2%; Zuid-Holland: 5.3%) ($M = 4.8$, $SD = 0.74$), 234 fathers (71.1%, $M = 39.8$, $SD = 5.78$), and 301 mothers (91.5%, $M = 37.1$, $SD = 4.72$) participated in the study. Schools in Zeeland were overrepresented, as their participation rate (17.4%) was higher compared to the average school participation rate (11.0%: $\Delta = 6.3$, $t(166) = 2.2$, $p < 0.05$). Children from Gelderland were overrepresented, as their participation rate (16.2%) was higher compared to the average participation rate (8.4%: $\Delta = 7.8$, $t(494) = 4.7$, $p < 0.001$). Children from Flevoland (5.9%) and Zuid-Holland (5.3%) were underrepresented, as their participation rates were lower compared to the average participation rate (8.4%: $\Delta = -2.5$, $t(730) = -2.9$, $p < 0.01$, and 8.4%: $\Delta = 3.0$, $t(598) = -3.2$, $p < 0.01$, respectively). Nonetheless, we still recruited a large nationwide sample. The schools that decided not to participate in the study indicated that they were either too busy (37.2%), overburdened with invitations for study participation (19.5%), not interested (10.1%), participated already in another study (6.6%), or did not want to burden the parents and children (2.8%). Schools also reported other (3.8%) or unknown reasons (19.4%). The child sample ranged in age from 4 to 6 years ($M = 4.8$, $SD = 0.74$) and included 48.9% boys. Most children (98.1%) were of Dutch origin.

Procedure

The data were collected between May and August 2015 during home visits that lasted approximately 40 minutes. Children completed the Dutch eABT on a tablet (i.e., Samsung Galaxy Tab 4 10.1; Samsung Electronics Co., Ltd., Suwon, South Korea) with an average completion time of 26 minutes ($SD = 19$). The Dutch eABT is largely based on the Swiss eABT, an age-appropriate, convenient, and easy to use validated instrument measuring alcohol-related knowledge and alcohol-related norms in young children (Kuntsche et al., 2016). The Swiss eABT was culturally adapted to make the instrument suitable for the Dutch target population

consisting of 4- to 6-year-olds. For instance, the dinner drawing in the Swiss eABT depicted a family (father, mother, boy, girl) eating cheese fondue while the Dutch eABT depicted a family eating meat, potatoes, and vegetables, both typical cultural dishes (Fig. 1). We added 7 drawings to the Dutch eABT in addition to the 11 drawings of the Swiss eABT to provide different alcohol-related norms or appropriateness of drinking alcohol, including situations in which it is presumably more appropriate to drink alcohol (e.g., "when having an indoor party") and presumably more inappropriate to drink alcohol (e.g., "when driving a car"). More information about the rank order of the perceived appropriateness of drinking alcohol in 18 family-specific situations in the Dutch eABT, ranging from drinking at a party, Christmas dinner, in a restaurant, at a barbecue, on a terrace, on a camp site, while having dinner, during Saint Nicolas celebration, while watching TV, during a picnic, at the beach, while playing a board game, at an amusement park, in the train, while reading a book, during lunch, in the office, and while driving a car (from the most appropriate to the least appropriate in that order), is reported elsewhere (Voogt CV, Smit K, Kleinjan M, Otten R, Scheffers-van Schayck T, Kuntsche E, manuscript submitted for publication). The Dutch eABT was developed using the iterative process between the research team and the designer to ensure that the drawings actually contain the specific situations that we would like to show.

Similar to the original eABT (Kuntsche et al., 2016), the Dutch eABT contains a practice task, which was not scored or analyzed, to familiarize the child with the procedure. Children were shown 2 black and white drawings of different animals (dog/cat/rabbit; cow/sheep) on the top of the screen and 12 colored food pictures (4 nonanimal foods; 8 animal foods) on the bottom of the screen. The animals in these drawings were indicated consecutively by an orange arrow. In each drawing, a research assistant asked the child to touch the picture of 1 food that (s)he thinks that the animal to which the arrow was pointing was eating. By touching 1 of the food pictures, the arrow moved to the next animal from the left- to the right-hand side. After the practice task, each child was shown 18 black and white drawings of male and female adults and/or children in various situations on the top of the screen and 12 colored beverage pictures (4 alcoholic: beer, champagne, red wine, white wine; 8 nonalcoholic: chocolate milk, cola, coffee, lemonade, milk, orange juice, tea, water) on the bottom of the screen. As depicted in Table 1, the 18 drawings can be divided into 6 categories: 7 family drawings (2 parents, 2 children), 4 extended family drawings (2 parents, 2 children, 2 grandparents), 1 parents and friends drawing (2 parents, 2 friends), 2 small family drawings (1 parent, 1 child), 1 family and friends drawing (2 parents, 2 children, 2 friends), and 3 parents drawings (2 parents).

As done previously (Kuntsche et al., 2016), the drawings of persons were presented one at a time in a random order on top of the screen. The pictures of beverages were presented on the bottom of the screen in a fixed order throughout one assessment but randomly across the participating children. For each person depicted in a given drawing (72 in total: 26 children [13 boys; 13 girls] and 46 adults [23 males including fathers, grandpas, and male friends; 23 females including mothers, grandmas, and female friends]) and indicated consecutively by an orange arrow, the child was asked what the person is drinking by touching 1 of the 12 beverages depicted below the drawing on the tactile tablet screen. By doing so, the children's answers were automatically stored in a database, and the arrow moved to the next person from the left of the screen to the right side. After the 18 drawings, only the beverage pictures were shown, and 1 of 9 research assistants asked the child to name each beverage (i.e., name). Subsequently, adhering to a strict protocol regarding asking the questions and coding the answers, research assistants asked the child whether the beverages contain alcohol (i.e., content). According to this protocol, research assistants should once again ask the child about the name and alcohol content when



Fig. 1. Screenshot of the dinner drawing of the original Swiss eABT (above) and the Dutch eABT (below).

she or he did not answer the question right away or when she or he shrugged. When it was answered correctly the second time, it was coded as “right,” when it was answered incorrectly, it was coded as “wrong.” Concerning the name question, synonyms of beverage names were also coded as “right” (e.g., lemonade or syrup). Children’s answers were extremely simple and easy to code; therefore, no double coding was needed (Fig. 2).

At the time of the eABT administration, the parent(s) were not present because they were asked to complete an online questionnaire. Although communication between the child and parent(s) was not allowed during the data collection, both were allowed to complete the eABT and questionnaire in the same place. A small present (e.g., pencil) was provided to the child while 1 parent received a gift coupon of 10€ as an incentive at

Table 1. Content and Number and Type of Persons Represented in the 18 Drawings of the Dutch Electronic Appropriate Beverage Task (eABT)

Content	Persons								Total number of persons
	Children		Adults						
	Boy	Girl	Father	Mother	Grandfather	Grandmother	Male friend	Female friend	
1. Terrace ^a	1	1	1	1	0	0	0	0	4
2. Camping ^a	1	1	1	1	0	0	0	0	4
3. Dinner ^a	1	1	1	1	0	0	0	0	4
4. Picnic ^a	1	1	1	1	0	0	0	0	4
5. Beach ^a	1	1	1	1	0	0	0	0	4
6. Board game ^a	1	1	1	1	0	0	0	0	4
7. Lunch ^a	1	1	1	1	0	0	0	0	4
8. Christmas ^b	1	1	1	1	1	1	0	0	6
9. Restaurant ^b	1	1	1	1	1	1	0	0	6
10. Saint Nicholas ^b	1	1	1	1	1	1	0	0	6
11. Amusement park ^b	1	1	1	1	1	1	0	0	6
12. Party ^c	0	0	1	1	0	0	1	1	4
13. TV ^d	1	0	1	0	0	0	0	0	2
14. Book ^d	0	1	0	1	0	0	0	0	2
15. Barbecue ^e	1	1	1	1	0	0	1	1	6
16. Train ^f	0	0	1	1	0	0	0	0	2
17. Office ^f	0	0	1	1	0	0	0	0	2
18. Car ^f	0	0	1	1	0	0	0	0	2
Total number of persons	13	13	17	17	4	4	2	2	72

^a7 family drawings including 2 parents and 2 children.

^b4 extended family drawings including 2 parents, 2 children, and 2 grandparents.

^c1 parents and friends drawing including 2 parents and 2 friends.

^d4 small family drawings including 1 parent and 1 child.

^e1 family and friends drawing including 2 parents, 2 children, and 2 friends.

^f3 parents drawings including 2 parents.

the end of the home visit. The Ethical Committee of the Faculty of Social Sciences of the Radboud University approved the study (ECSW2014-2411-272).

Measures

Alcohol-Related Knowledge. For name, mean percentage scores of alcoholic beverages and nonalcoholic beverages correctly identified by name were calculated. For content, mean percentage scores of alcoholic beverages and nonalcoholic beverages correctly identified as alcohol containing and nonalcohol containing were calculated.

Alcohol-Related Norms. Mean percentage scores of (i) children, male adults (i.e., fathers, grandpas, and male friends) and female adults (i.e., mothers, grandmas, and female friends) in the 18 drawings who were assigned any alcoholic beverage to drink and (ii) adults (i.e., fathers, mothers, grandpas, grandmas, male friends, and female friends) in 18 specific situations (e.g., “when having an indoor party”) who were assigned any alcoholic beverage to drink were calculated.

Analyses

All children completed the entire eABT, resulting in no missing data. One-sample *t*-tests were performed to determine whether one score differed significantly from another [i.e., whether the children: more often correctly identified the name and nonalcoholic content of nonalcoholic beverages than the name and alcoholic content of alcoholic beverages (hypothesis 1); assigned alcoholic beverages more often to male than female adults and children (hypothesis 4); assigned alcoholic beverages more often to adults depicted in the presumably more appropriate situations than to those in the presumably more inappropriate situations to drink alcohol (hypothesis

5)] or whether the answers that alcoholic beverages contained alcohol were different from random choice (i.e., different as expected by chance, that is, 4 alcoholic of the 12 beverages = 33.3%). Multiple linear regression analyses were performed to test for sex [i.e., whether girls more often correctly identified the name and the non-alcoholic content of nonalcoholic beverages compared to boys (hypothesis 2)] and age [(whether alcohol-related knowledge about the name and content of alcoholic and nonalcoholic beverages is age graded: hypothesis 3)] differences (independent variables) across the study variables (dependent variables). For the *t*-test analyses, we report mean differences (deltas), *t*-test values, degrees of freedom, and *p*-values. For the multiple linear regression analyses, we report standardized beta coefficients and *p*-values.

RESULTS

Alcohol-Related Knowledge

Children identified 30.7% of the alcoholic beverages correctly by name, and they identified 41.6% of the alcoholic beverages correctly as alcohol containing (Table 2). Beer was most often correctly identified by name (62.9%) and as alcohol containing (42.9%), followed by red wine (32.8% and 42.6%), white wine (23.4% and 41.3%), and champagne (3.6% and 39.8%). In total, 75.1% of the children identified at least 1 alcoholic beverage correctly by name, and 59.0% of them identified at least 1 alcoholic beverage correctly as alcohol containing.

Children's knowledge of nonalcoholic beverages was higher ($\Delta_{\text{Name}} = 51.8\%$, $t(328) = 53.5$, $p < 0.001$;



Fig. 2. Screenshots of the different parts of the eABT, that is, the practice task by presenting 1 drawing of different animals and the main task by presenting 2 of the 18 drawings of persons in various situations (“party” and “car”) and presenting the 12 beverage pictures.

$\Delta_{\text{Content}} = 12.9$, $t(328) = 5.5$, $p < 0.001$) compared to their knowledge of alcoholic beverages. No sex differences emerged in alcohol-related knowledge of alcoholic beverages

(name: $\beta = 0.07$, $p = 0.22$; content: $\beta = 0.04$, $p = 0.49$) and nonalcoholic beverages (name: $\beta = 0.07$, $p = 0.21$; content: $\beta = 0.03$, $p = 0.55$). However, alcohol-related knowledge of



Fig. 2. continued.

alcoholic beverages (name: $\beta = 0.28$, $p < 0.001$; content: $\beta = 0.17$, $p < 0.01$) and nonalcoholic beverages (name: $\beta = 0.30$, $p < 0.001$; content: $\beta = 0.28$, $p < 0.001$) is age graded. For instance, 6-year-olds identified 38.9% of the alcoholic beverages correctly by name and they identified 47.5% of the alcoholic beverages correctly as alcohol containing while 4-year-olds identified 22.2% of the alcoholic beverages correctly by name and identified 31.5% of the alcoholic beverages correctly as alcohol containing.

Alcohol-Related Norms

Of the 26 children, 23 male adults, and 23 female adults depicted in the drawings, 13.2%, 39.2%, and 24.8% were assigned an alcoholic beverage to drink, respectively (Table 3). The proportion of alcoholic beverages given to male adults was higher compared to that

given to female adults ($\Delta = 14.4\%$, $t(328) = 12.4$, $p < 0.001$) and children ($\Delta = 26.0\%$, $t(328) = 22.4$, $p < 0.001$). For male adults, this proportion was also higher compared to the random choice ($\Delta = 5.9\%$, $t(328) = 5.1$, $p < 0.001$). For female adults ($\Delta = -8.5\%$, $t(328) = -8.2$, $p < 0.001$) and children ($\Delta = -20.1\%$, $t(328) = -27.9$, $p < 0.001$), this proportion was lower compared to the random choice. The results also revealed sex and age differences in the assignment of alcoholic beverages to persons. Girls compared to boys assigned less often alcoholic beverages to children (10.7% vs. 15.8: $\beta = -0.19$, $p < 0.001$). Additionally, 6-year-olds assigned less often alcoholic beverages to children compared to 4-year-olds (11.1% vs. 16.8%: $\beta = -0.19$, $p < 0.001$), yet more often to male adults (41.0% vs. 35.7%: $\beta = 0.11$, $p = 0.04$).

Children assigned more often alcoholic beverages to adults depicted in the presumably more appropriate situations (i.e.,

Table 2. Percentage of Correctly Identified Name and Content of Alcoholic and Nonalcoholic Beverages in Total and According to Sex and Age Given by 4- to 6-Year-Olds (i.e., Alcohol-Related Knowledge)

	Alcoholic beverages		Nonalcoholic beverages	
	Name	Content	Name	Content
Total (<i>N</i> = 329; 100.0%)	30.7%	41.6%	82.5%	54.5%
Sex				
Boys (<i>n</i> = 161; 48.9%)	29.0%	40.1%	81.3%	53.0%
Girls (<i>n</i> = 168; 51.1%)	32.3%	43.2%	83.7%	55.9%
Difference ^a	0.07 ^{n.s.}	0.04 ^{n.s.}	0.07 ^{n.s.}	0.03 ^{n.s.}
Age				
4-year-olds (<i>n</i> = 134; 40.7%)	22.2%	31.5%	75.9%	39.1%
5-year-olds (<i>n</i> = 134; 40.7%)	35.5%	49.1%	86.2%	64.0%
6-year-olds (<i>n</i> = 61; 18.5%)	38.9%	47.5%	88.9%	67.4%
Difference ^a	0.28***	0.17**	0.30***	0.28***

^aMultiple linear regression analyses with sex and age as independent variables (shown are standardized beta coefficients).

n.s., nonsignificant; **p* < 0.05, ***p* < 0.01, ****p* < 0.001.

party, Christmas, restaurant) compared to adults in the presumably more inappropriate situations (i.e., car, office, lunch). For instance, the proportion of alcoholic beverages assigned to adults depicted “when having an indoor party” (37.0%) was higher compared to the one depicting adults “driving a car” (28.6%) ($\Delta = 8.4\%$, $t(328) = 4.9$, $p < 0.001$) as well as compared to the random choice ($\Delta = 3.7\%$, $t(328) = 2.2$, $p = 0.03$). Sex differences in the assignment of alcoholic beverages to adults in 2 of the 18 drawings were also found. Compared to boys, girls assigned alcoholic beverages less often to adults depicted “at an indoor party” (33.6% vs. 40.5%: $\beta = -0.11$, $p = 0.04$) and more often to adults depicted “when celebrating Christmas” (37.2% vs. 30.7%: $\beta = 0.11$, $p = 0.047$). However, no age differences emerged in the assignment of alcoholic beverages to adults in any of the situations (Table 4).

DISCUSSION

This study aimed to develop the Dutch version of the eABT and to provide insight into alcohol-related knowledge and alcohol-related norms in a large nationwide sample of 4- to 6-year-old children in the Netherlands. The results revealed that 4- to 6-year-olds identified about 30% of the alcoholic beverages correctly by name, and they identified about 40% of the alcoholic beverages correctly as alcohol containing. These percentages are lower compared to those reported (i.e., 46.6% and 68.1%) in the most recent study conducted with the same aged children in Switzerland (Kuntsche et al., 2016). As expected (hypothesis 1), 4- to 6-year-olds more often correctly identified the name and non-alcoholic content of nonalcoholic beverages compared to the name and alcoholic content of alcoholic beverages, probably because they are more experienced with nonalcoholic rather than alcoholic beverages (Kuntsche et al., 2016). In accordance with the expectations (hypothesis 2), no sex differences emerged among 4- to 6-year-olds in the correct identification of the name and the alcoholic content of alcoholic beverages. It appears that alcohol-related knowledge depends more strongly on parental alcohol use and specific environmental factors rather than on children’s sex (Kuntsche et al., 2016). Additionally, in contrast to the expectations, girls did not correctly identify the name and the nonalcoholic content of nonalcoholic beverages more often compared to boys. A possible explanation may be that Dutch children are more exposed to soda consumption than to alcohol consumption, as Dutch male and female adults consume less alcohol these days (Rijksoverheid, 2016). In addition, the alcohol-related knowledge of Dutch children is lower compared to their Swiss counterparts. This high exposure to soda consumption may diminish sex differences in the knowledge of the name and the nonalcoholic content of nonalcoholic beverages. As expected (hypothesis 3), alcohol-related knowledge increased with age, as children’s cognitive and language abilities develop rapidly between age 4 and 6 (Berk, 2013; Dalton

Table 3. Percentage of the Assignment of Alcoholic Beverages to Persons (i.e., Children, Male Adults, Female Adults) in Total and According to Sex and Age Given by 4- to 6-Year-Olds (i.e., Alcohol-Related Norms)

	Persons ^a				
	Children (<i>n</i> = 26)	Male adults (<i>n</i> = 23)	Female adults (<i>n</i> = 23)	Difference male adults versus female adults ^d	Difference male adults versus children ^d
Total ^b	13.2%***	39.2%***	24.8%***	$t(328)=12.4$ ***	$t(328)=22.4$ ***
Sex					
Boys (<i>n</i> = 161; 48.9%) ^b	15.8%***	37.3%*	26.4%***	$t(160)=6.9$ ***	$t(160)=13.6$ ***
Girls (<i>n</i> = 168; 51.1%) ^b	10.7%***	41.0%***	23.3%***	$t(167)=10.6$ ***	$t(167)=18.1$ ***
Difference ^c	-0.19***	0.09	-0.08		
Age					
4-year-olds (<i>n</i> = 134; 40.7%) ^b	16.8%***	35.7%**	24.9%***	$t(133)=6.0$ ***	$t(133)=10.5$ ***
5-year-olds (<i>n</i> = 134; 40.7%) ^b	10.5%***	41.9%***	25.9%***	$t(133)=8.3$ ***	$t(133)=16.4$ ***
6-year-olds (<i>n</i> = 61; 18.5%) ^b	11.1%***	41.0%**	22.3%***	$t(60)=8.1$ ***	$t(60)=13.0$ ***
Difference ^c	-0.19***	0.11*	-0.04		

^aMale adults include fathers, grandpas, and male friends; female adults include mothers, grandmas, and female friends.

^bDifferent than the one-third (4/12) random choice for alcoholic versus nonalcoholic beverages using *t*-test analyses.

^cMultiple linear regression analyses with sex and age as independent variables (shown are standardized beta coefficients).

^dDifference between male adults and female adults using *t*-test analyses; n.s., nonsignificant; **p* < 0.05, ***p* < 0.01, ****p* < 0.001.

Table 4. Percentage of the Assignment of Alcoholic Beverages to Adults in 18 Specific Situations in Total and According to Sex and Age Given by 4- to 6-Year-Olds (i.e., Alcohol-Related Norms)

Situations (number of adults)	Persons ^a adults (<i>n</i> = 46) (%)	Different than the one-third random choice	Sex			Age			Difference ^b
			Boys (<i>n</i> = 161) (%)	Girls (<i>n</i> = 168) (%)	Difference ^b	4-year-olds (<i>n</i> = 134) (%)	5-year-olds (<i>n</i> = 134) (%)	6-year-olds (<i>n</i> = 61) (%)	
1. Terrace (<i>n</i> = 2)	34.8	n.s.	36.0	33.6	-0.03 ^{n.s.}	31.3	37.3	36.9	0.07 ^{n.s.}
2. Camping (<i>n</i> = 2)	31.9	n.s.	28.3	35.4	0.11 ^{n.s.}	32.1	31.0	33.6	0.01 ^{n.s.}
3. Dinner (<i>n</i> = 2)	28.0	**	26.4	29.5	0.04 ^{n.s.}	28.7	30.2	21.3	-0.06 ^{n.s.}
4. Picnic (<i>n</i> = 2)	31.2	n.s.	34.8	27.7	-0.11 ^{n.s.}	30.2	30.2	35.2	0.05 ^{n.s.}
5. Beach (<i>n</i> = 2)	28.3	**	28.0	28.6	0.01 ^{n.s.}	23.5	33.2	27.9	0.07 ^{n.s.}
6. Board game (<i>n</i> = 2)	30.9	n.s.	29.5	32.1	0.04 ^{n.s.}	28.0	34.0	30.3	0.04 ^{n.s.}
7. Lunch (<i>n</i> = 2)	28.0	**	31.1	25.0	-0.09 ^{n.s.}	28.0	28.7	26.2	-0.01 ^{n.s.}
8. Christmas (<i>n</i> = 4)	34.0	n.s.	30.7	37.2	0.11*	33.0	36.9	29.9	-0.02 ^{n.s.}
9. Restaurant (<i>n</i> = 4)	35.2	n.s.	32.9	37.4	0.08 ^{n.s.}	33.2	36.4	36.9	0.05 ^{n.s.}
10. Saint Nicholas (<i>n</i> = 4)	33.8	n.s.	32.5	35.1	0.05 ^{n.s.}	32.8	33.0	37.7	0.05 ^{n.s.}
11. Amusement park (<i>n</i> = 4)	28.9	**	29.0	28.7	-0.01 ^{n.s.}	28.0	30.4	27.5	0.01 ^{n.s.}
12. Party (<i>n</i> = 4)	37.0	*	40.5	33.6	-0.11*	31.7	42.0	37.7	0.10 ^{n.s.}
13. TV (<i>n</i> = 1)	42.9	**	42.9	42.9	0.00 ^{n.s.}	41.8	47.0	36.1	-0.02 ^{n.s.}
14. Book (<i>n</i> = 1)	24.6	***	24.2	25.0	0.01 ^{n.s.}	26.1	28.4	13.1	-0.09 ^{n.s.}
15. Barbecue (<i>n</i> = 4)	33.4	n.s.	33.4	33.5	0.00 ^{n.s.}	28.9	37.1	35.2	0.11 ^{n.s.}
16. Train (<i>n</i> = 2)	27.5	**	27.0	28.0	0.01 ^{n.s.}	29.1	28.7	21.3	-0.07 ^{n.s.}
17. Office (<i>n</i> = 2)	28.4	**	31.4	25.6	-0.09 ^{n.s.}	28.0	28.0	30.3	0.02 ^{n.s.}
18. Car (<i>n</i> = 2)	28.6	*	28.3	28.7	0.01 ^{n.s.}	28.3	28.0	30.3	0.02 ^{n.s.}

^aAdults include all male and female adults: fathers, mothers, grandpas, grandmas, male friends, and female friends.

^bMultiple linear regression analyses with sex and age as independent variables (shown are standardized beta coefficients). n.s., nonsignificant; **p* < 0.05, ***p* < 0.01, ****p* < 0.001.

et al., 2005; Flavell, 1999; Ross et al., 2005). Consistent with prior research and our expectations, 4- to 6-year-olds assigned alcoholic beverages more often to male adults compared to female adults and children (Lang and Stritzke, 1993; Silva et al., 2017; Zucker et al., 1995) (hypothesis 4) and more often to adults depicted in the presumably more appropriate situations (e.g., “when having an indoor party”) rather than to adults depicted in the presumably more inappropriate situations (e.g., “when driving a car”) (Kuntsche et al., 2016) (hypothesis 5). The results also revealed that children as young as 4 years old acquire alcohol-related knowledge by identifying alcoholic beverages from the photographs, and this is age graded. Children from the age of 4 comprehend alcohol-related norms by understanding that children usually do not drink alcohol, that male adults are more likely to drink alcoholic beverages compared to female adults, and that adults depicted in the presumably more appropriate situations to drink alcohol are more likely to drink alcoholic beverages.

When comparing the current results with those of the most recent study that utilized a similar sample and methodology (Kuntsche et al., 2016), it appears that Dutch children have less alcohol-related knowledge compared to Swiss children. Additionally, it seems that Dutch assigned alcoholic beverages to male and female adults less often compared to Swiss children; yet, children in both countries assigned a low proportion of alcoholic beverages to children. These differences may be explained by differences in children’s exposure to parental alcohol use. For example, Swiss consume alcohol more

frequently compared to Dutch adults (Rehm et al., 2012). Specifically, adult males and females in Switzerland consume alcohol 155 and 77 times per year on average, respectively, compared to their Dutch counterparts consuming alcohol 129 and 74 times per year, respectively, for adult males and females (Mäkelä et al., 2006). It might be the case that Swiss parents compared to Dutch parents not only consume alcohol more frequently, but possibly also more often in the presence of their children in family-specific situations, such as when having meals. In the Netherlands, only 5% of people consume alcohol when having meals while more than 50% consume alcohol on another drinking occasion, such as in a bar (Anderson and Baumberg, 2006). Particularly, Dutch adults over age 35 with a high educational background consume wine when having meals (AMPHORA, 2013). Switzerland, unlike the Netherlands (Rehm et al., 2003), is a traditional wine-producing country where alcohol use is a part of everyday life (Anderson and Nelgen, 2015). For instance, about 48% of pure alcohol is consumed in the form of wine and about 32% in the form of beer. Alcoholic beverages are generally consumed when having lunch and dinner in the Italian and French-speaking regions of Switzerland (AMPHORA, 2013).

Limitations and Strengths

The limitations of this study include a rather low school (11.1%) and individual (7.7%) participation rate, which is unfortunately common in studies on substance use research in the Netherlands (Van Loon et al., 2003). However, each

of the 5 randomly selected provinces was still represented in our sample with at least 12 schools. Additionally, although the Dutch eABT includes a wide range of situations in which it is presumably more or less appropriate to drink alcohol, a formal test of the continuum of alcohol-related norms remains to be empirically demonstrated.

The strengths of this study included the use of a large nationwide sample ($N = 329$) recruited through a random sampling strategy. Most studies conducted in the field of children's alcohol-related knowledge (Dalton et al., 2005; Greenberg et al., 1985; Jahoda et al., 1980; Mennella and Garcia, 2000; Noll et al., 1990; Zucker et al., 1995) and alcohol-related norms (Jahoda et al., 1980; Noll et al., 1990; Zucker et al., 1995) used small samples recruited through convenience samples strategies. Additionally, the data were collected in the children's natural and familiar environment (i.e., home visits) that provided an element of safety and limited disruption (Sweet and Appelbaum, 2004). This might be especially important for young children. Moreover, the eABT demonstrates that it can be adapted easily to other cultures, as the original American nonelectronic version (Zucker et al., 1995) was transformed into a Swiss electronic version (Kuntsche et al., 2016) and subsequently to a Dutch electronic version. This implies that the eABT might be easily modified and utilized in other industrialized countries as a suitable and age-appropriate modern instrument for measuring young children's alcohol-related knowledge and alcohol-related norms.

Future Directions

Future research should test how the children's alcohol-related knowledge and alcohol-related norms develop over time. Additionally, prior studies that assessed parental alcohol use revealed that if parents drink more, the alcohol-related knowledge of their 4- to 8-year-old children is more accurate (Noll et al., 1990; Zucker et al., 1995). However, these studies did not examine children's exposure to parental alcohol use. Therefore, future research should test whether children's exposure to parental alcohol use predicts the acquisition of children's alcohol-related knowledge and alcohol-related norms and its increase over time.

CONCLUSIONS

This study investigated alcohol-related knowledge and alcohol-related norms in 4- to 6-year-old children in the Netherlands using the Dutch eABT. In doing so, it provided insights into the largely unexplored field of young children's alcohol-related cognitions using an age-appropriate modern data collection technique in a new cultural context. The results revealed that 4- to 6-year-old children in the Netherlands already have knowledge about alcohol and its norms in adult culture. Insight into children's exposure to parental alcohol use in the acquisition and development of children's alcohol-related knowledge and

alcohol-related norms over time is required, as these alcohol-related cognitions are supposed to constitute the basis for alcohol expectancies and the transition to drinking motives that are the final pathway toward alcohol initiation (Kuntsche and Müller, 2012) and the prediction of subsequent use (e.g., binge drinking) (Andrews et al., 2011; Donovan et al., 2004; Windle et al., 2008).

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REFERENCES

- AMPHORA (2013) Report of an analysis of European alcohol-related cultural, social and policy interactions and their impact on alcohol consumption and alcohol-related harm. Available at: http://amphoraproject.net/w2box/data/Deliverables/AMPHORA_WP3_D3.2.pdf. Accessed July 14, 2017.
- Anderson K, Nelgen S (2015) *Global Wine Markets, 1961 to 2009: A Statistical Compendium*. Australia University of Adelaide Press, Adelaide.
- Anderson P, Baumberg B (2006) *Alcohol in Europe*. Vol. 2, pp. 73–75. Institute of Alcohol Studies, London.
- Andrews JA, Hampson S, Peterson M (2011) Early adolescent cognitions as predictors of heavy alcohol use in high school. *Addict Behav* 36:448–455.
- Austin EW, Nach-Ferguson B (1995) Sources and influences of young school-aged children's general and brand-specific knowledge about alcohol. *Health Commun* 7:1–20.
- Berk LE (2013) *Child Development*. 9th ed. Pearson Education, Boston.
- Casswell S, Gilmore LL, Silva P, Brasch P (1988) What children know about alcohol and how they know it. *Br J Addict* 83:223–227.
- Dalton MA, Bernhardt AM, Gibson JJ, Sargent JD, Beach ML, Adachi-Mejia AM, Titus-Ernstoff LT, Heatherton TF (2005) Use of cigarettes and alcohol by preschoolers while role-playing as adults: 'honey, have some smokes'. *Arch Pediatr Adol Med* 159:854–859.
- Donovan JE, Leech SL, Zucker RA, Loveland-Cherry CJ, Jester JM, Fitzgerald HE, Puttler LI, Wong MM, Looman WS (2004) Really underage drinkers: alcohol use among elementary students. *Alcohol Clin Exp Res* 28:341–349.
- Flavell JH (1999) Cognitive development: children's knowledge about the mind. *Annu Rev Psychol* 50:21–45.
- Flett R, Casswell S, Brasch P, Silva P (1987) Alcohol knowledge and experience in children aged 9 and 11. *N Z Med J* 100:747–749.
- Fossey E (1993a) Identification of alcohol by smell among young children: an objective measure of early learning in the home. *Drug Alcohol Depend* 34:29–35.

- Fossey E (1993b) Young children and alcohol: a theory of attitude development. *Alcohol Alcohol* 28:485–498.
- Gaines LS, Brooks PH, Maisto S, Dietrich M, Shagena M (1988) The development of children's knowledge of alcohol and the role of drinking. *J Appl Dev Psychol* 9:441–457.
- Greenberg GS, Zucker RA, Noll RB (1985) The development of cognitive structures about alcoholic beverages among pre-schoolers. Paper presented at the American Psychological Association, Los Angeles.
- Hahn EJ, Hall LA, Rayens MK, Burt AV, Corley D, Sheffel KL (2000) Kindergarten children's knowledge and perceptions of alcohol, tobacco, and other drugs. *J Sch Health* 70:51–55.
- Ham LS, Hope DA (2003) College students and problematic drinking: a review of the literature. *Clin Psychol Rev* 23:719–759.
- Jahoda G, Davies JB, Tagg S (1980) Parents' alcohol consumption and children's knowledge of drinks and usage patterns. *Br J Addict* 75:297–303.
- Kuntsche E, Le Mével L, Zucker RA (2016) What do preschoolers know about alcohol? Evidence from the electronic version of the Appropriate Beverage Task (eABT). *Addict Behav* 61:47–52.
- Kuntsche E, Müller S (2012) Why do young people start drinking? Motives for first-time alcohol consumption and links to risky drinking in early adolescence. *Eur Addict Res* 18:34–39.
- Kuntsche E, Rehm J, Gmel G (2004) Characteristics of binge drinkers in Europe. *Soc Sci Med* 59:113–127.
- Lang AR, Stritzke WG (1993) Children and alcohol. *Recent Dev Alcohol* 11:73–85.
- Mäkelä P, Gmel G, Grittner U, Kuendig H, Kuntsche S, Bloomfield K, Room R (2006) Drinking patterns and their gender differences in Europe. *Alcohol Alcohol* 41:i8–i18.
- Mennella JA, Garcia PL (2000) Children's hedonic response to the smell of alcohol: effects of parental drinking habits. *Alcohol Clin Exp Res* 24:1167–1171.
- Noll RB, Zucker RA, Greenberg GS (1990) Identification of alcohol by smell among preschoolers: evidence for early socialization about drugs occurring in the home. *Child Dev* 61:1520–1527.
- Rehm J, Rehn N, Room R, Monteiro M, Gmel G, Jernigan D, Frick U (2003) The global distribution of average volume of alcohol consumption and patterns of drinking. *Eur Addict Res* 9:147–156.
- Rehm J, Shield KD, Rehm MX, Gmel G, Frick U (2012) Alcohol Consumption, Alcohol Dependence and Attributable Burden of Disease in Europe. Centre for Addiction and Mental Health, Toronto.
- Rijksoverheid (2016) Belangrijkste feiten en trends alcohol. Available at: <https://www.rijksoverheid.nl/documenten/rapporten/2016/12/16/belangrijkste-feiten-en-trends-alcohol-2016>. Accessed June 16, 2017.
- Rijksoverheid (2017) Leerplicht en kwalificatieplicht. Available at: <https://www.rijksoverheid.nl/onderwerpen/leerplicht/inhoud/leerplicht-en-kwalificatieplicht>. Accessed June 16, 2017.
- Ross BH, Gelman SA, Rosengren KS (2005) Children's category-based inferences affect classification. *Br J Dev Psychol* 23:1–24.
- Schulenberg JE, Maggs JL (2008) Destiny matters: distal developmental influences on adult alcohol use and abuse. *Addiction* 103:1–6.
- Silva AP, Jager G, Van Zyl H, Voss HP, Pintado M, Hogg T, De Graaf C (2017) Cheers, proost, saúde: cultural, contextual and psychological factors of wine and beer consumption in Portugal and in the Netherlands. *Crit Rev Food Sci Nutr* 57:1340–1349.
- Spiegler DL (1983) Children's attitudes toward alcohol. *J Stud Alcohol* 44:545–552.
- Stone LL, Janssens JM, Vermulst AA, Van Der Maten M, Engels RCME, Otten R (2015) The Strengths and Difficulties Questionnaire: psychometric properties of the parent and teacher version in children aged 4-7. *BMC Psychol* 3:4.
- Sweet MA, Appelbaum MI (2004) Is home visiting an effective strategy? A meta-analytic review of home visiting programs for families with young children. *Child Devel* 75:1435–1456.
- Tennant FS (1979) Awareness of substance abuse and other health-related behaviors among preschool children. *J Drug Educ* 9:119–128.
- Valentine G, Jayne M, Gould M (2014) The proximity effect: the role of the affective space of family life in shaping children's knowledge about alcohol and its social and health implications. *Childhood* 21:103–118.
- Van Loon AJM, Tjihuis M, Picavet HSI, Surtees PG, Ormel J (2003) Survey non-response in the Netherlands: effects on prevalence estimates and associations. *Ann Epidemiol* 13:105–110.
- Voogt C, Beusink M, Kleinjan M, Otten R, Engels RCME, Smit K, Kuntsche E (2017) Alcohol-related cognitions in children (aged 2–10) and how they are shaped by parental alcohol use: a systematic review. *Drug Alcohol Depend* 177:277–290.
- Windle M, Spear LP, Fuligni AJ, Angold A, Brown JD, Pine D, Smith GT, Giedd J, Dahl RE (2008) Transitions into underage and problem drinking: developmental processes and mechanisms between 10 and 15 years of age. *Pediatrics* 121(Suppl 4):S273–S289.
- Zucker RA, Kincaid SB, Fitzgerald HE, Bingham CR (1995) Alcohol schema acquisition in preschoolers: differences between children of alcoholics and children of nonalcoholics. *Alcohol Clin Exp Res* 19:1011–1017.