Is it how we tell them about alcohol? The role of presentation formats in health education materials for lower educated students

Zebregs, S.

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Chapter 5: A comparison of the effects of narrative versus statistical evidence in school health education for low educated adolescents

Abstract

Lower educated adolescents are more likely to engage in heavy drinking. Meanwhile, little is known about the effectiveness of health education materials for this group and the factors that influence this effectiveness. Our study examines whether health education materials about alcohol have an effect on knowledge, cognitive attitude, affective attitude, and behavioral intention and compares materials containing narrative versus statistical evidence. Previous studies making this comparison mostly focused on college students. A three-wave quasi-experiment with two conditions was conducted at the lowest levels of the Dutch secondary education system. Results showed intended effects on knowledge, cognitive attitude and affective attitude for students who had much opportunity for change that did not differ between conditions. Therefore, it is concluded that health education materials can be effective for low educated adolescents. Although, in contrast to what was found amongst college students, evidence type does not have an influence.

This chapter is submitted as:
Introduction

Creating effective school health education materials for low educated adolescents is a challenging task for developers, because little knowledge is available about how to create effective materials for this target group. While lower educated adolescents are more likely than higher educated students to engage in heavy drinking (Kepper, Monshouwer, Van Dorselaer, & Vollebergh, 2011), research on the effectiveness of school health education materials has particularly focused on higher educated students (Cuijpers, Jonkers, De Weerdt, & De Jong, 2002; Gray, Anderman, & O’Connell, 2011). As a consequence, it remains unknown whether school health education materials have any effects on low educated adolescents and, if so, which factors influence these effects.

One potential factor of influence is the use of specific evidence formats to support the claims that are being made (Reinard, 1988). To increase the effectiveness of health education materials, developers can add either narrative or statistical evidence. Narrative evidence presents a cohesive story, often from the perspective of one or more protagonists (Kopfman, Smith, Ah Yun, & Hodges, 1998), whereas statistical evidence summarizes quantitative information about a large number of cases and can be generalized across a population (Allen & Preiss, 1997). Several previous studies have compared the effects of these types of evidence on health outcomes mostly amongst college students (Gray & Harrington, 2011; Yu, Ahern, Connolly-Ahern, & Shen, 2010). Recently, a meta-analysis of these studies showed that statistical evidence had a slightly stronger impact on beliefs and attitude, whereas narrative evidence had a slightly stronger impact on behavioral intention (Zebregs, Van den Putte, Neijens, & De Graaf, 2015). Low educated adolescents, however, have less cognitive capacities than college students and they are less able to process information (Hunt, 2005). As a result, the general impact of health education materials is likely to be smaller amongst this target group, which also decreases the effect differences between different variants of materials. Hence, the findings of previous studies amongst college students may not apply to low educated adolescents.

The aim of our study is to gain more insight into the effectiveness of school health education materials for low educated adolescents and whether this effectiveness is influenced by the presence of narrative versus statistical evidence. We will specifically focus on the effects of school health education materials about alcohol on knowledge about the negative consequences of alcohol consumption, affective and cognitive attitude towards alcohol, and intention to drink alcohol. We will apply a two condition (narrative vs. statistical evidence) repeated
measures design, including a pre-measurement, immediate post-measurement, and delayed post-measurement. With this study we aim to make an important contribution to the existing knowledge about school health education for low educated adolescents.

Theory

The effects of narrative and statistical evidence are suggested to differ across outcome variables, because they trigger different affective and cognitive reactions while being processed (Kopfman et al., 1998; Zebregs et al., 2015). On the one hand, narrative evidence is considered to be more concrete, imaginable, emotionally involving and, as such, more vivid than statistical evidence (Taylor & Thompson, 1982). Consequently, narrative evidence is expected to trigger more affective reactions than statistical evidence (Kopfman et al., 1998). Narrative evidence is, however, only based on one or a small number of cases (Allen & Preiss, 1997). This makes it easier for people to argue that the evidence presents a unique case and that they are not likely to experience similar outcomes themselves. Statistical evidence, on the other hand, provides information about the likelihood that a behavior will have particular outcomes, which is based on a large number of cases. Because of the large number of cases, statistical evidence provides a stronger argument for the likelihood that people will experience the behavioral outcomes that are discussed (Baesler & Burgoon, 1994; Zebregs et al., 2015). Stronger arguments trigger more cognitive reactions that are in line with the advocated position than weaker arguments (Petty & Cacioppo, 1979). As such, statistical evidence is likely to trigger more cognitive reactions that are in line with the advocated position than narrative evidence (Kopfman et al., 1998). Effects of statistical and narrative evidence differ across outcome variables, because for each outcome variable the magnitude of the influence of affective and cognitive reactions is different. That is, some outcome variables relate more affect, while others relate more to cognition (Keer, Van den Putte, & Neijens, 2010; Nisbett & Ross, 1980). In the following paragraphs, these relations will be considered separately for each outcome variable to provide a thorough understanding.

Knowledge about the Negative Consequences of Alcohol

Effects on knowledge about the negative consequences of alcohol that are discussed in health education materials may be stronger when the information is supported by narrative evidence. This effect can be explained through the associations that are established in memory. Narrative evidence is considered to estab-
lish more diverse associations because it is more vivid (Nisbett & Ross, 1980). These associations make it more likely for the knowledge that has been learned to be activated and retrieved when needed (Radvansky, 2011). It could therefore be expected that knowledge learned through narrative evidence is easier to retrieve and, as a result, that narrative evidence shows a stronger effect on knowledge. This hypothesis is supported by the few studies that compared the effects of narrative and statistical information in health messages on knowledge. These studies showed that participants indeed remembered more information after reading a message containing narrative evidence than after reading a message containing statistical evidence (Kazoleas, 1993; Mazor et al., 2007). Nevertheless, exposure to materials containing statistical evidence is also likely to have an effect on knowledge. Hence, we expect both materials with narrative and statistical evidence to have a positive effect on knowledge, but that this effect will be stronger for materials containing narrative evidence.

The expected effects may however not be similar for all students, because some students already possess more knowledge before exposure to the materials and have less possibility to learn (Mason, Mennis, Linker, Bares, & Zaharakis, 2014). Preventive health education about substance use, as we focus on in this study, aims to educate students about the negative consequences of the targeted behavior. Students who already know the negative consequences that are mentioned in the materials have little possibility to learn additional negative consequences from the materials. Therefore, we expect the effects on knowledge of health education materials to be moderated by the amount of knowledge that students have before exposure to materials. That is, effects on knowledge about negative consequences of alcohol are expected to be stronger for students who have little knowledge before exposure than for students who have more knowledge before exposure. Based on these expectations, we formulated the following hypothesis:

\[ H1: \text{Health education materials containing narrative evidence have a stronger positive effect on alcohol knowledge than materials containing statistical evidence, moderated by the amount of alcohol knowledge at T1.} \]

Affective and Cognitive Attitude towards Alcohol

To understand the effects of statistical and narrative evidence on recipients’ evaluation of a behavior, it is important to distinguish between the cognitive and affective component of attitude. Although it is suggested that the attitude construct consists of both a cognitive and an affective component (Conner, Go-
previous studies that compared the effects of narrative and statistical evidence have examined attitude as a single construct (Hong & Park, 2012; Kazoleas, 1993). Affective attitude consists of the feelings and emotions that people associate with a behavior, whereas the cognitive attitude consists of the beliefs, thoughts, and attributes that people associate with a behavior (Haddock & Maio, 2007). As such, affective attitude relates to the affective reactions that are triggered by a message and cognitive attitude to the cognitive reactions that are triggered by a message. Because narrative evidence triggers more affective reactions, we expect it to have a stronger effect on affective attitude. Likewise, we expect statistical evidence to have a stronger effect on cognitive attitude, because statistical evidence triggers more cognitive reactions. Nevertheless, for a large share of the target population there might be little possibility and need for change, because previous studies have found that early adolescents often already have unfavorable attitudes towards alcohol (Mason et al., 2014). Hence, we expect the predicted effects to be stronger for students who already have a favorable affective or cognitive attitude towards alcohol before exposure. However, there is no empirical support for our propositions, because the effects of statistical and narrative evidence on affective and cognitive attitude have not been studied yet.

H2: Health education materials containing statistical evidence have a stronger negative effect on cognitive attitude towards alcohol use than materials containing narrative evidence, moderated by the favorability of cognitive attitude at T1.

H3: Health education materials containing narrative evidence have a stronger negative effect on affective attitude towards alcohol use than materials containing statistical evidence, moderated by the favorability of affective attitude at T1.

Behavioral Intention

Because narrative evidence is expected to have a stronger effect on affective attitude and statistical evidence to have a stronger effect on cognitive attitude, the expected effect for behavioral intention depends on the strength of its relation with affective and cognitive attitude. Various studies have found that affect in most cases has a stronger impact on behavioral intention than cognition (Keer et al., 2010; Trafimow & Sheeran, 2004). Because we expect narrative evidence to have more impact on affective attitude than statistical evidence, we could therefore also expect narrative evidence to have a stronger impact on behavior-
al intention. This was indeed found in a meta-analysis comparing the impact of statistical and narrative evidence, although the difference in effect strength between both types of evidence was very small (Zebregs et al., 2015). Hence, we expect narrative evidence to have a stronger effect on students’ intention to drink alcohol than statistical evidence. Similar to our predictions for knowledge, affective attitude, and cognitive attitude, we expect this effect to be stronger for students who already have a higher intention to drink alcohol.

**H4:** Health education materials containing narrative evidence have a stronger negative effect on intention to drink alcohol than materials containing statistical evidence, moderated by the intention to drink alcohol at T1.

### Method

A three-wave quasi-experiment with two conditions (narrative vs. statistical evidence) was conducted during the spring of 2014 at schools of the two lowest levels of the Dutch secondary education system. The first wave (T1) consisted of a pre-measurement questionnaire. At the second wave (T2) participants were first exposed to the stimulus materials, followed by an immediate post-measurement. Finally, the third wave (T3) consisted only of a post-measurement questionnaire. There was an interval of approximately four weeks between each wave.

### Materials

To manipulate the type of evidence, the stimulus materials consisted of two booklets, which were based on existing materials of the Dutch Trimbos Institute’s ‘Healthy School and Drugs’ program. The booklets contained four pages of texts, in which the negative consequences of alcohol consumption were addressed. The main texts were identical in both booklets. Below each main text on the first three pages, there was a text box in which evidence was provided that supported the claims in the text above. This evidence was either provided in a narrative or a statistical format. In the narrative condition the text boxes contained 47.01 percent of the total amount of text and in the statistical condition 40.65 percent. It was inevitable to have lengthier narratives than statistical texts, because narratives typically contain information about the setting and characters whereas statistical evidence does not (Kopfman et al., 1998). In both conditions the booklets contained identical exercises after each text page. The use of exercises is common in health education materials and is part of the materials of the “Healthy School and Drugs” program. Hence, the purpose of these exercises was
to raise the ecological validity of the study.

Participants

In this study students of special education schools and pre-vocational schools participated. Pre-vocational schools form the lowest mainstream level of the Dutch secondary education system. At schools of this type we particularly sampled classes that included students within a special support program. These students have learning problems that hinder their performance at school. Therefore, they require additional support. Students are allowed to enroll in this support program after receiving advice from their school to do so. Special education schools form a level below the lowest mainstream level, intended for students who have severe learning difficulties. To be allowed to enroll in this type of education students have to meet special requirements, of which an IQ between 60 and 75 is one of the most important. At special education schools groups usually do not contain more than ten students, because the students who attend this type of education require much individual attention.

Six special education schools and three pre-vocational schools participated in this study. Of each school level 14 classes were included. In total 122 special education school students and 211 pre-vocational school students entered the condition assignment process. From this sample, 109 special education school students and 192 pre-vocational school students completed all three waves. At special schools more students dropped out in the statistical condition \( (n = 9) \) than in the narrative condition \( (n = 4) \), while at pre-vocational schools the dropouts were about equally divided across the statistical \( (n = 10) \) and narrative condition \( (n = 9) \). All dropouts were caused by the absence of students in class due to illness or other obligations. The higher number of dropouts in the statistical evidence condition in special education schools was due to the same reasons. For both school types Chi-square tests indicated that students who dropped out did not have significantly more drinking experience at T1 \( (p's > .05) \). Before the analyses were conducted, 13 special education school students and eight pre-vocational school students were removed from the sample due to missing values. As a result, the final sample contained 101 special education school students and 187 pre-vocational school students.

Table 5.1 provides an overview of students’ demographics. The sample contained slightly more boys than girls and the average age was close to thirteen \( (M = 12.85; SD = .57; \text{range: } 12-14) \). Most students were born in the Netherlands and spoke mainly Dutch at home. Furthermore, most students had no religion, the
others being mainly Muslim, Catholic, or Protestant. Chi-square tests indicated there were no differences in demographics between conditions ($p$'s > .05).

### Table 5.1

*Overview of background variables*

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>52.4%</td>
</tr>
<tr>
<td>Girls</td>
<td>47.6%</td>
</tr>
<tr>
<td><strong>Birth country</strong></td>
<td></td>
</tr>
<tr>
<td>Dutch</td>
<td>91.6%</td>
</tr>
<tr>
<td>Morocco</td>
<td>1.4%</td>
</tr>
<tr>
<td>Turkish</td>
<td>1.0%</td>
</tr>
<tr>
<td>Surinam</td>
<td>0.3%</td>
</tr>
<tr>
<td>Other</td>
<td>5.6%</td>
</tr>
<tr>
<td><strong>Primary language at home</strong></td>
<td></td>
</tr>
<tr>
<td>Dutch</td>
<td>77.3%</td>
</tr>
<tr>
<td>Turkish</td>
<td>6.6%</td>
</tr>
<tr>
<td>Arab</td>
<td>5.2%</td>
</tr>
<tr>
<td>Berber</td>
<td>2.1%</td>
</tr>
<tr>
<td>Papiamento</td>
<td>8.0%</td>
</tr>
<tr>
<td>Other</td>
<td>0.7%</td>
</tr>
<tr>
<td><strong>Religion</strong></td>
<td></td>
</tr>
<tr>
<td>No religion</td>
<td>51.4%</td>
</tr>
<tr>
<td>Catholic</td>
<td>13.3%</td>
</tr>
<tr>
<td>Protestant</td>
<td>10.8%</td>
</tr>
<tr>
<td>Muslim</td>
<td>20.9%</td>
</tr>
<tr>
<td>Buddhist</td>
<td>0.4%</td>
</tr>
<tr>
<td>Jewish</td>
<td>0.7%</td>
</tr>
<tr>
<td>Other</td>
<td>2.5%</td>
</tr>
<tr>
<td><strong>Frequency of alcohol consumption</strong></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>69.4%</td>
</tr>
<tr>
<td>1 – 10 days per year</td>
<td>20.5%</td>
</tr>
<tr>
<td>1 day per month or more</td>
<td>10.1%</td>
</tr>
</tbody>
</table>
Ethics statement

The ethical committee of the Faculty of Social Sciences at the University of Amsterdam approved this study. In accordance with the procedures of the ethical committee, we first informed schools about the details of the study and did not continue until they formally agreed to participate in writing. Before the study started, parents were informed about the participation of their child through an information letter. Attached to the information letter was a form that parents could sign and return if they did not agree with their child’s participation. This method of consent is in accordance with the rules specified in the ethical committee’s guidelines and explicitly agreed on following the ethical committee’s review of the study protocol (registration number: 2014-CW-09). The rejection rate was below five percent.

Procedure

Data were collected in a classroom setting. During the first wave, students received verbal instructions from the experiment leader. Hereafter, they individually completed the questionnaire, which contained items about the dependent and control variables. Students spent about 25 minutes to complete the questionnaire.

About four weeks later schools were revisited for the second wave. Before the visits, classes were assigned to one of the two conditions. Of the final sample 14 classes (141 students) students were assigned to the narrative condition and 15 classes (147 students) to the statistical condition. Students first received verbal instructions as a group, after which they individually completed the booklet of the condition they were assigned to. Completing the booklet took about 15 minutes. When they were finished, students handed in their booklets and received the post-measurement questionnaire. The questionnaire contained items about dependent variables and took about 20 minutes to complete.

The third wave took place approximately another four weeks later. Again students first received instructions as a group. Hereafter, they individually completed the questionnaire, which required about 20 minutes to complete.

Measures

The questionnaire at each wave contained items on various determinants of drinking behavior. At the first wave, demographics and background variables
were measured as well. At the second wave, the questionnaire contained some additional text processing measures. All items were adapted to the abilities of the low educated adolescents that participated in this study. A description of the measures that we included in our analyses is provided below.

**Knowledge about the negative consequences of alcohol.** Knowledge about the negative consequences of drinking alcohol was measured using an open-ended question, in which the participants were asked to write down as many negative consequences as they knew. Two independent coders coded the number of negative consequences. Inter-coder reliability was determined by computing the correlation between coders at each wave (T1: \( r = .99; p < .001 \). T2: \( r = .99; p < .001 \). T3: \( r = .99; p < .001 \)). Differences between coders were discussed until agreement was reached. The number of negative consequences that participants wrote down was used as an indicator of knowledge (T1: \( M = 3.11; SD = 1.47 \). T2: \( M = 3.70; SD = 1.53 \). T3: \( M = 2.91; SD = 1.50 \)).

**Affective and cognitive attitude towards alcohol.** Affective attitude towards alcohol was measured at each wave using two semantic differential items *enjoyable-enjoyable* and *unpleasant-pleasant* (Crites, Fabrigar, & Petty, 1994). Cognitive attitude towards alcohol was measured using the items *unwise-wise* and *bad-good* (Conner et al., 2013). The sentence “I find drinking alcohol...” preceded each item. Responses were measured on a four-point scale (Ajzen, 2006). A total affective attitude score was computed by averaging the two items (T1: \( r = .81; M = 1.79; SD = .83 \). T2: \( r = .80; M = 1.81; SD = .83 \). T3: \( r = .83; M = 1.85; SD = .86 \)). And a total cognitive attitude score was computed by averaging the two items (T1: \( r = .72; M = 1.56; SD = .63 \). T2: \( r = .65; M = 1.57; SD = .65 \). T3: \( r = .71; M = 1.59; SD = .66 \)).

**Intention to drink alcohol.** Intention to drink alcohol was measured through three statements: (1) “I plan to drink alcohol”; (2) “I plan to drink alcohol in the upcoming month”, and (3) “I plan to drink alcohol in the upcoming year” (Ajzen, 2006). The scale ranged from 1 *(no, certainly not)* to 4 *(yes, certainly)*. An intention score was computed by averaging the items (T1: \( \alpha = .76; M = 1.61; SD = .66 \). T2: \( \alpha = .79; M = 1.65; SD = .63 \). T3: \( \alpha = .84; M = 1.70; SD = .80 \)).

**Past behavior.** To control for differences in past behavior we included a closed-ended question at T1. Students were asked to indicate how often they consumed alcohol on the following response categories: *never*, *1-3 days per year*, *4-10 days per year*, *1 day per month*, *2-3 days per month*, *1 day per week*, and *more than 1 day per week*. Because only a small share of students consumed alcohol,
some categories were merged. This resulted in an indicator of past behavior with the categories never, 1–10 days per year, and 1 day per month or more.

**Data Analyses**

All hypotheses were examined through repeated measures analyses of variance in SPSS 20. To distinguish between students who scored high and low on knowledge, affective attitude, cognitive attitude, and behavioral intention at T1 we created separate grouping variables based on the median of each outcome variable. Students who scored below or equal to the median of the outcome variable at T1 were assigned the value 0 and students who scored above the median were assigned the value 1. A separate repeated measures analysis was conducted for each outcome variable. In each analysis we included the median split variable and evidence type (testimonials vs. statistics) as between-subjects factors. In addition, we controlled for age, gender, school level and past behavior in all analyses. However, if the influence of a control variable was not significant at a level of \( p < .10 \), the control variable was eliminated from the analysis. All contrasts were computed using a Bonferroni correction for multiple comparisons. Table 5.2 provides an overview of the means of all dependent variables per condition.

**Results**

At the baseline measurement, students on average knew slightly more than three negative consequences of consuming alcohol. Furthermore, students had slightly negative affective and cognitive attitudes towards alcohol, and a low intention to consume alcohol (see Table 5.2). About 7 out of 10 students never consumed alcohol, 2 out of 10 did this on one to ten days per year, and 1 out of 10 on one day per month or more (see Table 5.1). A chi-square test indicated that there were no differences in previous behavior between conditions (\( p > .05 \)).

**Main Analyses**

Our first hypothesis predicted that health education materials containing narrative evidence would have a stronger positive effect on knowledge than materials containing statistical evidence, moderated by the amount of knowledge at T1. The results did not show a significant interaction between time, condition, and T1 knowledge \( (F(2, 562) = .43, \eta^2 = .00, p = .653) \). Therefore, hypothesis 1 was rejected. However, we found a significant interaction between time and the amount of knowledge at T1 \( (F(2, 562) = 64.53, \eta^2 = .19, p < .001) \). Post-hoc analysis showed that students who had little knowledge at T1 had significantly
more knowledge at T2 than at T1. However, knowledge decreased significantly between T2 and T3. Students who scored high on knowledge at T1 wrote down significantly less negative consequences at each subsequent wave (see Table 5.2).

Hypothesis 2 predicted that health education materials containing statistical evidence has a stronger negative effect on cognitive attitude than materials containing narrative evidence, moderated by the favorability of cognitive attitude at T1. The results showed no significant interaction involving condition, time, and cognitive attitude at T1 ($F(2, 564) = 2.27, \eta^2 = .01, p = .104$). Therefore, hypothesis 2 is rejected. There was a significant interaction effect between time and cognitive attitude at T1 ($F(2, 564) = 16.03, \eta^2 = .05, p < .001$). Students, who had a favorable cognitive attitude towards alcohol at T1, had a significantly less favorable attitude at T2 and T3 than at T1. An unintended effect was found for students who had an unfavorable cognitive attitude at T1. These students had a significantly more favorable cognitive attitude towards alcohol at T3 than at T1 (see Table 5.2).

Table 5.2

<table>
<thead>
<tr>
<th></th>
<th>Knowledge</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T1 low</td>
<td>2.17 (.08)</td>
<td>3.19 (.13)</td>
<td>2.42 (.13)</td>
</tr>
<tr>
<td>Cognitive Attitude</td>
<td>T1 high</td>
<td>4.72 (.10)</td>
<td>4.09 (.17)</td>
<td>3.09 (.16)</td>
</tr>
<tr>
<td>T1 unfavorable</td>
<td>1.21 (.03)</td>
<td>1.31 (.05)</td>
<td>1.40 (.05)</td>
<td></td>
</tr>
<tr>
<td>T1 favorable</td>
<td>2.28 (.03)</td>
<td>2.12 (.05)</td>
<td>2.12 (.05)</td>
<td></td>
</tr>
<tr>
<td>Affective Attitude</td>
<td>T1 unfavorable</td>
<td>1.27 (.05)</td>
<td>1.49 (.08)</td>
<td>1.53 (.07)</td>
</tr>
<tr>
<td>T1 favorable</td>
<td>2.62 (.04)</td>
<td>2.46 (.06)</td>
<td>2.54 (.06)</td>
<td></td>
</tr>
<tr>
<td>Behavioral Intention</td>
<td>T1 low</td>
<td>1.39 (.04)</td>
<td>1.50 (.07)</td>
<td>1.59 (.07)</td>
</tr>
<tr>
<td>T1 high</td>
<td>2.22 (.03)</td>
<td>2.20 (.05)</td>
<td>2.31 (.05)</td>
<td></td>
</tr>
</tbody>
</table>

Note. Superscript indicates group means that do not differ significantly ($p > .05$) between waves.

Our third hypothesis predicted that health education materials containing narrative evidence has a stronger negative effect on affective attitude than materials containing statistical evidence, moderated by the favorability of affective attitude at T1. No significant interaction effect on affective attitude was found between time, condition, and affective attitude at T1 ($F(2, 560) = .58, \eta^2 = .00, p$
Hypothesis 3 predicted that health education materials containing narrative evidence has a stronger negative effect on intention to drink alcohol than materials containing statistical evidence, moderated by the intention to drink alcohol at T1. There was no interaction effect between conditions, time, and behavioral intention at T1 ($F(2, 564) = .91, \eta^2 = .01, p = .166$). Hence, hypothesis 4 is rejected. We neither found a significant interaction between time and behavioral intention at T1 ($F(2, 564) = 2.21, \eta^2 = .01, p = .110$).

**Discussion**

In this study we aimed to examine the effects of school health education materials for low educated adolescents on knowledge, cognitive and affective attitude towards alcohol, and intention to drink alcohol. We also examined whether these effects differed between materials containing statistical evidence and materials containing narrative evidence. Desired immediate effects were found on knowledge, affective attitude, and cognitive attitude for students who had much opportunity for change in a healthy direction. The effect for knowledge disappeared within a month, while the effects persisted for cognitive attitude and partly persisted for affective attitude. Undesired effects were found for knowledge, cognitive attitude, and affective attitude amongst students who already had high knowledge and negative attitudes and thus had little opportunity for change in a more healthy direction. No effects were found on intention to drink alcohol. We did not find any differences between conditions. That is, effects were equally strong for the narrative evidence and the statistical evidence condition.

The lack of differences between conditions contradicts the findings of previous studies that mainly found small effects of evidence (Zebregs et al., 2015). However, these studies were mostly conducted amongst college students (Gray & Harrington, 2011; Yu et al., 2010). We suggested that the findings for college students would possibly not apply to students who have less cognitive capacities (Hunt, 2005). Due to their limited cognitive capacities, these students could be
expected to be less capable to process information. This most likely decreases the overall effect of health education materials and, as a consequence, the difference between materials containing statistical and narrative evidence.

To explain the undesired effects amongst the students who had little opportunity for change, we have to distinguish the effect on knowledge from the effects on affective and cognitive attitude. The undesired effects for affective attitude and cognitive attitude are most likely the product of regression towards the mean. Regression towards the mean occurs in situations where participants are allocated to a group based on pretest scores, like we did in this study (Marsh & Hau, 2002). Most students with little possibility of change in a healthy direction reported the lowest possible score at T1 (Affective attitude: 80.3%. Cognitive attitude: 80.7%). All measures include some level of measurement error. As a result, repeated measurements of the same variable will never result in fully identical scores. Due to the extremely low scores at T1, the change of scores for affective and cognitive attitude at subsequent waves could only be an increase. Hence, the undesired effects that we found are most likely statistical artifacts (Campbell & Kenny, 1999). Because the scores in the groups with more possibility for change were not as close to the extreme ends of the scales, this effect was not likely to occur amongst these students.

Regression towards the mean was also not likely to occur for knowledge, because a smaller share of students (30.9%) had the most extreme score. Therefore, the unintended effect for knowledge is probably caused by a different mechanism. We found that students, who had much knowledge at T1, had less knowledge at each subsequent wave. Knowledge was measured using an open-ended question asking the participants to write down all the potential negative consequences of drinking alcohol that they knew. The willingness to write down all negative consequences they knew may have decreased most amongst those who already had much knowledge, because they had to write down most of all students. This decrease may have been reinforced at each subsequent wave and explain the decrease in knowledge at each subsequent wave.

This study adds to the existing literature in two ways. First, we showed that health education can effectively increase low educated students’ knowledge and make their attitudes towards alcohol more negative, when there is an opportunity for such change. This is important, because previous studies focused primarily on higher educated students and it was not known whether health education materials could be effective for lower educated students (Cuijpers et al., 2002; Gray et al., 2011). Second, we revealed that amongst low educated students
there is no difference between the effects of statistical and narrative evidence. Previous studies comparing the effects of statistical and narrative evidence have mainly been conducted amongst college students (Gray & Harrington, 2011; Yu et al., 2010). Our findings suggest that the findings for these highly educated samples do not apply to lower educated target groups.

Our study has several implications for future studies. The finding that students forget the negative consequences they learned within a month suggests there is a need for repeated exposure. Hence, future studies should aim to examine the effects of multiple exposures to health education materials and whether it is possible to establish enduring effects. Repetition of information is likely to reinforce the associations students have with alcohol and its negative consequences, making it more likely for knowledge to be activated when it is needed (Radvansky, 2011). Hence, multiple exposures increase the likelihood that materials will be effective over time. However, repeated exposures to the same materials is likely to be perceived as boring. Therefore, researchers should examine whether the use of different materials for exposures at different time points is more effective (Tellis, 1997). Our results showed that both types of materials that were used in this study were effective. Therefore, both materials containing statistical and narrative evidence could be applied to create more diversity. As such, information about the same topics could be repeated through different formats, which may help to establish more diverse traces in memory and could make it more likely that the knowledge is recalled at a later moment in time (Nisbett & Ross, 1980; Radvansky, 2011).

Furthermore, researchers should examine the moderating influence of education level, because our findings differ from the findings of studies conducted amongst college students. Our current findings suggest there is a difference between the effects that are found for students from higher and lower education levels, but conclusive evidence would require studies in which students from different education levels are included. In this way it would be possible to test the influence of education level statistically. Finally, future studies should examine the unintended effects that we found by applying designs that include a control group. We suggested that the unintended effects are most likely not caused by exposure to the materials, but by statistical and methodological causes. However, it is necessary to confirm these explanations with a control group that is not exposed to any materials. These effects should then also occur for this group.

In practical terms the implications of this study are that professionals involved with health education could expect materials to be effective means to influence
knowledge, cognitive attitude, and affective attitude of low educated adolescents. However, especially the short-lived effect on knowledge that we found suggests that a single exposure is not sufficient to establish enduring effects. Therefore, health education professionals should consider programs that involve multiple exposures at different time points. It could even be considered to spread exposures over several years, but the most promising intervals between time points and durations of programs remain yet to be determined (Janiszewski, Noel, & Sawyer, 2003).

We believe that through our study important progress was made in understanding the effectiveness of school health education materials for low educated adolescents. In addition to the empirical findings, this study provided additional questions for future studies. We particularly stress the importance of additional studies that include lower educated target groups. A lot of existing knowledge about the effectiveness of message strategies is derived from studies amongst highly educated college students. Because we do not know how these effects differ for lower educated target groups, it is very difficult to apply this existing knowledge to create effective materials for lower educated target groups. While it are these target groups that are often most likely to engage in unhealthy behaviors (Kepper et al., 2011). Therefore, it will only be possible through the means of additional research to create school health education materials for low educated target groups that are most effective.
References


