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School of Transportation Sciences

Master of Transportation Sciences

Master's thesis

Crossing the Line: Measuring (Socio-Cognitive Variables of) Behavior at Railway Crossings among Flemish Youth and Evaluation of Live versus Video Testimonial Interventions

Ronald Wolfs

Thesis presented in fulfillment of the requirements for the degree of Master of Transportation Sciences

SUPERVISOR :
Prof. dr. Davy JANSSENS

CO-SUPERVISOR :
Prof. dr. Ariane CUENEN

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2024

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Preface

When I was a child, I experienced the loss of a friend of the family due to a traffic accident. I witnessed from up close how it tormented the people that were left behind. Since that moment, traffic safety is very close to my heart. I even had the opportunity to turn this passion into a career. After almost ten years of working at De Lijn, I started working with engineering consultancy company Sweco three and a half years ago, were I joined the Traffic & Mobility team. Not much later, I had the honour to become the project leader of an important traffic safety project of AWV, the Flemish governmental agency for Roads and Traffic. In this project, a large number of problematic locations with regard to traffic safety are analysed and improvements are proposed. These improvements are solely infrastructural improvements. It gives me a great feeling of satisfaction when a suggested solution is implemented in the field. However, I must admit that I am even more interested in the human factor of traffic safety and the effect of human behavior on road safety. As a father of two children, aged 7 and 11, the traffic safety of children is a subject that is very dear to me. My goal therefore was to complete a thesis that addresses a concrete, societally relevant traffic safety problem related to young people in a solution-oriented manner.

It is my honest opinion that I have succeeded in achieving this goal.

During the period in which I was looking for such a concrete, societally relevant traffic safety problem, I saw a video on social media of a young Flemish cyclist who miraculously survived a collision with a train, which occurred after he slalomed through the closed barriers of a railway crossing. In the weeks that followed, the problem of unsafe behavior at railway level crossings was frequently reported in the media and attracted my attention. It seemed like the subject had chosen me.

When thinking of a possible intervention to tackle this problematic behavior, my attention initially fell on applications of Virtual Reality. When it turned out that this was not possible within the available time and budget, I happened to come into contact with Roy Kunnen, who a few years ago was the victim of an accident with a train, in which he lost three of his four limbs. Roy has since given lectures on the subject in schools. After an initial short contact with him he appeared willing to cooperate. Once again the refined version of my subject seemed to have chosen me.

I am utterly satisfied that the study shows a positive effect, also in the long run, of the live testimonial. I hope that the findings, propositions for further research and the recommendations can be picked-up and implemented and this thesis can make a difference.

I owe a lot of acknowledgement to a lot of people, without whom this thesis would not have come about. First of all, I would like to express my sincere thanks to

Roy Kunnen for his willing cooperation. His courage, positivity and sense of humor have been an inspiration throughout my thesis work.

Next, I would like to thank my promotor prof. dr. Janssens and co-promotor prof. dr. Ariane Cuenen for their extensive knowledgeable and dedicated feedback during the process of writing this thesis. Thanks also to mrs. Nadine Smeyers for the clear and prompt advice on the administrative side of thesis.

I would also like to send words of thanks to the principals and personnel of Humaniora Kindsheid Jesu (HKJ) for their extensive and willing cooperation during the research process: mr. Sebastian Braecke, mr. Werner Nevels, mrs. Ann Oris, mr. Kurt Vanbockrijck and mrs. Sara Coels. I am also indebted to the students of HKJ, who, as members of the experimental group, were willing to attend a testimonial and complete up to three surveys.

I would also like to express my gratitude to mrs. Christel Thijs, mrs. Sara Jehaes and mrs. Katrien Slegers and all students of the Instituut voor Katholiek Secundair Onderwijs (IKSO) for the willingness to participate in the study as a control group by spreading and completing up to three surveys without the upside of the opportunity to attend a testimonial.

Furthermore, I would like to show my appreciation to mr. Paul Vanhoudt and mrs. Daisy Molemans from WICO Neerpelt, for their enthusiasm to cooperate in the pre-test of this study.

A word of thanks also goes out to the people at Infrabel (mrs. Annelies De Keyser Annelies, mr. Gaetan Van Overmeiren and mr. Vincent Godeau) to prof. prof. dr. sc. Danijela Barić and prof. dr. Ruiter, for giving their valuable insights that helped me to choose the right topic, target group, research method and type of intervention.

Many thanks to my colleagues at Sweco that made it possible for me to pursue my goal of getting my master's degree in Transportation Sciences: mrs. Nele Meex, mr. Stijn Van Pe, mr. Jeroen Bastiaens and mr. Jonathan Cops. Also thank you to my colleague Elke, who helped me to get in contact with Roy.

Special thanks and lots of love to my nieces Kirsten Coels and Janne Vanderheyden for testing and giving their feedback on the surveys.

Last but not least, I have a lot of gratitude towards my wife Sara and my children Liam and Emma. Thanks a lot for you understanding and support during the many hours and days that dad sat working behind his desk and had less time to spend with you. Know that I am incredibly much looking forward to making this up to you guys. I love you all immensely.

To my dad in heaven: thank you for giving me the most precious lesson in live: to never give up, no matter how though the battle may seem. I miss you.

Summary

Dangerous behavior in the vicinity of railway crossings is a significant problem in Belgium. According to the data of Infrabel, 55 people lost their lives and 41 got seriously injured in railway crossing incidents between 2012 and 2022. In addition to the physical and mental impact on victims, their families and friends as well as on railway personnel, railway crossing incidents were the cause of many minutes of delay on the Belgian rail network in 2022. In the past months, this traffic safety issue has received a lot of attention in the Flemish media.

Despite the infrastructural interventions for which Infrabel makes a great effort, the number of incidents and victims remains more or less stable leading to the conclusion that behavioral interventions should be included into the solution mix. These should be targeted to younger people, as they are (together with the elderly) disproportionally represented in pedestrian-train collisions. Based on previous studies, the target group of Flemish students in the second and third grade of secondary schools is established.

The type of intervention that was examined were testimonials. More specifically, a comparative study of the effect of a scalable, online video testimonial and a testimonial in person, was conducted. For this purpose, contact was made with a victim of a train accident, who lost three of his limbs in the accident and who gives lectures about his experiences, mainly in schools. For this study, the victim was asked to make a three-part video testimonial in which he tells his story in a comparable manner as in the live testimonial.

A longitudinal control group experimental study design was adopted to measure change in attitudes and behavior in traffic in general and at railway crossings in specific and the impact of live and video testimonials. The results of a pre-test, which was performed before the experimental group was confronted with the testimonials, are compared with the results of two post-tests, one of which was performed directly after the testimonials and the other one month after. The control group received the pre- and post-tests surveys but not the intervention. Both the live and video testimonial were offered to selected students in the 2nd and 3rd grade of a secondary school in Hasselt, while the control group involved students from a secondary school in Hoeselt.

Four main analyses were performed. First of all, exposure to railway crossings and attitudes and behavior with regard to traffic safety in general and at railway crossings in specific are examined, using a dataset of 763 second and third grade secondary school students.

In this analysis, it is found that a lot of students are exposed to railway crossings, pointing out the importance of good education on railway crossings. Almost eight out of ten respondents are exposed to a railway crossing when going to school, on other occasions than travelling to school or both. Almost four out of ten times

this exposure happens by foot, by bike or by moped, both for school as for non-school travel. More than one third of those who cross a railway crossing on their way to school do so every day or nearly every day. Nearly half of the respondents live within one kilometre of a railway crossing.

Risky behavior is quite common. More than 5% of the students don't find it dangerous to cross a railway crossing when the red lights are flashing and the barriers are completely closed. Only 45.2% consider this very dangerous. Furthermore, 3% of the students indicate they have done it more than once a week in the past 6 months and over 13% indicates that it is likely or very likely that they will be doing it in the future.

The situation is even worse for risky behaviors when the barriers are opening or closing and for risky behaviors that cause distraction, such as using a smartphone or wearing headphones while crossing a railway crossing. There should be extra focus on male students and 2nd graders, as they are significantly less safe across the board.

A second analysis, the search for factors that predict attitudes and behavior at railway crossings, reveals that the most important predictors are attitude towards traffic safety in general and past behavior at railway crossings, which is in line with what is found in the literature. Socio-demographical variables are not good at predicting attitudes, past behavior and behavioral intention at railway crossings, except for grade (only for past behavior).

Next, in the evaluation of the live and video testimonials, it becomes clear that students by far prefer live testimonials over video testimonials. They are perceived as more credible, useful, interesting, important, informative, humorous and shocking. Lack of time, budget and experience might have led to a less professional and lower quality video testimonial leading to a significantly lower cognitive and emotional impact.

Last, but not least: the effect evaluation shows that the live testimonial has an immediate positive effect on both the attitude and the behavioral intention towards risky behavior at railway crossings. Only the effect on behavioral intention remains after a month. The video testimonial only has an immediate effect on attitude and not on behavioral intention. After a month, there is no trace of the effect on attitude. No significant effects were found for the control group for these variables, neither in the short term nor in the long term.

It can be recommended to school boards to start providing students with testimonials to change attitudes and behavioral intention at railway crossings. Live testimonials are definitely recommended, because they appear to have a lasting effect on behavioral intention. It has not been proven that video testimonials have a similar effect. Further research should demonstrate whether high quality, professional video testimonials can achieve this and if there is any effect on actual behavior at level crossings, and not only on behavioral intention.

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1. Introduction

1.1 Problem statement

1.1.1 Risky behavior at railway crossings

Dangerous behavior in the vicinity of a railway crossing is a significant problem in Belgium. According to the data of Infrabel, the organisation that is responsible for the maintenance, expansion and modernization of the Belgian rail network, 55 people lost their lives and 41 got seriously injured in 6,858 railway crossing incidents between 2012 and 2022 (Infrabel, 2023). In addition to the physical and mental impact on victims, their families and friends as well as on railway personnel, railway crossing incidents were the cause of 39,049 minutes of delay on the Belgian rail network in 2022 (Infrabel, 2023).

In the past months, this traffic safety issue has received a lot of attention in the Flemish media. In November of 2023, two deadly incidents occurred in the province of East-Flanders with only a few days in between them. In the same period, Infrabel spread some mind-boggling images of near accidents by Infrabel. In April, a young cyclist that ignored the closed barriers at a railway crossing in Wezemaal and died after being hit by a train. Based on media reports, the number of fatalities due to accidents at railway crossings between September 2023 and June 2024 can be estimated at 6, which is slightly more than the average of 5 per year over the period 2012 and 2022. In 2022, however, there was an "annus horribilis", in which 11 people died in a collision with a train at a railway crossing (Infrabel, n.d.).

The problem was strikingly demonstrated in a tv interview on safety near railway crossings with a spokesperson of Infrabel in the Flemish current-affairs programme Ter Zake on December 4th, 2023. During the recording of the interview, multiple people crossed the railway crossing, of which two were caught on camera (VRT NWS, 2023).

On January 1st 2023, Belgium had 1,630 railway crossings. Since 2005, Infrabel has already abolished 442 railway crossings (Infrabel, 2023). Furthermore, infrastructural and technological enhancements, such as tripping mats and cameras near the tracks, are being operationalised to prevent and detect dangerous behavior at railway crossings (Infrabel, 2023).

1.1.2 The importance of behavioral interventions for young people

Despite these infrastructural interventions, the number of incidents and victims remains more or less stable, leading to the conclusion that behavioral interventions should be included into the solution mix. Infrabel has set up several awareness-raising campaigns and educational programs, some of which are specifically aimed at children and adolescents (Infrabel, 2023). Examples are theoretical courses on railway safety and the escape game Rail Codes.

This is no coincidence, as research shows that younger and older pedestrians are disproportionally represented in pedestrian-train collisions (Freeman et al., 2015). A study among 1000 Belgians living near a railway crossing and/or occasionally travelling by train, performed in 2018 by GfK (Gesellschaft für Konsumforschung) at Infrabel's request, leads to the same conclusions with regard to younger people (Infrabel, 2019). In the age group of 15- to 24-year-olds, 5.48% indicated that they had crossed a railway crossing while the red lights were flashing and the barriers were fully closed at least once every two months in the past 6 months, compared to 2.83% of the total sample. The difference is not significant, probably because of a too low number of respondents in this age category. However, when it comes to crossing a railway crossing when the red lights are flashing but the barriers are not yet fully closed and when a train had already passed but the barriers are not fully open yet or de red lights are still flashing, the difference is significant (respectively 90.28% versus 96.01% for the total sample and 90.16% versus 96.57% for the total sample did seldom or never dot it in the past 6 months).

GfK performed a segmentation of the total sample in a number of segments, according to the behavior and attitude with regard to imprudent behavior in the vicinity of railway crossings. In the segment of Dangerous Doers, which are defined as people that are aware that most of the risky behaviors are dangerous but do not view their own behavior as dangerous, 15- to 24-year-olds are significantly overrepresented. 79% of the Dangerous Doers have been careless near a railway crossing at least once in the past 6 months. (Infrabel, 2019).

1.1.3 The need for education and the rise of microlearning tools

Education is needed to change the attitudes and – more important – the behavior of youth at railway crossings. There are already many types of interventions with regard to dangerous behavior at railway crossings or rail tracks that are already in use in Belgium. Most of them are provided by Infrabel: theoretical lessons on safety rules and consequences of dangerous behavior, gamification, dramatic videos, immersion and testimonials.

Lessons about traffic safety in general and safety at railway crossings in particular are mainly offered within the regular education system. However, it is not easy to provide an extensive and repeated offering within the already busy learning program.

A rise of microlearning tools can be witnessed in the educational system and in society as a whole, as it saves time, can be used on the go and doesn't need a high level of concentration or a long attention span. However, it is not fit for large amounts of (complex) information and for group interaction. There are many different forms of microlearning tools, of which videos are the most popular, especially for tutorials and demonstrations of new skills (Buljan, 2021).

In this study however, the focus is on video testimonials that can be used as an intervention tool to prevent and correct dangerous behavior by young people at railway crossings. These are videos in which victims, family members of victims, train drivers and other railway personnel tell their story. However, research that examines the effectiveness of these video testimonials appears to be scarce or even non-existent.

1.2 Key findings from scientific literature

1.2.1 Risky behavior at railway crossings

Risky behavior at railway crossings can be defined as crossing the tracks whenever the red lights are flashing, the bell is ringing and/or the barriers are not completely open.

This behavior could be the result of an error or a violation (Stefanova et al., 2018). In the first case, defective safety infrastructure (barriers, flashing lights, bell,…) may be the cause, but also an incorrect assessment of the situation or limited knowledge of the rules and operation of a railway crossing (Stefanova et al., 2018). Distraction or inattention which stems from engaging in secondary tasks, is also mentioned as a risk factor in traffic situations, especially in busy or complex ones (Young et al., 2018).

In the case of a violation, the behavior is intentional and has some benefits that are greater than the perceived risk of being involved in a crash or being sanctioned. Examples of perceived benefits are minimising effort (Read et el., 2016), saving time, being socially accepted by important others and avoiding being late (for example missing a train)(Stefanova et al., 2018). According to Freeman and Rakotonirainy (2015) and Larue et al. (2019) more violations are made than errors.

The Theory of Planned Behavior, states that intention is the most important factor for planned behavior. Intention is in turn influenced by 3 factors: attitude, subjective norm and perceived behavioral control. The theory was an extension of Ajzen's own Theory of Reasoned Action, adding the concept of perceived behavioral control. A person's perception of his or her ability to perform a certain behavior is therefore an important determinant of whether he or she will actually perform that behavior. (Ajzen, 1985).

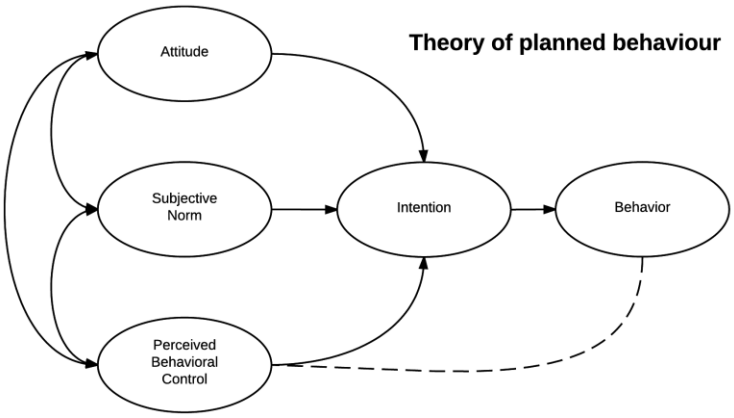

Figure 1 - The Theory of Planned Behavior (Orzanna, 2015)

Different studies, such as Xu et al. (2017), indicate that violations are most of the time not made out of a weighting of costs and benefits, but automatic and routinized behavior, such as past experiences leading to habits and social influences. Two important theories are mentioned by Stefanova et al. (2018): Social Learning Theory and Social Comparison Theory.

The Social Learning Theory was developed by Albert Bandura of the Stanford University in the seventies, and states that behavior is learned from the environment through the process of observational learning (Bandura, 1977), rather than approval from others (Cialdini et al., 1990). This is also supported by observational research, such as the study conducted by Larue et al. (2018).

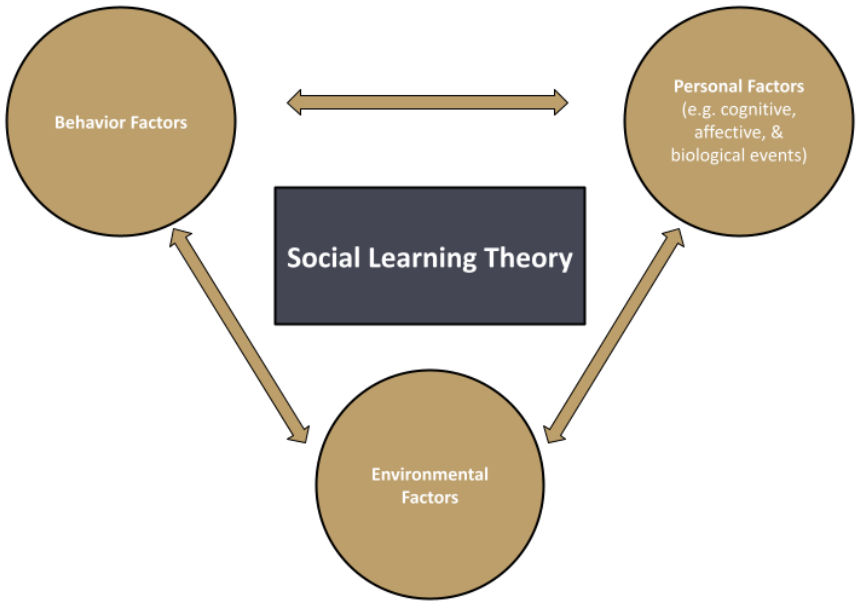

Figure 2 - The Social Learning Theory (Sutton, 2021)

In the Social Comparison Theory (Festinger, 1954), it is posed that people evaluate their own social and personal worth based on how they compare to others, when objective criteria are not available. However, when comparing themselves to others, people tend to have more biased thoughts, underestimate possible risks and overestimate the likelihood of positive experiences and are more likely to engage in risky behavior. A possible explanation is that people perceive themselves as more skilled than others (Stefanova, 2018). This is important in the context of traffic safety in general and behavior near railway crossings in specific.

Stefanova et al. (2018) found out that the behavior of pedestrians at railway crossings depends on the situation, i.e., the status of the automatic safety controls and the train's visibility and position. Risk perception was the lowest and crossing likelihood was highest when (pedestrian) lights were active and (pedestrian) gates had started moving. However, past behavior, descriptive norms and perceived risk of being involved in a crash were good predictors of the likelihood of risky behavior for all scenario's/situations.

As measuring risky traffic behavior is not easy, Stefanova at al. (2018) developed an innovative method to measure crossing intentions and risk perceptions, in which for several scenario's, the participants reported their crossing likelihood, perceived risk of being hit by a train and of getting sanctioned.

1.2.2 Risky behavior of children at railway crossings

According to Freeman et al. (2015), both younger and older pedestrians are overrepresented in train-pedestrian collisions. The study identifies "non-perception of danger", "impulsive risk taking" and "inattention" as the main reasons for unsafe behavior of younger pedestrians near railway crossings. "Non-perception of personal risk" was reflected in the belief that the risk of being hit by a train applies less to them than to others. This is consistent with what can be found in the relevant literature (Lapsey & Hill, 2010)(Steinberg, 2009).

With regard to "impulsive risk taking", Steinberg (2009) indicates that the tendency to engage in risky behavior increases from the age of 10 to a peak at about the age 14 to 15, and then declines again. This may be due to an underdeveloped prefrontal cortex, a higher level of sensation seeking, and the ability to assess risks. The study of Freeman et al. (2015) confirms that the respondents, aged 15 or 16 years old, did not acknowledge that their behavior was risky, and the risky actions were impulsive and without cognition.

1.2.3 The effectiveness of microlearning tools to change attitudes and risky behavior in traffic

Linder (2007) describes microlearning as "[…] what people are doing […] when they face the challenge to find new information and build new knowledge in new networked digital media environments […] as professional and private users increasingly have to deal with small chunks of "microcontent", loosely joined, permanently changing, re-arranging and circulating."

There is not much literature available that specifically deals with the effectiveness of microlearning tools on traffic safety. The effectiveness of microlearning tools in the healthcare sector is nevertheless mentioned in several articles, such as Haghighat et al. (2023) and Zarshenas et al. (2022). Both studies make positive conclusions, indicating positive effects on the promotion and retention of knowledge, learners' satisfaction, raising learning outcomes and self-efficacy.

Although the general concept of microlearning in the context of traffic safety is not mentioned in literature, articles on the evaluation of some examples can be found. Riaz et al. (2019) evaluate a e-learning platform that uses gamification to improve traffic safety among elementary school pupils in Belgium. It contains a self-study programme for approximately 15 minutes per week over a 5-week period. Traditional learning methods seem to have a negative effect on student motivation and engagement. In contrast, visual worlds and digital games have very high engagement among children (McGonigal, 2011). The study Riaz et al. (2019) conducted, showed that the e-learning program significantly improved

pupils' score in risk detection and risk management. When visual representations of traffic situations were presented, pupils scored better in familiar surroundings and situations then in unfamiliar ones.

1.2.4 The use of testimonials as an intervention for risky behavior near railway crossings

Testimonials by traffic victims or their families and friends, are commonly used to promote safe behavior in traffic. This is done by linking the story of a traffic accident victim or their families, to the beliefs and behaviors of the audience (Bojesen & Rayce , 2020)(Cuenen et al., 2016). The underlying idea is that a testimonial will emotionally affect participants, thereby stimulating them to cognitively reflect upon their own behavior as a road user (Cuenen et al., 2016). Studies on the effect of this type of intervention are rather limited (Bojesen & Rayce , 2020)(Cuenen et al., 2016).

Cuenen et al. (2016), present the findings of a study on the effect of a testimonial programme in the third grade (5^{th} and 6^{th} year, ed.) of secondary schools. The focus is on the covered long-term effects of traffic accidents, rather than the more obvious short-term effects, such as pictures of injuries. The results of this pre-test/post-test designed study show that at baseline, female students were significantly more road safety supportive than male students and students of occupational education are significantly less road safety supportive than students of general and technical education with regard to attitude, behavioral intention and behavior. For subjective norm, they were only significantly less road safety supportive than students of general education.

Moreover, the study shows that the short-term effect of the testimonial programme (immediately after participation) on intentions, attitudes, social norms and self-efficacy were rather small for general education and occupational education students. Two months after participation in the program, the program appears to have a major effect on male students on intentions, attitudes and social norms, but not on self-efficacy. Students from general education had the highest cognitive reception and students from occupational education had the highest affective reception. The results indicate that both cognitive and affective reception increase the effect of the program.

In (Cuenen et al. 2016) the effect on different variables were examined: attitude, subjective norm, perceived behavioral control, behavioral intention and behavior. Results indicate that the program had only a small to medium impact on most socio-cognitive and behavioral variables. The effects depended on participants' demographic profile, baseline values on the socio-cognitive and behavioral variables and the cognitive and affective impact the program had on them.

Bojesen & Rayce (2020) also indicate that the effect of the testimonial program they examined was only small. The knowledge on risk factors was only slightly affected and for the cycling behavior and seat belt use there was no effect at all. The authors, nevertheless, point out some shortcomings of the study and suggest some improvements. Firstly, the study should include behavior for which the base line level is less high, as 99% of the participants already wore a seat belt at least "almost always" before the programme, leaving not much space for improvement. Secondly, further studies should make sure whether the ambassador is representative for the target group, in terms of age, story and mode of transportation.

2 Objectives and research questions

2.1 Objectives

The three main objectives for this study are 1) to examine how serious the problem of unsafe behavior at railway crossings is among young people and therefore how great the need is for using testimonies as an intervention tool (measurement of behavior); 2) to examine which variables predict attitudes and behavior at railway crossings; 3) to carry out an evaluation of a live and video testimonial, in order to find out how they are assessed by the participants (process evaluation) and 4) to evaluate what effect these live and video testimonial have on (socio-cognitive determinants of) the behavior of young people at railway crossings (effect evaluation).

To reach this goal, the following partial objectives are established:

- To gain a good insight into the presence of (socio-cognitive determinants) behavior in the target group, both for general road safety and for safety at railway crossings in particular and to examine the presence of notable differences between subgroups;
- To perform a (regression) analysis to get insight into the socio-demographical and socio-cognitive variables that are able to predict attitudes, past behavior and behavioral intention at railway crossings;
- To develop a video testimonial that can be presented to an experimental group with the aim of increasing safe attitudes and behavior in traffic in general and at railway crossings in specific;
- To organise a learning moment for the experimental group(s), in which they are subjected to one live or multiple video testimonials;
- To conduct a process and effect evaluation of the live and video testimonials, by performing one pre-test and two post-tests among two experimental groups and the control group.

2.2 Key research questions and sub questions

Research questions that can be distilled from these research objectives. Key research question and sub questions are formulated for each of the main objectives.

2.2.1 Measurement of (socio-cognitive determinants of) behavior in traffic in general and at railway crossings in particular

The key research question for the measurement of behavior in traffic in general and at railway crossings is:

"How serious is the problem of unsafe behavior at railway crossings among young people?"

The following sub questions are defined:

- How safe is/are the (socio-cognitive determinants of) behavior of the target group, for general road safety?
- Is there a significant difference in these/this (socio-cognitive determinants of) behavior in traffic in general between subgroups based on gender, grade and study domain?
- How safe is/are the (socio-cognitive determinants of) behavior of the target group, for safety at railway crossings in particular?
- Is there a significant difference in these/this (socio-cognitive determinants of) behavior at railway crossings between subgroups based on gender, grade and study domain?
- How high is the level of exposure of youth in Flanders to railway crossings?

2.2.2 Search for factors that predict attitudes and behavior at railway crossings

For the search for factors that predict attitudes and behavior at railway crossings, the key research question is formulated as follows:

- "Which variables are able to predict attitudes, past behavior and behavioral intention at railway crossings?"

To answer the key research questions, the following sub questions are defined:

    - Which socio-demographical variables are able to predict attitudes, past behavior and behavioral intention at railway crossings?
    - Which socio-cognitive variables are able to predict attitudes, past behavior and behavioral intention at railway crossings?

2.2.3 Process evaluation

For the process evaluation, the key research question is formulated as follows:

"How do participants evaluate the presented live and video testimonials on cognitive and emotional aspects and some qualitative elements and which format do they prefer?"

To answer the key research questions, the following sub questions are defined:

- How do the members of the target group assess the presented live testimonial on cognitive and emotional elements and some qualitative elements, such as duration, clarity and performance of the speaker?
- How do the members of the target group assess the presented video testimonial on cognitive and emotional elements and some qualitative elements, such as duration, clarity and performance of the speaker? Is there a significant difference with the assessment of the live testimonial?

2.2.4 Effect evaluation

The key research question for the effect evaluation is:

"Can the presented live and/or video testimonial help to change the (socio-cognitive determinants of) behavior of the target group with regard to risky behavior at railway crossings?"

The following sub questions are formulated to help answer the key research question and fulfil the research objective:

- Can an effect of the live and/or video testimonial be observed immediately after offering these testimonials to the respondents?
- Can an effect of the live and/or video testimonial be observed one month after offering these testimonials to the respondents?

3. Methodology

3.1 Exploratory discussions with stakeholders

The first step of the research process was the exploration of the subject in the form of conversations with those involved in the subject. The insights of two important stakeholders in the problem of dangerous behavior of young people in the vicinity of railway crossings were gathered: a secondary school and Infrabel. A meeting was set up with the principal and the deputy principal of the secondary school Humaniora Kindsheid Jesu, which took place on December 18th, 2023. A follow-up meeting took place on February 22nd, 2024. Contacts with Infrabel too place via e-mail, because of planning difficulties.

The goal of these discussions was to find out what to focus on, which knowledge of the subject is already available and which insights would be valuable for the stakeholders. For the secondary school, this meeting was also used to get aligned with respect to the possibilities and conditions for conducting the research at the school, with the students being part of the sample.

In the meeting with the principals of Humaniora Kindsheid Jesu, the subject and the approach of the research were presented. Next, the problem of dangerous behavior at the railway crossing in the vicinity of the school (Paalsteenstraat) and at the train station near the school (Kiewit Station) were discussed. At the Paalsteenstraat, the problem does not seem to be that big, because before and after school, a lot of people are waiting for the closed barriers by foot, on bikes or in cars, causing a certain level of social control. At Kiewit Station, the infrastructure was recently adapted (a pedestrian bridge with a broad staircase, higher platforms), which discourages dangerous behavior. A dangerous behavior that still takes place is standing too close to the rails, which can also lead to accidents. The school is already active in raising awareness of the dangers near railway tracks. When a student is caught breaking the rules, a notification is sent to the parents.

The school was willing to participate in the research. However, attention should be paid to practical feasibility. Students should miss as few lessons as possible. It would be ideal if the intervention and necessary surveys could be performed within one class period (50 minutes). Finally, attention was paid to possible side effects of research on dangerous behavior at railway crossings, because it might "inspire" some students and be a sensitive topic to others.

With Infrabel, a meeting was set up on January 15th, but this could not take place because of planning issues and because, by the 15th of January, the research design for this study already seemed to be moving in a more or less final direction. A discussion via e-mail revealed that Infrabel has only limited experience with

evaluations of the effectiveness of the interventions they organise. After "The Floor", an awareness campaign that uses virtual reality, Infrabel systematically sent an evaluation form to the participants. Teachers indicated that the action had an effect and that the message was getting through. However, it was not known whether this would enable long-term behavioral change. Behavioral studies were also performed in the past; However, these were performed with a broader panel than just young people. Infrabel also showed interest in evaluation the effect of the escape game "Code Rails" and their ready-made presentation with testimonials.

3.2 Target group and sampling

In the Railspect study that GfK performed on behalf of Infrabel, the lowest age group that was defined, was that of people between 15 and 24 years old. In Cuenen et al. (2016), the focus was on students of the 3rd grade of secondary schools. To maximize the alignment and comparability with these studies, the target group of Flemish students in the second and third grade of secondary schools is established. Flanders is chosen as a geographical scope, as it differs largely from the other Belgian regions, such as Wallonia, which has a significantly less dense rail network than Flanders. Education in Belgium is also organized at a regional level.

The target group of this study can therefore be defined as **Flemish 2nd and 3rd grade students**. To clarify, this concerns students in the 3rd to 7th year of secondary school.

The target population size is 315,529, according to the data of Departement Onderwijs Vlaanderen of February 1st, 2024.

Table 1 - Distribution of the target population by grade and gender

Grade	Total	Male	Female
2nd grade	159,910	82,145	77,765
3rd grade	155,619	79,094	76,525
Total target population	315,529	161,239	154,290

For practical, timing and budgetary reasons, it is not possible to perform the research on the total target population. For a population size of 315,529, a confidence level of 95% and a margin of error of 5%, the minimum sample size

should be 384 (Qualtrics Sample size calculator, 2023). However, this sample size is only obtained in the ideal case. Also in the ideal case, the control group is about the same size as the experimental group. In practice, the aim should always be to obtain the largest possible sample size within the practical, timing and budgetary possibilities.

The non-random sampling method of convenience sampling is used because of practical reasons. As the target population of this study consists solely of secondary school students, the research is done in the school context and during school hours.

Two secondary schools are selected in the province of Limburg, as it is the province in which Hasselt University is located and in which the Master student lives. The criteria that were used for the selection of the schools are that they provide education for the target group (2nd and 3rd grades of secondary education) and that the school is situated near a railway crossing (<400 m).

The secondary school Humaniora Kindsheid Jesu in the city of Hasselt, is chosen as the school in which the experimental group is addressed. This was done because of the size of the school, the Master student's familiarity with this school and the central location. The school is located near a railway crossing, which is located at 250 meters from the back entrance (Paalsteenstraat). There is also a train station nearby (Kiewit Station, at 350 meters from the front entrance).

The school management selected classes in the 2nd and 3rd grade, to whom either the live testimonial (12 classes, 250 students) and video testimonial (11 classes, 251 students) would be presented. The total experimental group was thus larger than the required minimum sample size of 384. This provided some margin for absent students, cleaning of data, …

A second school was selected as the school in which the control group was addressed. Therefor, a GIS-analysis was performed. In QGIS, a layer with al the secondary schools in Flanders and a layer with all the railway crossings in Belgium were created. Around the secondary schools, a buffer of 400 meter was drawn.

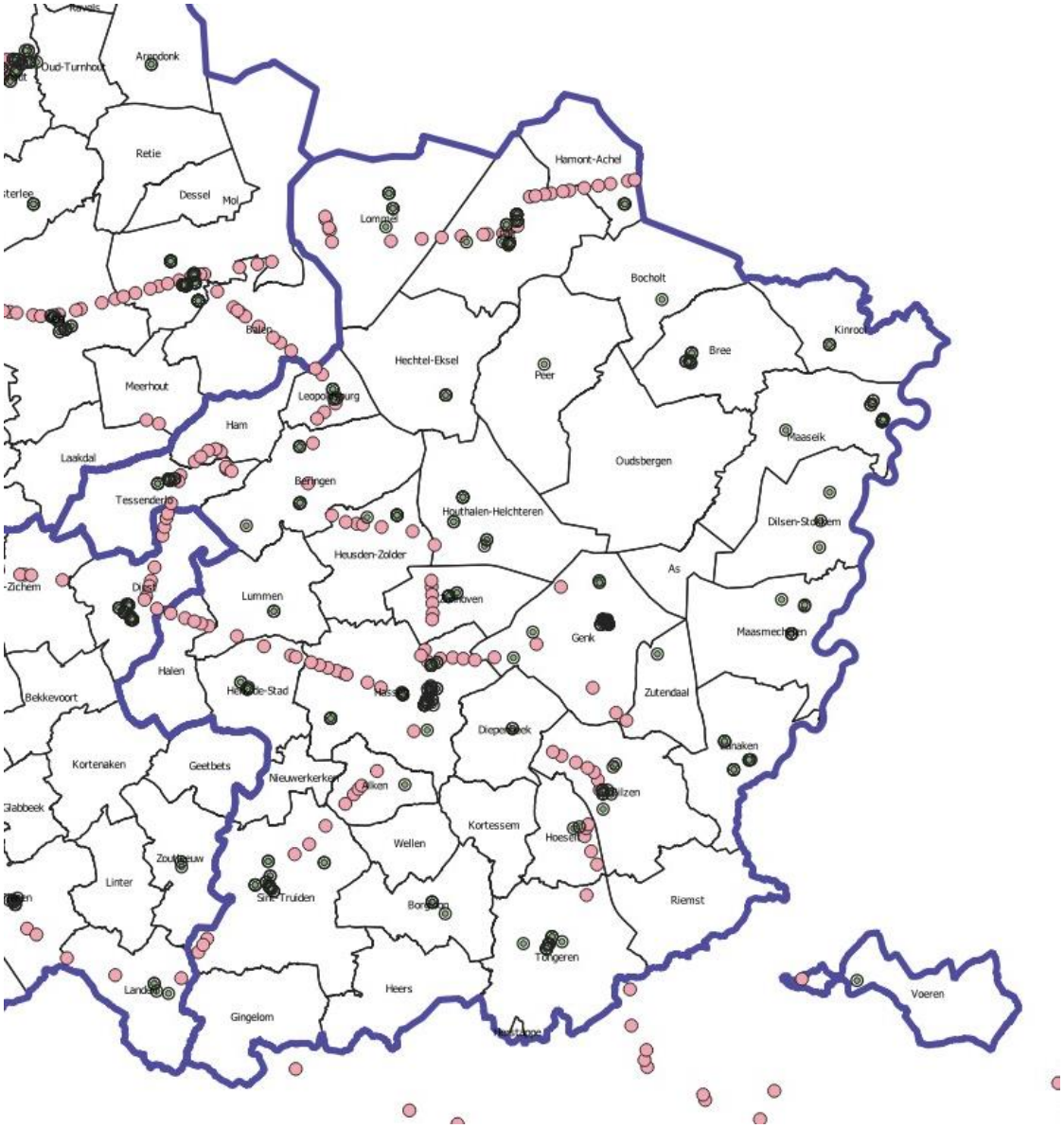

Figure 3 - Secondary schools (green dots) with 400-meter buffers and railway crossings (pink dots) in Limburg

A visual check was then carried out to detect all secondary schools in Limburg for which a railway crossing falls within the 400-meter buffer, as is the case in the image below for a school in Pelt.

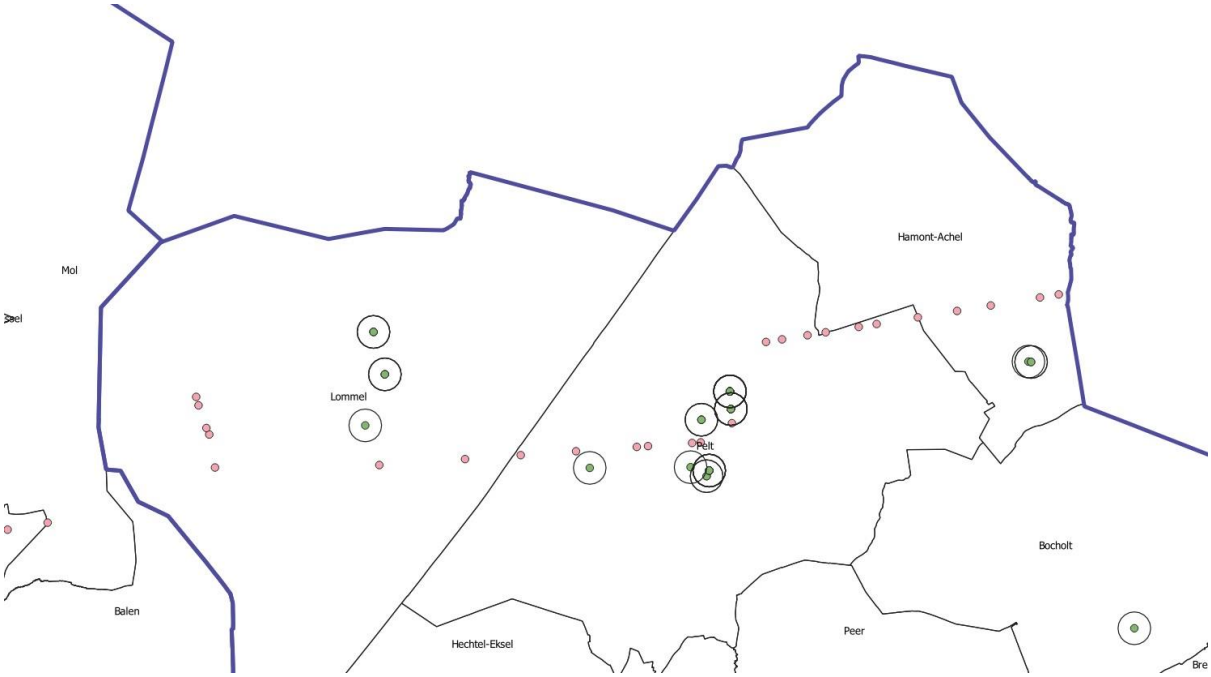

Figure 4 - Visual check of presence of railway crossings (pink dots) in 400-meter buffer around schools (green dots)

The following list of potential candidate school was obtained.

Table 2 - List of potential candidate schools for the control group

Name school	Address	Municipality
WICO Neerpelt	Stationsstraat 74	3910 Pelt
Bovenbouw Sint-Michiel	Diestersteenweg 3	3970 Leopoldsburg
Sint-Michiel Middenschool	Diestersteenweg 11	3970 Leopoldsburg
Campus MAX Middenschool	Stationsstraat 125	3980 Tessenderlo
Humaniora Kindsheid Jesu	Kempische Steenweg 400	3500 Hasselt
Middenschool Kindsheid Jesu	Kempische Steenweg 400	3500 Hasselt
Technisch Instituut Sint-Jozef	Sint-Lambertuslaan 15	3740 Bilzen
GO! Atheneum Martinus	Sint Martinusstraat 3	3740 Bilzen
Instituut voor Katholiek Secundair Onderwijs	Bruiloftstraat 10	3730 Hoeselt

These schools are then checked against the criteria of presence of the target group (2nd and 3rd grade). Also, Humaniora Kindsheid Jesu is deleted from the list as it is already selected for the experimental group.

The following schools remain in the running.

Table 3 - List of remaining potential candidate schools for the control group

Name school	Address	Municipality
WICO Neerpelt	Stationsstraat 74	3910 Pelt
Bovenbouw Sint-Michiel	Diestersteenweg 3	3970 Leopoldsburg
Technisch Instituut Sint-Jozef	Sint-Lambertuslaan 15	3740 Bilzen
GO! Atheneum Martinus	Sint Martinusstraat 3	3740 Bilzen
Instituut voor Katholiek Secundair Onderwijs	Bruiloftstraat 10	3730 Hoeselt

These schools were then contacted by telephone and the question was asked whether the school wanted to participate in the study. For most schools, the research did not fit into the planning and was considered rather burdensome. Two schools were willing to collaborate: Instituut voor Katholiek Secundair Onderwijs (IKSO) and WICO Neerpelt. Due to timing issues, the data collected at WICO Neerpelt was not included in the analyses of this study.

At IKSO, 2nd and 3rd grade students, in total 495 students, and their teachers were informed about the study via the school's communication tool in Smartschool. The teachers then guided the students in completing the surveys. The total control group was, like the experimental group, larger than the required minimum sample size of 384. This, once again, provided a margin for absent students, cleaning of data, …

Finally, it was examined whether infrastructural works are planned on the railway crossings in the vicinity of the selected schools. After all, Infrabel is continuously working on making railway crossings in Belgium safer. It became clear that Infrabel and the involved stakeholders have a vision for the different railway crossings in Hoeselt, including those near IKSO. This vision involves the closing of railway crossings and possibly replacing then with infrastructural alternatives, such as a bridge or a tunnel. However, no dates have yet been set for the start of the works (Infrabel, 2024).

3.3 Research design

A longitudinal control group experimental study design is adopted as it is the main objective of this study to measure change in attitudes and behavior and the impact and effectiveness of testimonials. To find an answer to the research questions, the results of a pretest, which is performed before the experimental group is confronted with the testimonial that needs to be evaluated (the intervention), is compared with the results of two post-tests, one of which is performed directly after the confrontation with the intervention and the other is performed one month after the confrontation with the intervention. The control group receives the pre- and post-tests but not the intervention. A double-control design, in which a second

control group does not receive a pre-test, can identify and separate reactive, maturation and regression effects. However, this second control group should be more or less as large as the experimental group and the first control group, raising the need for a large number of respondents even more. It was therefore decided that a double-control design is not implemented.

3.4 Measuring instrument

In order to find answer to the established research questions, a measuring instrument was developed, which would be presented to the members of the target group. An online survey that could be completed on a smartphone, laptop or tablet was preferred because of the convenience for the data collection, processing and analysis of the data. The measuring instrument was developed in Qualtrics.

The main survey, which is added in Annexe 1, was presented to both the members of the experimental group and the control group and is the basis for the measurement of behavior at railway crossings. It was somewhat adapted for later phases of the study (the two post-tests) and for different target groups (live testimonial experimental group, video testimonial group and control group).

Because the target group of this study consists of minors, it was necessary to obtain permission from the parents of the respondents. A consent form was drawn-up in an opt-out format and is attached to this report in Annexe 3.

3.4.1 Main survey for the measurement of (socio-cognitive determinants of) behavior in traffic in general and at railway crossings in particular

The main survey starts with an introduction, in which the research topic is briefly mentioned, and the most important term (railway crossing) is explained. Furthermore, the voluntary basis and the assurance of the anonymity of the respondents are emphasized and the estimated duration is stated. Instructions are also given on how questions should be answered that do not fully apply to the respondent's situation.

Respondents are then asked to provide a number of socio-demographic data, such as gender, year of birth, name of the school, grade and study domain. Travel behavior to and from school is also surveyed, including the main means of transport and driving license possession (permanent or provisional and for which means of transport).

Next, some questions are asked about the respondents' frequency of exposure to railway crossings on the way to and from school and at other occasions, the mode used when exposed to railway crossings and about the proximity of a railway crossing to the place of residence (within one kilometre, 15 minutes walking or 5 minutes cycling). Furthermore, the respondent's experience with traffic fines (how many times and for which violation) and traffic accidents (how many times and type of location) is asked.

In the last part of the survey, a number of scales (five-point Likert) are used to search for the socio-cognitive determinants of safe behavior in traffic in general and near railway crossings in particular.

A sizeable set of 55 items was taken from Ceunen et al. (2016). It includes items that attempt to measure the different concepts of Ajzen's (1985) Theory of Planned Behavior (attitude, subjective norm, perceived behavioral control, behavioral intention and behavior) by asking the respondent's opinion on a number of statements about (un)safe behavior in traffic, using an answer scale ranging from "completely disagree" to "completely agree".

To estimate attitudes, behavior and behavioral intention with regard to safety at railway crossings, inspiration was gained from the Railspect study that GfK carried out for Infrabel. Three different scales were added, assessing 7 unsafe behaviors at railway crossings. These behaviors and the results obtained are explained in detail in section 4.1.5.

Using a 5-point Likert scale, respondents were asked how dangerous these behaviors were (attitude), how often they had performed this behavior in the past 6 months (past behavior) and how likely it was that they would do this behavior in the future.

Finally, a set of 5 items was added, based on the way Feenstra et. al (2014) attempts to measure self-efficacy. This is done in a relative way, where the respondents have to compare their skills with those of their same-sex and same-age peers on a scale ranging from much worse to much better, rather than giving themselves an absolute score from very poor to very good. The items were adapted to the specific context of railway crossings.

3.4.2 Additions and adjustment for the process and effect evaluation

For the process evaluation (the assessment of the live and video testimonials immediately after they were presented) and the effect evaluation (the examination of effects on the socio-cognitive variables of the safety of traffic behavior immediately and a month after the testimonials), the main survey was adapted. These adjustments differed between the experimental groups and the control group.

First of all, respondents were asked to enter the first two letters of their first name, the first two letters of their mother's first name, their day of birth in two number and their month of birth in two numbers. These questions were asked in order to create a code that could be used to link the answers to the different surveys in the different phases of the study, while guaranteeing the anonymity of the respondents.

The adapted survey contained fewer socio-demographic questions (only year of birth and school). This was done deliberately in order to keep the survey as short as possible, while still collecting sufficient information that might help to link the different surveys of the different phases.

The questions about travel behavior to and from school, exposure to railway crossing, experience with traffic fines and traffic accidents were also no longer asked.

An important addition for respondents in the experimental group were the evaluation questions on the live and video testimonials (see also Annexe 2).

First, it was determined whether or not the respondent had been offered a testimonial and which testimonial the respondent had been offered (live or video). In case respondents indicated that they had seen the video testimonials, they were asked how many of the 3 videos they had seen.

The evaluation of the testimonies itself was based on a 5-point Likert scale with response options ranging from "completely disagree" to "completely agree". This involved asking the extent to which the respondent agreed with statements about cognitive aspects, such as credibility, usefulness, interestingness, importance, informativeness, and emotional aspects such as shockingness, perturbation, frighteningness, preference and some qualitative elements, such as duration, clarity and performance of the speaker. Also, two open-ended questions were added which asked what the respondent remembered most about the testimonial and what the respondent would possibly add and/or adjust to the testimonial.

In the second post-test, the evaluation questions were omitted, except for the question about what testimonial the respondents had received and the open question about what they remembered most about the testimonial.

For the effect evaluation, the questions about the socio-cognitive determinants of behavior in traffic in general and at railway crossings in particular were taken verbatim from the main survey. Only the question about past behavior at railway crossings was slightly adjusted because the question did not have to be asked about the past 6 months, but about the past week or month (i.e., since the pre-test). However, something went wrong when formulating the answer options, more about which in chapter 6 Limitations and future research.

3.5 Intervention

When looking at the interventions with regard to dangerous behavior in the vicinity of railway crossings or rail tracks that are already in use in Belgium, they can be divided into a few categories: theoretical lessons on safety rules and consequences of dangerous behavior, gamification, dramatic videos, immersion such as Virtual Reality and testimonials.

An example of gamification is Rail Codes, the escape game developed by Infrabel (n.d.). Dramatic videos are for example videos of people crossing closed railway crossings (Infrabel, 2014), videos of tests with crash test dummies (Infrabel TV, 2015) and videos in collaboration with a popular television soap in which a scene is shown of a character being hit while crossing a railway crossing (Infrabel TV, 2019).

For this study, it was decided upon that the intervention that would be examined would be testimonials: in person testimonials or videos in which victims of train-related incidents or their family members, train drivers and other railway personnel tell their story. More specifically, a comparative study of the effect of a scalable, online video testimonial and a testimonial in person, is conducted. For this purpose, contact was made with Roy Kunnen (www.roykandat.be), who was involved in a train accident five years ago in which he lost three of his limbs. Roy gives testimonials about his experiences, mainly in schools. In 2023 he was invited to ten schools. Roy was asked to make 3 video testimonials in which he tells his story in a comparable manner as in the live testimonial.

The live testimonial took place on March 11th from 13:50 until 14:40 in the auditorium of Humaniora Kindsheid Jesu before an audience of about 250 students and about a dozen of teachers. The duration was initially set to 30 minutes, after which the students had the opportunity to ask questions and go to their classroom to fill in the post-test survey under the surveillance of a teacher. However, the testimonial only finished after about 45 minutes, leaving no room for questions and leaving the responsibility of filling in the second to the students themselves. This will further be discussed in chapter 6 Limitations and future research.

The video testimonials consisted of three separate videos of about 10 minutes (respectively 8, 11 and 10). They were filmed with a smartphone in Roy's living room. In the videos Roy can be seen sitting on the sofa while he tells his story. The videos were posted to a YouTube channel, where they were hidden except from people who had the link. They were shown at three different times (March 12th, 13th and 14th always in the third period) to imitate the properties of microlearning as closely as possible (providing short learning moments in a dosed manner). They were shown in class on a smart board in the presence of a teacher. Each video had a different topic. The first video gave an outline of the accident,

the second video was about the time in the hospital and the third video was about the rehabilitation process.

3.6 Analysis

The obtained data in the pre-test and the post-tests, was processed using SPSS (IBM SPSS Statistics version 29.0.1.1 (244)) and was subjected to a number of statistical analyses, which will be described in detail in the following paragraphs. The analysis process, however, started with data cleaning and processing (merging, recoding, quality controls).

3.6.1 Data cleaning and processing

Five datasets emerged from the data collection phase: the pre-test dataset, the first post-test dataset for both the experimental group and the control group and the second post-test dataset for the experimental group and the control group. A number of cases were removed from this dataset in a first step: the test cases that were filled in to test the survey before the actual launch, cases with wrong or impossible answers, such as wrong school names, impossible birth years, double cases, unfinished cases in which the respondent had not at least answered the questions about the socio-cognitive determinants of traffic behavior, …

In addition, an extra cleaning was performed on the first and second post-test data sets. The cases were removed where the respondent indicated that he or she had not witnessed any testimonial (120 out of 287 respondents). Presumably the question ("Did you recently attend a testimonial at school by a victim of a traffic accident involving a train?") was misinterpreted and watching the video testimonial was not seen as attending a testimonial. Another explanation is that the students in question were actually not offered any live or video testimonial, but inquiries with the school show that this is virtually impossible. However, in the second post test, the question about the attendance of a testimonial was rephrased into "Did you recently see a testimonial at school from a victim of a traffic accident involving a train?" with the answer options " yes, in the form of a lecture in the auditorium", "yes, in the form of short videos" and "no", leaving little room for error. Still, 40 of 218 respondents answered "no". Once again, the school indicated that the surveys were only presented to respondents that attended the live testimonial or watched the video testimonial. It was decided not to remove these cases before merging and to see whether or not they could be matched to a case in the first post-test dataset that did indicate whether the live testimonial was attended, or the video testimonials were watched (see further).

One final cleaning on the first post-test dataset, consisted of removing all cases where respondents who indicated that they had seen the video testimonial said that they had not seen all 3 videos. This concerned 17 cases.

The following table provides an overview of the datasets after cleaning and before the merging process, which will be explained below the table.

Table 4 - Overview of the datasets after cleaning and before merging

Dataset	**Total # cases**	**# live testi-monials**	**# video testi-monials**	**Total experimental group**	**Total control group**
Pre-test	763	0	0	462	301
Post-test 1 control group	176	0	0	0	176
Post-test 1 experimental group	167	110	57	167	0
Post-test 2 control group	190	0	0	0	190
Post-test 2 experimental group	218	63	115	178	0

The data analysis for the measurement of behavior at railway crossings would be performed on the "pre-test" dataset (n=763), the data analysis for the process evaluation on the "post-test 1 experimental group" dataset (n=167). For the effect evaluation, the pre-test dataset had to be linked to the first and second post-test datasets, whereby cases from the same respondent had to be matched to each other to map the effects of the testimonials for these students.

To prepare the datasets for merging, the names and labels of variables were provided with a suffix (_pre, _post, _post2) and it was ensured that all corresponding variables from the data sets that needed to be linked had the same name and label.

A two-step method was used to obtain the final data file on which the effect evaluation was carried out. First, the post-test datasets of the experimental group and the control group were merged using the SPSS function Data -> Merge Files -> Add Cases. Only the evaluation questions about the testimonials, which the respondents in the experimental group additionally received, could not be paired.

In the second step, the pre-test dataset and the complete post-test datasets (containing both the cases for the control group and the experimental group respondents) were linked together. This was done using the SPSS-function Data -> Merge Files -> Add Variables. The previously mentioned code (see also paragraph 3.4.2) was used as the Key Variable, which was composed of the first

two letters of the respondent's first name, the first two letters of the respondent's mother's first name, the two digits of the respondent's day of birth and the two digits of the month of birth of the respondent.

To generate this code, a few more operations had to be done. First, the SPSS function Transform -> Compute Variable and the formula UPCASE () were used to ensure that all letters were capitalized. In addition, in the SPSS syntax, the formula FORMATS numvar (n2) converted all 1-digit numbers into a 2-digit number with a "leading zero", a zero at the beginning of the number (e.g., "1" -< "01 "). By joining these letters and numbers in the SPSS-syntax with the Concate formula CONCAT () a quasi-unique code was generated, while still ensuring the anonymity of the students.

First, the pretest dataset (n=763) was linked to the dataset of the first post-test (control group and experimental group combined, n=343). This already showed that the merging process would be difficult: only 179 cases could be matched, meaning 164 cases were lost (48%). Further research made it clear that the biggest problem lay with the control group, where of the 176 cases, 120 could not be matched (68%).

An extensive analysis of this problem revealed several possible explanations. It seems that many respondents went through the questions related to the code too quickly and thus did not read them carefully enough. After all, the questions were clearly formulated (see also Annexe 1). In some cases, the student's and/or mother's initials were given in place of the first two letters. Sometimes the first two letters of the student's last name were given instead of the first two letters of the mother's first name. At other times, only one letter was entered or even the full name instead of just two letters. Sometimes it was just typographical errors, including adding spaces before or after two letters or numbers. SPSS sees spaces as a character. SPPS also has difficulty dealing with accents. These are seen as 2 letters (the letter and the accent) and because a maximum number of characters was assigned to the code variable (8), the letters in some codes were incorrectly truncated and merged with the other letters and numbers. Chapter 6 Limitations and future research discusses this problem and its possible consequences in more depth.

A number of actions were taken to detect some of these errors and correct them in a substantiated manner: excess spaces were removed and accented letters were converted to regular letters. In addition, codes that were similar were searched for. This could, for example, concern codes where the day of birth and the month of birth were the same and at least 1 of the 4 letters was similar. Excel was also used for the search of similar codes using the VLOOKUP-function: the lists of all codes were searched for an approximate similarity for any unmatched codes in pre- or post-test. When a possible match was found, a check was made on year of birth and school to see if it matched. The ultimately obtained list of possible matches was then provided to the schools with the question whether they

could check in the student data whether these cases could be linked to each other. Confidentiality was fully respected: the school did not gain insight into the answers that the individual students had given to the survey, and, on the other hand, the personal data were not released to the researcher. When the schools confirmed that there was a match, the codes were adjusted in the datasets.

In this way, when the pre-test was linked to the first post-test, 18 additional cases were retrieved (7 from the live testimonial experimental group, 2 from the video testimonial experimental group and 9 from the control group).

These actions were also applied in the second step of the merging process, where the dataset obtained in the first step (the merged datasets with cases from the pre-test and the first post-test, n=197) was merged with the dataset of the second post-test (n=408, control group and experimental group combined).

Initially, only 68 cases could be linked, which represents only 35% of all cases in the previously linked file. Implementing the actions provided little relief: only 9 additional cases were retrieved (3 from the live testimonial experimental group, 3 from the video testimonial experimental group and 3 from the control group).

As mentioned above, it was also important to check whether or not the 40 cases in the 2nd post-test, for which the respondents indicated that they were not presented a testimonial, could be matched with a case in the pretest dataset and the 1st post-test. This was not the case for any of these 40 cases, making the search for a solution to this problem no longer necessary.

Table 5 provides an overview of the two merged datasets that were eventually used for the effect evaluation.

Table 5 - Overview of the two merged datasets for effect evaluation

Dataset	**Total # cases**	**# live testi-monials**	**# video testi-monials**	**Total experimental group**	**Total control group**
Prepost1	197	87	45	132	65
Prepost2	77	28	23	51	26

Both for the measurement of behavior and for the effect evaluation, the respondents need to be assigned a score on each of the socio-cognitive variables that determine (un)safe behavior in traffic in general and at railway crossings in particular. Therefore, the items in the survey must be combined into variables.

In SPSS, the mean scores for each respondent on these variables are computed with the function Transform -> Compute Variable and the formula MEAN (). First,

however, the scores on some items must be reversed. This study assumes that higher scores always imply a more road safety supportive view. It was checked which items were formulated inversely, namely as an unsafe statement, attitude or behavior. The items for which this was the case were reversed by using the SPSS function Transform -> Data -> Recode into Different Variables.

For the items with regard to traffic safety in general, the grouping per variable that was applied in Ceunen et al; (2016) was adopted as a starting point to construct the variables attitude (traffic), subjective norm (traffic), perceived behavioral control (traffic), behavioral intention (traffic) and behavior (traffic). For the variables concerning traffic safety at railway crossings, all items of the corresponding questions were included as a base for the construction of the variables attitude (railway crossings), past behavior (railway crossings), behavioral intention (railway crossings) and self efficacy (railway crossings).

For the process evaluation, different elements of cognitive and emotional program impact were combined into the two overarching constructs cognitive program impact and emotional program impact. In the first post-test dataset, the evaluation scores on credibility, usefulness, interestingness, importance, informativeness on the one hand (cognitive elements) and shockingness, perturbation, frighteningness on the other hand (emotional elements) are first reversed by using the SPSS function Transform -> Data -> Recode into Different Variables. Then the mean scores on the variables cognitive and emotional program impact are computed with the SPSS function Transform -> Compute Variable and the formula MEAN ().

Reliability tests are performed on these combined items and – if necessary – some items are left out to improve the reliability scores. The Cronbach's alpha was calculated for all combined items with the SPSS-function Analyze -> Scale -> Reliability Analysis with the model "Alpha". It is then checked which alphas are not greater than 0.65. For the variables for which this is the case, it is investigated whether and which items can be omitted so that there is an increase. An item was only deleted for the variables perceived behavioral control (traffic) and behavior (traffic). This is based on the reliability analysis for the pre-test. For the other datasets, the composition of the variables has been retained. Table 6 shows the Cronbach's alphas for each of the phases (pre-test, 1st post-test and 2nd post-test) in the pre-test dataset and the two merged datasets. For the variable subjective norm (traffic), the Cronbach's alpha remains below 0.65 in some cases, as is the case for the variable behavioral intention (traffic).

Table 6 - Cronbach's alphas for all phases (pre-test, 1st post-test and 2nd post-test) in the pre-test and the two merged datasets

Variable	Cronbach's alpha pre-test (n=763)	Cronbach's alpha prepost 1 pre (n=197)	Cronbach's alpha prepost 1 post1 (n=197)	Cronbach's alpha prepost 2 pre (n=77)	Cronbach's alpha prepost 2 post1 (n=77)	Cronbach's alpha prepost 2 post 2 (n=197)
Attitude (traffic)	0.80	0.78	0.80	0.78	0.83	0.86
Subjective norm (traffic)	0.66	0.61	0.66	0.68	0.66	0.60
Perceived Behavioral Control (traffic)	0.65	0.65	0.68	0.66	0.68	0.69
Behavioral Intention (traffic)	0.67	0.64	0.71	0.68	0.73	0.71
Behavior (traffic)	0.77	0.75	0.87	0.79	0.87	0.83
Attitude (railway crossings)	0.87	0.87	0.89	0.90	0.85	0.84
Behavioral Intention (railway crossings)	0.92	0.91	0.92	0.90	0.93	0.86
Past Behavior (railway crossings)	0.91	0.90	0.90	0.89	0.85	0.76
Self Efficacy (railway crossings)	0.87	0.85	0.89	0.81	0.91	0.91
Cognitive Program Impact	N/A	N/A	0.83	N/A	N/A	N/A
Emotional Program Impact	N/A	N/A	0.84	N/A	N/A	N/A

A test-retest reliability analysis was also performed to measure the stability of the test over time. This happened on both merged datasets. In each case, the Pearson correlation coefficient was calculated between 2 measurements using the SPSS function Analyze -> Correlate -> Bivariate with the options "Pearson", "two-tailed", and "exclude cases pairwise". Table 7 shows the Pearson correlation coefficients between pre- and 1st post-test in the 1st post-test dataset and between pre-test and 1st post-test, between pre-test and 2nd post-test and between 1st post-test and 2nd post-test in the 2nd post-test dataset. Significant differences ($p<0.05$) are indicated with an asterix (*). As mentioned in paragraph 3.4.2, something went wrong when formulating the answer options for the question about past behavior at railway crossings in the 1st post-test, leading to a very low Pearson correlation effect for every pair of measurements that includes the 1st post-test.

Table 7 - Pearson correlation coefficient between the different measurements in the 1st and 2nd post-test dataset

Variable	Prepost1 (n=197)	Prepost2 (n=77)		
	Pearson correlation pre- vs. post-test 1	Pearson correlation pre- vs. post-test 1	Pearson correlation pre- vs. post-test 2	Pearson correlation post-test 1 vs. post-test 2
Attitude (traffic)	0.74	0.77	0.72	0.77
Subjective norm (traffic)	0.62	0.55	0.51	0.59
Perceived Behavioral Control (traffic)	0.74	0.71	0.58	0.68
Behavioral Intention (traffic)	0.62	0.57	0.55	0.63
Behavior (traffic)	0.57	0.47	0.57	0.54
Attitude (railway crossings)	0.36	0.57	0.60	0.63
Behavioral Intention (railway crossings)	0.35	0.58	0.45	0.68
Past Behavior (railway crossings)	0.12*	0.05*	0.35	0.02*
Self Efficacy (railway crossings)	0.42	0.42	0.47	0.49

In the first post-test dataset (n=197), there is a significant difference between the control group and the experimental group on gender, with Pearson Chi-Square (2,n=197)=7.65, p=0.02. There is a significantly higher proportion of female students in the control group than in the experimental group. There is also a significant difference between the control group and the experimental group on grade, with Pearson Chi-Square (1,n=197)=7.10, p=0.01. There is a significantly higher proportion of 3rd graders in the experimental group than in the control group. Finally, there is a significant difference between the control group and the

experimental group in terms of study domain, with Pearson Chi-Square (2,n=197)=188.08, p<0.01. There is a significantly lower proportion of throughflow finality students and a significantly higher proportion of double finality and labor market finality students in the control group than in the experimental group.

When looking at the differences between the control group and the experimental group in the second post-test dataset (n=77), a significant difference is found on gender, with Pearson Chi-Square (1,n=77)=4.56, p=0.03. There is a significantly higher proportion of female students in the control group than in the experimental group. There is also a significant difference between the control group and the experimental group on grade, with Pearson Chi-Square (1,n=77)=4.72, p=0.03. There is a significantly higher proportion of 3rd graders in the experimental group than in the control group. Finally, there is a significant difference between the control group and the experimental group in terms of study domain, with Pearson Chi-Square (2,n=197)=68.40, p<0.01. There is a significantly lower proportion of throughflow finality students and a significantly higher proportion of double finality and labor market finality students in the control group than in the experimental group.

Next, the same analysis is done for the three groups that are obtained when the experimental group is split into a live testimonial experimental group and a video testimonial experimental group. In the first post-test dataset (n=197), there is a marginally significant difference between the control group, the live testimonial experimental group and the video testimonial experimental group on gender, with Pearson Chi-Square (4,n=197)=8.83, p=0.07. There is a significantly higher proportion of female students in the control group than in the live testimonial experimental group. There is also a significant difference between the control group and the experimental group on grade, with Pearson Chi-Square (2,n=197)=28.82, p<0.01. There is a significantly higher proportion of 3rd graders in the live testimonial experimental group than in the video testimonial experimental group and the control group. Finally, there is a significant difference between the control group and the experimental group in terms of study domain, with Pearson Chi-Square (4,n=197)=188.09, p<0.01. There is a significantly lower proportion of throughflow finality students and a significantly higher proportion of double finality and labor market finality students in the control group than in the live and video testimonial experimental groups.

When looking at the differences between the control group, the live testimonial experimental group and the video testimonial experimental group in the second post-test dataset (n=77), a significant difference is found on gender, with Pearson Chi-Square (2,n=77)=7.92, p=0.02. There is a significantly higher proportion of female students in the control group than in the live testimonial experimental group. There is also a significant difference between the control group, the live testimonial experimental group and the video testimonial experimental group on grade, with Pearson Chi-Square (2,n=77)=20.18, p<0.01. There is a significantly

higher proportion of 3rd graders in the live testimonial experimental group than in the video testimonial experimental group and the control group. Finally, there is a significant difference between the control group, the live testimonial experimental group and the video testimonial experimental group in terms of study domain, with Pearson Chi-Square (4,n=77)=68.40, p<0.01. There is a significantly lower proportion of throughflow finality students and a significantly higher proportion of double finality and labor market finality students in the control group than in the experimental group.

3.6.2 Data analysis for the measurement of (socio-cognitive determinants of) behavior in traffic in general and at railway crossings in particular

The analyses for the measurement of behavior are performed on the main/pre-test dataset of 763 cases. To describe the study sample in this dataset using a series of socio-demographic variables and variables related to traffic behavior and exposure to railway crossings, the SPSS function Frequencies is used (Analyze -> Descriptive Statistics -> Frequencies). Under "Charts" both Bar charts and Pie charts are selected (two different output files).

Significant differences (p<0.05) on categorical variables between subgroups (gender, grade and study domain) are calculated with the SPSS function Crosstabs (Analyze -> Descriptive Statistics -> Crosstabs). The categorical variables are added in the columns and the variables that determine the subgroups are added to the rows. Under "Statistics", Chi-quare is selected and under "Cells", Row Percentages are selected. To make pairwise comparisons between the three study domains, a univariate ANOVA is performed using the SPSS-function Analyse -> General Linear Model -> Univariate with the categorical variables as Dependent Variable and study domain as Fixed Factor. The Estimated Marginal Means are displayed for study domain and are compared with Confidence interval adjustment: Bonferroni.

Means of continuous variables and significant differences (p<0.05) on these means between subgroups (gender, grade and exposure) are calculated with the SPSS function Independent Samples t-test (Analyze -> Compare Means and Proportions -> Independent-Samples T test). The continuous variables are added as Test Variables and the variables that determine the subgroups are added as Grouping Variables. In the SPSS output, the Levene Test for Equality of Variances is first interpreted: if this appears significant, equal variances are assumed, and the corresponding two-sided p is taken into account. Otherwise, the other two-sided p is used. The most important examples of continuous variables in this study are the mean scores on the constructed socio-cognitive variables that determine behavior in traffic and at railway crossings.

Significant differences ($p<0.05$) between study domains were calculated with a Multivariate Analysis of Variance (MANOVA, SPSS-function Analyse -> General Linear Model -> Multivariate) for the socio-cognitive variables that determine traffic safety in general, with the socio-cognitive variables as Dependent Variables and study domain as Fixed Factor. The Estimated Marginal Means are displayed for study domain and are compared with Confidence interval adjustment: Bonferroni.

For the variables with a significant effect in the MANOVA, pairwise comparisons are made between the three study domains, by performing a univariate ANOVA using the SPSS-function Analyse -> General Linear Model -> Univariate with the socio-cognitive variable at hand as Dependent Variable and study domain as Fixed Factor. The Estimated Marginal Means are displayed for study domain and are compared with Confidence interval adjustment: Bonferroni.

For the socio-cognitive variables that determine behavior at railway crossings, a comparable analysis is performed. However, univariate Analysis of Variance (ANOVA) is used for each of these variables instead of MANOVA for all the variables together, as is done for the variables that determine traffic safety in general. Whereas the variables with regard to traffic safety in general were treated as a group because they originate from a previous study (Cuenen et al., 2016), the variables with regard to railway crossings were constructed for this study. Therefore, assumptions on interconnection between them were not made.

Finally, it is important to mention that all analyses regarding study domain are done without the (three) cases in which respondents indicated that they don't know in what study domain they are. This is done by applying the SPSS-function Data-> Select Cases.

3.6.3 Data analysis for the search for factors that predict attitudes and behavior at railway crossings

The analyses for the measurement of behavior are performed on the main/pre-test dataset of 763 cases. To get insight into the socio-demographical and socio-cognitive variables that are able to predict attitudes, past behavior and behavioral intention at railway crossings, a Linear Regression is performed, using the SPSS function Linear Regression (Analyze -> Regression -> Linear). The analysis is done for 3 dependent variables: attitude (railway crossings), past behavior (railway crossings)and behavioral intention (railway crossings). These variables are entered under "Dependent". The independent variables that are used for the analysis are socio-demographical and socio-cognitive variable. The socio-demographical variables are the same for the 3 dependent variables: gender, grade and study domain. They are entered under Block 1 of "Independent(s)".

The socio-cognitive variables that are included in the analysis (and also entered under Block 1 of "Independent(s)"), differ for each of the dependent variables. They are determined on the basis of a correlation analysis (Analyze -> Correlate -> Bivariate): only one of two correlated independent variables (Pearson correlation>0.65 and p<0.01) is included. It appears that behavioral intention (traffic) is correlated with behavior (traffic) (Pearson correlation = 0.68 and p<0.01). It is decided that behavioral intention (traffic) will be excluded from the linear regression analysis.

For the dependent variable "attitude (railway crossings)", the following independent variables are entered into the linear regression analysis: subjective norm (traffic), perceived behavioral control (traffic), behavior (traffic), behavioral intention (railway crossings), past behavior (railway crossings) and self efficacy (railway crossings).

For the dependent variable "past behavior (railway crossings)", the independent variables that are considered in the analysis are: attitude (traffic), subjective norm (traffic), perceived behavioral control (traffic), behavior (traffic), attitude (railway crossings), behavioral intention (railway crossings) and self efficacy (railway crossings).

For the third and final dependent variable, "behavioral intention (railway crossings)", the following independent variables are included in the linear regression analysis: attitude (traffic), subjective norm (traffic), perceived behavioral control (traffic), behavior (traffic), attitude (railway crossings), past behavior (railway crossings) and self efficacy (railway crossings).

This complies with the rule of thumb that states that the maximum number of independent variables that are included in the analysis, is one per 10-15 respondents. With a sample of 763 respondents, up to 51 independent variables could be added.

The method "Enter" is chosen. All independent variables are included in the regression equation. The adjusted R^2 and the significance of the ANOVA are examined. If the significance of the ANOVA is below 0.05, the p-value of the coefficients are examined. The variables with a p-value higher than 0.05 are removed and the adjusted R^2 is examined again for a possible increase. As long as the adjusted R^2 can be increased, these steps are repeated.

3.6.4 Data analysis for the process evaluation

The analyses for the process evaluation were performed on the first post-test dataset and specifically for the experimental group (Data -> Select Cases was used). This sub-dataset consisted of 167 cases. To describe the study sample in this sub-dataset on a series of variables that explain (elements of) cognitive and

emotional impact, preference and some qualitative elements, such as duration, clarity and performance of the speaker, the SPSS function Frequencies is used (Analyze -> Descriptive Statistics -> Frequencies). Under "Charts" both Bar charts and Pie charts are selected (two different output files).

Significant differences ($p<0.05$) on these mainly categorical variables between subgroups (live vs. video testimonial experimental group and birth year) are calculated with the SPSS function Crosstabs (Analyze -> Descriptive Statistics -> Crosstabs). The categorical variables are added in the columns and the variables that determine the subgroups are added to the rows. Under "Statistics", Chi-quare is selected and under "Cells", Row Percentages are selected.

To compare the means of the continuous variables cognitive and emotional program impact with one another, the SPSS function Paired-Samples t-test (Analyze -> Compare Means and Proportions -> Paired-Samples T test) with cognitive program impact as Variable 1 and emotional program impact as Variable 2.

Significant differences ($p<0.05$) on these means of the variables cognitive and emotional program impact between subgroups (live vs. video testimonial experimental group, gender, grade) are calculated with the SPSS function Independent Samples t-test (Analyze -> Compare Means and Proportions -> Independent-Samples T test). The continuous variables are added as Test Variables and the variables that determine the subgroups are added as Grouping Variables. In the SPSS output, the Levene Test for Equality of Variances is first interpreted: if this appears significant, equal variances are assumed, and the corresponding two-sided p is taken into account. Otherwise, the other two-sided p is used. To examine the possible significant differences between subgroups (gender and grade) for the different formats (live and video testimonial), the SPSS function Data-> Split File is used with to organise the output by format.

Differences between study domains study domains cannot be examined for the variables under study of in the process evaluation, as all students in the experimental group(s) are in the throughflow finality.

3.6.5 Data analysis for the effect evaluation

In a first step of the analysis, a repeated measures MANOVA was performed on the socio-cognitive variables that determine traffic safety in general. In SPSS, Analyze -> General Linear Model -> Repeated Measures was selected. "Measurement" was chosen as the Within-Subject Factor Name and the number of levels was set at 2 for the pre-test-post-test analysis for the first post test and at 3 for pre-test-post-test analysis for the second post test (for results see paragraph 4.3 and 4.4 respectively). All variable names were jointly inserted as

Measure Names. The different Measurement (1, 2, 3) of the Within-Subject Variables were then defined/added and the variable group (with values live testimonial experimental group, video testimonial experimental group and control group) was added as the Between-Subjects Factor. Furthermore, under Plots, the Measurement was selected for the horizontal axis and the variable group was selected for Seperate Lines. Finally, The Estimated Marginal Means were displayed for Measurement and were compared with Confidence interval adjustment: Bonferroni.

When a significant ($p<0.05$) or marginally significant ($0.05<p<0.10$) multivariate within subject interaction effect was found, the univariate within subject interaction effect was examined. For the variables for which a significant ($p<0.05$) or marginally significant ($0.05<p<0.10$) univariate within subject interaction effect was found, extra analyses were performed to better understand the (marginal) effects that arose.

The possible significant difference between pre-test and post-test for each of these groups was examined by repeating the repeated measure MANOVA on the different groups separately (the Data -> Split File function in SPSS was used to separate the group results and the variable "Group" was removed as a Between-Subjects Factor). Only the variables for which there is 1) no significant difference ($p>0.05$) for the control group between the two or three measurements and 2) a significant ($p<0.05$) or marginally significant ($0.05<p<0.10$) effect on either the live testimonial experimental group or the video testimonial experimental group or both, are considered to represent a noteworthy effect on the examined variables.

For the variables for which no significant or marginally significant ($p>0.10$) univariate within subject interaction effect was found, the main effects for group (live and video testimonial experimental group and control group) and measurement (pre-test and post-test) are examined. For the main effect for group, the multivariate between-subject effect for group is examined for significance ($p<0.05$). For the main effect for measurement, the univariate within subject effect is examined for significance ($p<0.05$).

As opposed to the variables with regard to traffic safety in general, the variables that determine behavior at railway crossings were analysed separately, using a repeated measures univariate ANOVA. Whereas the variables with regard to traffic safety in general were treated as a group because they originate from a previous study (Cuenen et al., 2016), the variables with regard to railway crossings were constructed for this study. Therefore, assumptions on interconnection between them were not made. The settings in SPSS are similar to those of the MANOVA. However, there is no need to fill in the Measure Name.

As for the MANOVA, when a significant univariate within subject interaction effect was found in the repeated measures univariate ANOVA, extra analyses were performed to better understand the (marginal) effects that arose.

The possible significant difference between pre-test and post-test for each of these groups was once again examined by repeating the repeated measure univariate ANOVA on the different groups separately (the Split File function in SPSS was used to separate the group results). Only the variables for which there is 1) no significant difference ($p>0.05$) for the control group between the different measurements and 2) a significant ($p<0.05$) or marginally significant ($0.05<p<0.10$) on either the live testimonial experimental group or the video testimonial experimental group, are considered to represent an noteworthy effect on the examined variables.

For the variables for which no significant or marginally significant ($p>0.10$) within subject interaction effect was found, the main effects for group (live and video testimonial experimental group and control group) and measurement (pre-test and post-test) are examined. For the main effect for group, the between-subject effect is examined for significance ($p<0.05$). For the main effect for measurement, the within subject effect is examined for significance ($p<0.05$).

4 Results

In this chapter, the results of three main analyses will be presented: the measurement of attitudes and behavior at railway crossings among Flemish youth, the evaluation of the live and video testimonials and the effect evaluation that looks into the effect of the live and video testimonials on the socio-cognitive and behavioral variables under examination.

4.1 Measuring (socio-cognitive determinants of) behavior in traffic in general and at railway crossings in particular among Flemish youth

This cross-sectional study was performed on a dataset of 763 cases (completed or nearly completed surveys). In the following paragraphs, the study sample is first described with regard to socio-demographics, mode choice and exposure to railway crossings. Subsequently, attitudes and behavior with regard to traffic safety in general are examined and the results are presented on a sample level and on a subgroup level (gender, grade and study domain) to search for significant differences between these subgroups. Finally, the main findings regarding attitudes and behavior at railway crossings are presented on a sample level as well as on a subgroup level.

4.1.1 Description of the study sample with regard to socio-demographics

Almost two thirds of the respondents are female (64%). Most respondents were born in 2007 (31.1%), almost 95% was born between 2006 and 2009, as shown in figure 5 below.

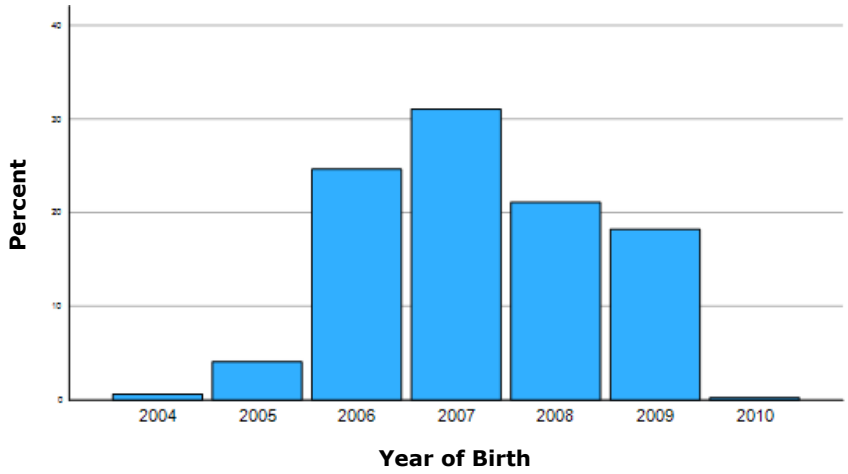

Figure 5 - Distribution of study sample on birth year

Almost a third of the respondents is in the 5th year (32.6%). The fourth and sixth year are also well represented, with respectively 22.1 and 25.0%. Almost 60% of the respondents are in 3rd grade (7th year included).

Two thirds of the respondents are in the throughflow finality study domain ("doorstroomfinaliteit"). Only 9% is in the labor market finality study domain ("arbeidsmarktfinaliteit").

4.1.2 Description of the study sample with regard to mode choice to travel to school

Almost 78% of the study sample travel to school sustainably (by foot, bike or public transport) with a balance between bus (29.9%) and bicycle (31.6%). While 20.3% of respondents indicated they have a drivers license for a car (both temporary and permanent), only 2% travels to school by car as a driver.

There is a significant difference between male and female students when it comes to the main transport mode from home tot school ($p<0.01$ on a Pearson Chi-Square test). For example, 39.2% of male students travel to school by bike, compared to only 24.8% of female students. Also, significantly more male students (14.1%) go to school by train than female students (8.0%). On the other hand, 20.8% of male students travels to school by bus, compared to 38.1% of female students.

There is also a significant difference between 2nd graders and 3rd graders when it comes to their main transport mode from home tot school ($p<0.01$ on Pearson Chi-Square). More specifically, 25.6% of 2nd graders goes to school by bike, compared to 32.8% of 3rd graders. Second graders travel to school significantly more by bus (38.5%) than 3rd graders (26.9%).

Finally, there is a significant difference between the study domains when it comes to the main transport mode from home tot school ($p<0.01$ on Pearson Chi-Square). For example, 37.6% of throughflow finality students go to school by bike, compared to only 17.4% of students in double finality ("dubbele finaliteit") and only 5.9% of labor market finality. A significant difference is found between each of the study domains. Significantly fewer students in the throughflow finality study domain (24.2%) travel school by bus, than their double finality (46.2%) and labor market finality counterparts (47.1%).

The difference in main mode choice to travel to school between study domains most likely reflect differences between the two schools when it comes to mobility options (e.g., location of the school, presence of a train station, availability of bus

connections, …). This will further be discussed in chapter 6 Limitations and future research.

4.1.3 Main findings regarding traffic safety in general

Five percent of respondents indicates that they ever received a traffic fine. One respondent states that he or she has ever received a fine for crossing a railway track where this was not allowed, and one respondent received a fine for breaking the rules at a railway crossing. The most common traffic fines are for cycling without the hands on the handlebar (31.6%), for speeding (13.2%) and for red light negation (10.5%).

A significant difference can be found between male and female students when it comes to having ever received a traffic fine ($p < 0.01$ on Pearson Chi-Square). Among male students, 9.1% has ever received a fine, compared to only 2.5% of female students. There is also a significant difference between study domains when it comes to having ever received a traffic fine ($p < 0.01$ on Pearson Chi-Square).

About a third of respondents (32.6%) has ever been involved in an accident. 5 respondents indicate that they have ever been involved in an accident at a railway crossing, but it is not clear whether a train was involved and which mode they were using at the time of the accident. There are no significant differences between male and female students, 2nd and 3rd graders and study domains, when it comes to involvement in accidents.

Table 6 shows an overview of the total sample means on the socio-cognitive and behavioral variables with regard to traffic safety in general and the means for each subgroup, with the significant differences between the subgroups shown with an asterix. The means are calculated as the average score on a number of items, which were asked using a five-point scale, where the maximum score is 5 and this maximum score always represents the safest score. This was described in more detail in paragraph 3.4 and 3.7.

The variables Behavioral Intention (traffic) and Behavior (traffic) have the highest means: 4.20 and 3.77 respectively. The variables attitude (traffic) and subjective norm (traffic) have a lower mean with respectively 3.56 and 3.38. Respondents score the lowest on the variable perceived behavioral control, with a mean of only 3.08.

Different subgroups have significantly different means for these variables. Female students, for example, score significantly higher (and thus safer) on the variable attitude (traffic), which represents attitude towards traffic safety in general ($t(741) = -3.33$, $p < 0.01$). They also score significantly higher on perceived behavioral control towards traffic safety in general ($t(741) = -2.41$, $p = 0.02$).

However, there is no significant difference between male and female students when it comes to subjective norm (traffic) ($t(741) = 1.13$, $p = 0.26$), behavioral intention (traffic)($t(741) = 0.06$, $p = 0.95$) and behavior (traffic) ($t(741) = 0.54$, $p = 0.59$).

There is a significant difference between 2nd and 3rd graders on the variables attitude (traffic) ($t(761) = -5.69$, $p < 0.01$), perceived behavioral control (traffic) ($t(761) = -2.08$, $p = 0.04$), behavioral intention (traffic) ($t(761) = -3.90$, $p < 0.01$) and behavior (traffic) ($t(761) = -4.40$, $p < 0.01$). Third graders score significantly higher on all of these variables. This 3rd graders can be regarded as safer in attitude, intention and behavior in traffic in general. However, there is no significant difference between 2nd and 3rd graders when it comes to subjective norm (traffic) ($t(609.35) = -0.13$, $p = 0.90$).

There is also a significant difference between study domains when it comes to perceived behavioral control (traffic), behavioral intention (traffic) and behavior (traffic). A significant multivariate effect was found: $F(10,1508) = 3.28$, $p < 0.01$. A significant univariate between-subjects effect was found for perceived behavioral control (traffic) ($F(2,757) = 4.56$, $p = 0.01$), for behavioral intention (traffic): $F(2,757) = 3.14$, $p = 0.04$ and for behavior (traffic) ($F(2,757) = 4.99$, $p = 0.01$).

A univariate ANOVA for each of these variables with a pairwise comparison between the study domains, shows that throughflow finality students score significantly lower (and thus less safe) on perceived behavioral control ($p = 0.03$) than their labor market finality counterparts. On the other hand, it shows that throughflow finality students score significantly higher (and thus safer) on behavioral intention (traffic) and behavior (traffic) than labor market finality students, with respectively $p = 0.04$ and $p = 0.01$.

Table 8 - Overview of means on socio-cognitive and behavioral variables with regard to traffic safety in general (*sign. diff. between subgroups p<0.05)

Variable	Total mean (n=763)	Male (n=255)	Female (n=488)	2nd grade (n=309)	3rd grade (n=454)	Through-flow finality (n=508)	Double finality (n=184)	Labor market finality (n=68)
Attitude (traffic)	3.56	3.50*	3.61*	3.46*	3.64*	3.57	3.57	3.55
Subjective Norm (traffic)	3.38	3.41	3.37	3.38	3.39	3.39	3.38	3.40
Perceived Behavioral Control (traffic)	3.08	3.01*	3.12*	3.02*	3.11*	3.03*	3.17*	3.18*
Behavioral Intention (traffic)	3.77	3.77	3.77	3.66*	3.84*	3.80*	3.75*	3.60*
Behavior (traffic)	4.20	4.19	4.22	4.08*	4.29*	4.25*	4.17*	4.00*

4.1.4 Description of the study sample with regard to exposure to railway crossings

Just over half of the respondents (51%) are exposed to a railway crossing when going to school. More than one third (35.1%) crosses a railway crossing every day or nearly every day. Almost two thirds of respondents are exposed to a railway crossing on other occasions than travelling to school (63.3%). Almost four out of ten times this exposure happens either by foot, by bike of by moped, both for school (39.5%) as for non-school travel (37.1%). Almost eight out of ten respondents (78%) are exposed to a railway crossing in either school or non-school travel or both. Nearly half of the respondents (48.6%) lives within one kilometre of a railway crossing.

Male students are significantly more exposed to railway crossings when traveling to school than female students ($p < 0.01$ on Pearson Chi-Square). Well over 50% of female students (53.5%) do never cross a railway crossing, compared to only 42.7% of male students. Forty percent of male students do it every day or nearly every day, compared to only 31.1% of female students.

There is also a significant difference between 2nd graders and 3rd graders when it comes to the exposure to railway crossings from home tot school ($p < 0.01$ on Pearson Chi-Square). For instance, 57.9% of 2nd graders never crosses a railway crossing when travelling to school, compared to only 43% of 3rd graders. Furthermore, 28.2 % of 2nd graders is exposed to a railway crossing every day or nearly every day, compared to 39.9% of 3rd graders.

Finally, there is also a significant difference between study domains when it comes to the exposure to railway crossings from home tot school ($p < 0.01$ on Pearson Chi-Square). After all, 41.3% of students in the throughflow finality study domain never crosses a railway crossing, compared to 61.4% of students in double finality and 73.5% of students in labor market finality (there is no significant difference between students in these latter two study domains). Moreover, 41.7% of throughflow finality students cross a railway crossing every day or nearly every day, compared to only 23.9% of double finality and 14.7% of labor market students (no significant difference between the latter two).

The difference in exposure to railway crossings when travelling to school between study domains might reflect differences between the two schools in terms of the location of important neighbouring residential zones in relation to the railway crossing(s) in the area. This will further be discussed in chapter 6 Limitations and future research.

There is a significant difference between 2nd graders and 3rd graders when it comes to the exposure to railway crossings on other routes than from home tot school (p

= 0.01 on Pearson Chi-Square). Indeed, 43.4% of 2nd graders never crosses a railway crossing in those circumstances, compared to 32.2% of 3rd graders.

There is also a significant difference between study domains when it comes to the exposure to railway crossings on other routes than from home tot school (p = 0.02 on Pearson Chi-Square). More than half of the students in labor market finality (54.4%) never crosses a railway crossing, compared to only 35.9% of double finality and 34.3% of throughflow finality students (no significant difference between the latter two). Significantly more students in the throughflow finality study domain crosses a railway crossing on other routes than from home to school every day or nearly every day (9.6%) than labor market finality students (2.9%).

The difference in exposure to railway crossings on other occasions than travelling to school between study domains might reflect differences between schools in terms of railway track density in the area. This will further be discussed in chapter 6 Limitations and future research.

4.1.5 Main findings regarding (socio-cognitive determinants of) behavior at railway crossings on a sample level

4.1.5.1 Socio-cognitive variables that determine behavior at railway crossings

Four variables were included in the analyses that deal particularly with behavior at railway crossings: attitude (railway crossings), behavioral intention (railway crossings), past behavior (railway crossings) and self efficacy (railway crossings). Table 7 shows an overview of the total sample means on these socio-cognitive and behavioral variables with regard to traffic safety at railway crossings and the means for each subgroup, with the significant differences between the subgroups shown with an asterix. As is the case with the variables on traffic safety in general, the means in the overview table are calculated as the average score on a number of items, which were asked using a five-point scale, where the maximum score is 5 and this maximum score always represents the safest score. This was described in more detail in paragraph 3.4 and 3.7.

The variables attitude (railway crossings) and past behavior (railway crossings) have the highest means: 4.05 and 4.50 respectively. The variables behavioral intention (railway crossings) and self efficacy (railway crossings) have a lower mean with respectively 3.86 and 3.59.

Female students score significantly higher (and thus safer) on attitude (railway crossings), which represents attitude towards traffic safety at railway crossings ($t(732) = -3.34$, $p < 0.01$). They also score significantly better on past behavior (railway crossings), meaning that they less frequently displayed unsafe behavior at railway crossings in the past 6 months ($t(721) = -2.49$, $p = 0.01$). Male

students, however, score significantly higher on self efficacy (railway crossings) than female students ($t(718) = 2.02$, $p = 0.04$).

However, there is no significant difference between male and female students when it comes to behavioral intention (railway crossings) ($t(726) = -0.93$, $p = 0.35$).

There is a significant difference between 2nd and 3rd graders on the variables attitude (railway crossings) ($t(625.43) = -3.23$, $p < 0.01$), behavioral intention (railway crossings) ($t(745) = -2.37$, $p = 0.02$) and self efficacy (railway crossings) ($t(737) = -2.82$, $p = 0.01$). Third graders score significantly higher on all of these variables. However, there is no significant difference between 2nd and 3rd graders when it comes to past behavior (railway crossings) ($t(740) = -0.33$, $p = 0.74$).

A univariate ANOVA for each of these variables shows that there are no significant differences between the study domains on attitude (railway crossings) ($F(2,748) = 1.49$, $p = 0.23$)), behavioral intention (railway crossings)($F(2,741) = 0.92$, $p = 0.40$)), past behavior (railway crossings)($F(2,736) = 1.79$, $p = 0.17$) and self efficacy (railway crossings)($F(2,733) = 0.08$, $p = 0.92$).

Table 9 - Overview of means on socio-cognitive and behavioral variables with regard to traffic safety at railway crossings (*sign. diff. between subgroups)

Variable	Total mean (n=763)	Male (n=255)	Female (n=488)	2nd grade (n=309)	3rd grade (n=454)	Through-flow finality (n=508)	Double finality (n=184)	Labor market finality (n=68)
Attitude (railway crossings)	4.05	3.95*	4.14*	3.95*	4.13*	4.04	4.14	4.01
Behavioral Intention (railway crossings)	3.86	3.82	3.89	3.75*	3.94*	3.86	3.92	3.71
Past Behavior (railway crossings)	4.50	4.41*	4.57*	4.49	4.51	4.47	4.60	4.45
Self Efficacy (railway crossings)	3.59	3.67*	3.55*	3.50*	3.66*	3.60	3.58	3.58

There is a significant difference between students who are exposed to railway crossings (on trips from home to school and/or other occasions) and students who are not on the variable past behavior (railway crossings) ($t(740) = 3.37$, $p < 0.01$). People who are exposed to railway crossings score significantly lower (and thus less safe) on this variable, which means that the have more frequently behaved unsafe at railway crossings in the past. However, there is no significant difference between these subgroups when it comes to attitude (railway crossings) ($t(245.85) = 0.66$, $p = 0.51$), behavioral intention (railway crossings) ($t(256.30) = 0.84$, $p = 0.40$) and self efficacy (railway crossings) ($t(248.13) = -0.19$, $p = 0.85$).

There is a significant difference between students who live near a railway crossings (within 1 km) and students who do not on the variables attitude (railway crossings) ($t(701.75) = -2.82$, $p = 0.01$) and past behavior (railway crossings) ($t(687.57) = -2.42$, $p = 0.02$). People who live near railway crossings score significantly lower on both variables, which means that they have a less safe attitude towards unsafe behavior at railway crossing and that hey have more frequently behaved unsafe at railway crossings in the past. However, there is no significant difference between these subgroups when it comes to behavioral intention (railway crossings) ($t(679.64) = -0.60$, $p = 0.55$) and self efficacy (railway crossings) ($t(637.20) = -0.04$, $p = 0.97$).

4.1.5.2 Different types of behaviors at railway crossings

It is also interesting to take a closer look at the seven different forms of risky behavior at railway crossings, which were separately presented to the students in the surveys and later aggregated into the constructs attitude (railway crossings), behavioral intention (railway crossings) and past behavior (railway crossings).

These 7 forms of behavior at railway crossings can be divided into 3 behaviors that are related to the timing and transitional phases of the signalling and 4 behaviors that are related to different types of distraction.

With regard to the timing of risky behavior, a person can cross a railway crossing when the red lights are flashing and the barriers are completely closed, when the red lights are flashing, but before the barriers are completely closed or when a train has just passed, but before the barriers are completely open and the red lights are still flashing. Respondents have different attitudes and intentions about these behaviors and have performed them with different frequency in the past.

For example, 5.2% of respondents indicate that they don't find it dangerous (not at all and totally not) to cross a railway crossing when the red lights are flashing, and the barriers are completely closed. Only 81.4% of respondents consider this very dangerous. Furthermore, 2.6% of respondents indicate they have done it more than once a week and 4.2% more than once a month in the past 6 months.

Finally, 12.2% of respondents indicate that it is (very) likely that they will be doing it in the future.

For the behavior of crossing a railway crossing when the red lights are flashing, but before the barriers are completely closed, 5.6% of respondents indicate that they don't find it dangerous. Only 45.2% of respondents consider this very dangerous. Furthermore, 3.0% of respondents indicate they have done it more than once a week and 5.7% more than once a month in the past 6 months. Finally, 13.1% of respondents indicate that it is (very) likely that they will be doing it in the future.

With regard to crossing a railway crossing when a train has just passed, but before the barriers are completely open and the red lights are still flashing, 8.7% of respondents indicate that they don't find it dangerous. Only 37.1% of respondents consider this very dangerous. Furthermore, 1.8% of respondents indicate they have done it more than once a week and 5.2% more than once a month in the past 6 months. Finally, 13.8% of respondents indicate that it is (very) likely that they will be doing it in the future.

When looking at the behaviors that are related to different types of distraction, a distinction can be made between crossing a railway crossing without carefully looking at the signals, when visibility is limited due to bad weather conditions (e.g. fog or rain), when hearing is impaired (e.g. listening to music through headphones) and while using a smartphone.

For example, 5.3% of respondents indicate that they don't find it dangerous (not at all and totally not) to cross a railway crossing without carefully looking at the signals. Only 39.4% of respondents consider this very dangerous. Furthermore, 2.6% of respondents indicate they have done it more than once a week and 6.9% more than once a month in the past 6 months. Finally, 13.5% of respondents indicate that it is (very) likely that they will be doing it in the future.

With regard to crossing a railway crossing when visibility is limited due to bad weather conditions, 10.6% of respondents indicate that they don't find it dangerous. Only 23.2% of respondents consider this very dangerous. Furthermore, 3.0% of respondents indicate they have done it more than once a week and 9.2% more than once a month in the past 6 months. Finally, 25.1% of respondents indicate that it is (very) likely that they will be doing it in the future.

With regard to crossing a railway crossing when hearing is impaired, 14% of respondents indicate that they don't find it dangerous. Only 21.6% of respondents consider this very dangerous. Furthermore, 5.1% of respondents indicate they have done it more than once a week and 12.9% more than once a month in the past 6 months. Finally, 27.1% of respondents indicate that it is (very) likely that they will be doing it in the future.

Finally, for the behavior of crossing a railway crossing while using a smartphone, 5.6% of respondents indicate that they don't find it dangerous. Only 43% of respondents consider this very dangerous. Furthermore, 3.1% of respondents indicate they have done it more than once a week and 7.3% more than once a month in the past 6 months. Finally, 15.6% of respondents indicate that it is (very) likely that they will be doing it in the future.

Female students score significantly higher (and thus safer) than male students on attitude towards all mentioned risky behaviors (Pearson Chi-Square: $p < 0.05$ for all). There is also a significant difference between male and female students in frequency of the mentioned risky behavior in the past six months (Pearson Chi-Square: $p < 0.05$ for all), except for crossing a railway crossing when hearing is impaired (Pearson Chi-Square: $p=0.47$). With regard to when the red lights are flashing and the barriers are completely closed, the significance is marginal (Pearson Chi-Square: $p=0.08$). All significant differences indicate a safer behavior of female students than their male counterparts. A significant difference in behavioral intention is only found for crossing a railway crossing while using a smartphone (Pearson Chi-Square: $p=0.04$).

Third grade students score significantly higher (and thus safer) than 2nd grade students on attitude towards crossing a railway crossing without carefully looking at the signals (Pearson Chi-Square: $p<0.01$), when the red lights are flashing, but before the barriers are completely closed (Pearson Chi-Square: $p<0.01$), when a train has just passed, but before the barriers are completely open and the red lights are still flashing (Pearson Chi-Square: $p<0.01$) and while using a smartphone (Pearson Chi-Square: $p=0.07$), but not on attitude towards crossing a railway crossing when the red lights are flashing and the barriers are completely closed (Pearson Chi-Square: $p=0.12$),when visibility is limited due to bad weather conditions (Pearson Chi-Square: $p=0.18$), when hearing is impaired (Pearson Chi-Square: $p=0.45$). There is only a significant difference between 2nd and 3rd grade students in frequency of the mentioned risky behavior in the past six months for crossing a railway crossing when hearing is impaired (Pearson Chi-Square: $p=0.04$). Third graders did it more frequently than 2nd graders. A significant difference in behavioral intention is found for crossing a railway crossing when the red lights are flashing and the barriers are completely closed (Pearson Chi-Square: $p<0.01$), when the red lights are flashing, but before the barriers are completely closed (Pearson Chi-Square: $p=0.02$) and when a train has just passed, but before the barriers are completely open and the red lights are still flashing (Pearson Chi-Square: $p<0.01$). Third grade students score significantly higher (and thus safer) than 2nd grade students on the intention towards these risky behaviors. Also, a marginally significant difference is found for the intention towards crossing a railway crossing without carefully looking at the signals (Pearson Chi-Square: $p=0.10$). Here, also, 3rd graders are safer.

There is a significant difference between students of different study domain on attitude towards attitude towards crossing a railway crossing when the red lights

are flashing and the barriers are completely closed(Pearson Chi-Square: p=0.03), when a train has just passed, but before the barriers are completely open and the red lights are still flashing(Pearson Chi-Square: p=0.04), without carefully looking at the signals(Pearson Chi-Square: p=0.04), when hearing is impaired (Pearson Chi-Square: p<0.01), while using a smartphone (Pearson Chi-Square: p<0.01). Throughflow finality students have a significantly safer attitude than labor market finality students towards crossing a railway crossing when the red lights are flashing, and the barriers are completely closed and while using a smartphone. Labor market finality students have a significantly safer attitude than throughflow finality and double finality students towards crossing a railway crossing when a train has just passed, but before the barriers are completely open and the red lights are still flashing and than throughflow finality students towards crossing a railway crossing when hearing is impaired. Double finality students have a significantly safer attitude than throughflow finality students towards crossing a railway crossing without carefully looking at the signals and when hearing is impaired and than labor market finality students towards crossing a railway crossing while using a smartphone.

There are no significant differences between students in different study domains in frequency of the mentioned risky behaviors in the past six months (Pearson Chi-Square: p >0.05 for all). A significant difference in behavioral intention is found towards all mentioned risky behaviors (Pearson Chi-Square: p <0.05 for all), except for crossing a railway crossing without carefully looking at the signals (Pearson Chi-Square: p=0.17) and while using a smartphone (Pearson Chi-Square: p=0.18). Labor market finality students have a significantly less safe intention than throughflow and double finality students towards crossing a railway crossing when the red lights are flashing and the barriers are completely closed and when the red lights are flashing, but before the barriers are completely closed and than double finality students towards crossing a railway crossing when a train has just passed, but before the barriers are completely open and the red lights are still flashing. On the other hand, labor market finality students have a significantly safer intention than throughflow finality and double finality students towards crossing a railway crossing when hearing is impaired. Double finality students have a significantly safer intention than throughflow finality students towards crossing a railway crossing when visibility is limited due to bad weather conditions.

4.1.6 Main findings for the search for factors that predict attitudes and behavior at railway crossings through linear regression

As explained in detail in paragraph 3.6.3, the "Enter" method is used initially, in which all independent variables are included in the regression equation. For each of the three selected dependent variables, the adjusted R^2 is examined and an

attempt is made to increase it by removing the independent variables for which the p-value of the coefficients is higher than 0.05.

For the dependent variable attitude (railway crossings), the initial adjusted R^2 equals 0.22. The ANOVA shows that the model is significant ($F(9,732)=24.01$, $p<0.01$). The coefficients of the variables Gender ($t(732)= 1.02$, $p=0.31$), study domain ($t(732)= 0.74$, $p=0.46$), and behavioral intention (railway crossings) ($t(732)= -0.98$, $p=0.33$) are not significant. These independent variables are therefor removed from the model. For the independent variable grade, the coefficient is only marginally significant ($t(732)= 1.93$, $p=0.05$). It is therefor decided to leave this variable in the model for now.

In a second run, the adjusted R^2 remains stable at 0.22. The ANOVA shows that the model is significant ($F(6,735)=35.59$, $p<0.01$). The coefficient of the variable grade is, once again only marginally significant ($t(735)= 1.74$, $p=0.08$). It is therefor decided to remove this variable from the model, to examine for a possible increase of the adjusted R^2.

After the removal of the variable grade from the model, the adjusted R^2 remains stable at 0.22. The ANOVA shows that the model is significant ($F(5,736)=41.98$, $p<0.01$), meaning that the independent variable explains a significant portion of the variation in attitude towards risky behavior at railway crossings. However, an adjusted R^2 of 0.22 can be considered as rather weak. The coefficients of the independent variables are all significant. It is therefor decided that no more variables will be remove from the model.

The independent variables that are retained in the model are attitude (traffic) ($\beta=0.14$, $t(736)=3.20$, $p<0.01$), subjective norm (traffic)($\beta=0.08$, $t(736)=2.17$, $p=0.03$), perceived behavior control (traffic)($\beta=-0.10$, $t(736)=-2.38$, $p=0.02$), behavior (traffic)($\beta=0.23$, $t(736)=5.72$, $p<0.01$), past behavior (railway crossings)($\beta=0.26$, $t(736)=7.66$, $p<0.01$).

In other words, a safer attitude, subjective norm and behavior in traffic in general and safer behavior in the past predict a safer attitude at railway crossing. On the contrary, a safer perceived behavior control in traffic in general predicts a less safe attitude at railway crossing.

For the dependent variable past behavior (railway crossings), the initial adjusted R^2 equals 0.31. The ANOVA shows that the model is significant ($F(10,728)=34.42$, $p<0.01$). The coefficients of the variables Gender ($t(728)= -0.94$, $p=0.35$), study domain ($t(728)= 0.80$, $p=0.43$), perceived behavioral control (traffic) ($t(728)= 0.69$, $p=0.49$), behavior (traffic)($t(728)= -0.11$, $p=0.91$) and self efficacy (railway crossings) ($t(728)= -0.23$, $p=0.82$) are not significant. These independent variables are therefor removed from the model.

In a second run, the adjusted R^2 remains stable at 0.31. The ANOVA shows that the model is significant ($F(5,736)=68.98$, $p<0.01$), meaning that the independent

variable explains a significant portion of the variation in attitude towards risky behavior at railway crossings. However, an adjusted R^2 of 0.33 can be considered as rather weak. The coefficients of the independent variables are all significant. It is therefor decided that no more variables will be remove from the model.

The independent variables that are retained in the model are grade (β=-0.08, $t(736)$=2.63, p=0.01), attitude (traffic) (β=0.15, $t(736)$=4.15, $p<0.01$), subjective norm (traffic)(β=-0.07, $t(736)$=-2.00, p=0.05), attitude (railway crossings)(β=0.25, $t(736)$=7.61, $p<0.01$) and behavioral intention (railway crossings)(β=0.40, $t(736)$=12.50, $p<0.01$).

In other words, a higher grade, a safer attitude in traffic in general and a safer attitude and behavioral intention at railway crossings predict a safer behavior at railway crossings in the past. On the contrary, a safer subjective norm in traffic in general predicts a less safe past behavior at railway crossings.

For the dependent variable behavioral intention (railway crossings), the initial adjusted R^2 equals 0.28. The ANOVA shows that the model is significant ($F(10,728)$=30.16, $p<0.01$). The coefficients of the variables gender ($t(728)$= -0.30, p=0.76), grade ($t(728)$= 1.51, p=0.13), study domain ($t(728)$= -0.98, p=0.33), subjective norm (traffic) ($t(728)$= -0.37, p=0.71), behavior (traffic)($t(728)$= 1.38, p=0.17), attitude (railway crossings) ($t(728)$= -0.95, p=0.34) and self efficacy (railway crossings) ($t(728)$= -0.78, p=0.44) are not significant. These independent variables are therefor removed from the model.

In a second run, the adjusted R^2 remains stable at 0.28. The ANOVA shows that the model is significant ($F(3,738)$=97.52, $p<0.01$), meaning that the independent variable explains a significant portion of the variation in attitude towards risky behavior at railway crossings. However, an adjusted R^2 of 0.28 can be considered as rather weak. The coefficients of the independent variables are all significant. It is therefor decided that no more variables will be remove from the model.

The independent variables that are retained in the model are attitude (traffic) (β=0.10, $t(738)$=2.68, p=0.01), perceived behavioral control (traffic)(β=0.17, $t(738)$=4.51, $p<0.01$) and past behavior (railway crossings)(β=0.41, $t(738)$=12.44, $p<0.01$).

In other words, a safer attitude and perceived behavioral control in traffic in general and safer behavior in the past predict a safer behavioral intention at railway crossing.

4.2 Process evaluation: evaluating the live and video testimonials

In the process evaluation, the live and video testimonials that were offered to a selected group of second and third grade students, are assessed and compared to each other on cognitive and emotional impact, preference and some qualitative elements, such as duration, clarity and performance of the speaker.

4.2.1 Evaluation of cognitive and emotional impact

Of the 167 people who indicated they witnessed a testimonial, 66% attended the live testimonial, while 34% was presented with the videos.

Concerning the cognitive impact of the testimonials, significantly more students who followed the live testimonial found it credible ($p<0.01$ on a Pearson Chi-Square test), useful ($p = 0.02$), interesting ($p<0.01$), important ($p < 0.01$) and informative ($p<0.01$) than students who followed the video testimonial. More specifically, 95.5% of respondents who attended the live testimonial found it rather or very credible, compared to only 78.9% of video testimonial attendees. More than two thirds of respondents who witnessed the live testimonial (75.5%) found it rather or very useful, compared to only 54.4% of video testimonial viewers. Of the live testimonial attendees, 79.1% found it rather or very interesting, versus only 52.6% of respondents that were offered the video testimonial. Almost 9 out of 10 respondents (85.5%) who attended the live testimonial indicated the story was rather or very important to them, compared to only 59.6% of video testimonial attendees. Finally, 71.8% of respondents who attended the live testimonial experienced it to be informative, compared to only 56.1% of video testimonial attendees.

When looking at the emotional impact of the testimonials, 87.3% of respondents who attended the live testimonial found it rather or very shocking, compared to only 77.2% of video testimonial attendees. This is a significant difference ($p<0.01$ on a Pearson Chi-Square test). No significant difference was found for the feelings "disturbing" ($p = 0.49$ on a Pearson Chi-Square test) and "frightening" ($p = 0.52$ on a Pearson Chi-Square test). The proportion of attendees that found the testimonial rather or very disturbing was 57.3% for the live testimonial and 52.6% for the video testimonial. The share of attendees that found the testimonial rather or very frightening was 57.3% for the live testimonial and 57.9% for the video testimonial.

The percentage of respondents that found the story rather or very shocking is significantly different for respondents of different birth years ($p = 0.52$ on a Pearson Chi-Square test). For example, 100% of students that were born in 2005 found the story rather of very shocking, compared to 83% of respondents born in

2006, 80% of students born in 2007, 65% of respondents born in 2008 and 31% for respondents born in 2009. This leads to the conclusion that the younger the students, the less shocking they find the testimonials, which seems counter intuitive.

Two constructs were developed, cognitive program impact and emotional program impact (see also paragraph 3.6.1). The mean scores for these variables are respectively 3.98 and 3.72, indicating a significantly higher cognitive than emotional impact, with $t(166)=3.84$, $p<0.01$.

There is a significant difference between the students that attended the live testimonial and those who watched the video testimonial when it comes to cognitive program impact: $t(165)=5.31$, $p<0.01$. The live testimonial has a higher cognitive program impact (mean=4.18) than the video testimonial (mean=3.59).

Next, the cognitive program impact is examined for differences between subgroups based on gender and grade. These analyses were performed on the first post-test dataset, which contains the merged cases for the pre-test and first-post test. After all, in the first post-test, in which the evaluation questions were asked, the gender and grade of the respondent were no longer asked. Analyses can therefore only be performed on the 132 matched cases that received the evaluation questions (experimental video and live testimonial group).

There is no significant difference between male students and female students when it comes to cognitive program impact: $t(104.12)=-0.11$, $p=0.91$. Also, among the students who attended the live testimonial, there is no significant difference in cognitive program impact between male and female students: $t(66.44)=-1.62$, $p=0.11$. Finally, among the students who attended the video testimonial, there is no significant difference in cognitive program impact between male and female students $t(24.11)=1.21$, $p=0.24$.

There is also no significant difference between 2nd and 3rd grade students when it comes to cognitive program impact: $t(38.88)=-1.67$, $p=0.10$. Also, among the students who attended the live testimonial, there is no significant difference in cognitive program impact between 2nd and 3rd graders: $t(4.70)=-0.66$, $p=0.54$. The low number of 2nd graders in this dataset that attended the live testimonial (n=5) might be part of the cause of the non-existence of a significant difference. Finally, among the students who watched the video testimonial, there is no significant difference in cognitive program impact between 2nd and 3rd graders $t(43)=0.51$, $p=0.61$.

There is a significant difference between the students that attended the live testimonial and those who watched the video testimonial when it comes to emotional program impact: $t(115.68)=2.07$, $p=0.04$. The live testimonial has a higher emotional program impact (mean=3.82) than the video testimonial (mean=3.53).

Next, the emotional program impact is examined for differences between subgroups based on gender and grade. Once again, these analyses were performed on the first post-test dataset, more specifically on the 132 matched cases that received the evaluation questions (experimental video and live testimonial group).

There is a marginally significant difference between male students and female students when it comes to emotional program impact: t(98.79)=-1.91, p=0.06. Female students report a higher emotional program impact (mean=3.38) than male students (mean=3.53). Also, among the students who attended the live testimonial, there is a marginally significant difference in emotional program impact between male and female students: t(64.26)=-2.92, p=0.01. Finally, among the students who attended the video testimonial, there is no significant difference in cognitive program impact between male and female students t(31.22)=0.81, p=0.42.

There is a significant difference between 2nd and 3rd grade students when it comes to emotional program impact: t(34.60)=-2.20, p=0.04. Second graders report a significantly lower emotional program impact (mean=3.31) than 3rd graders (mean=3.76). However, among the students who attended the live testimonial, there is no significant difference in emotional program impact between 2nd and 3rd graders: t(4.47)=-1.79, p=0.14. The low number of 2nd graders in this dataset that attended the live testimonial (n=5) seems to be the cause of the non-existence of a significant difference, as the means differ largely (mean=3.83 for 3rd graders and mean=3.07 for 2nd graders). Finally, among the students who watched the video testimonial, there is no significant difference in emotional program impact between 2nd and 3rd graders t(39.69)=-0.56, p=0.58.

4.2.2 Evaluation of the quality of the testimonials

Significantly more respondents who followed the live testimonial found the witness very good ($p < 0.01$ on a Pearson Chi-Square test), clear and easy to understand ($p < 0.01$ on a Pearson Chi-Square test) than respondents who watched the video testimonials. Almost two thirds of respondents who attended the live testimonial (64%) found the witness very good. This is significantly higher than the 30% of video testimonial attendees that found the witness very good. Furthermore, 68% of respondents who witnessed the live testimonial found the witness very clear and clearly understandable, significantly more than the 11% of those students that watched the video testimonials.

Only 5.5% of respondents who attended the live testimonial would rather have followed the video testimonials. This is significantly lower than the 64.9% of video testimonial attendees that would rather have attended the live testimonial.

There is a significant difference between the live and the video testimonial when it comes to the perceived duration of the testimonial ($p < 0.01$ on a Pearson Chi-Square test). Only 1.2% of respondents who attended the live testimonial found the duration of the testimonial too short, compared to 15.8% of video testimonial viewers. Thirty percent of respondents of the live testimonial attendees found the duration too long, compared to 21.1% of those who watched the video testimonial. In this respect, it is important to mention, that the live testimonial actually lasted longer than the 30 minutes that were anticipated and mentioned in the survey question. The actual duration of the live testimonial was more or less 45 minutes.

The answers on the open-ended questions that tried to find out what respondents remembered most about and what they would recommend for both the live and video testimonial reveal that the sound and therefore the comprehensibility of the video testimonial was not good. Furthermore, the humor and positivity of the speaker, that many who had followed the live testimonial remembered, was mentioned as a recommendation for the video testimonial, in which this humour was much less present.

4.3 Effect evaluation: evaluating the effect of the live and video testimonials (pre-test-post-test analysis for the first post test)

To evaluate the possible effect of the testimonials presented to the students in the experimental group, a repeated measures MANOVA was performed for the socio-cognitive and behavioral variables with regard to traffic safety in general and a repeated measures ANOVA was conducted on the socio-cognitive and behavioral variables with regard to safety at railway crossings in general. The following paragraphs describe in detail the steps that were taken during the analysis and the results these steps produced. A first paragraph focuses on the evaluation of the effect between the pre-test and the first post-test. Differences between the effect of the live testimonial and the video testimonial are compared with the evolution in the control group. This analysis is performed on the first post-test dataset (n=197). In the second paragraph, the focus lies on the evaluation of the effect between the pre-test, the first post-test and the second post-test, which is only considered for the variables that produced a significant effect after the first post-test. This analysis is performed on the first post-test dataset (n=77).

4.3.1 Effect of the live and video testimonial on socio-cognitive and behavioral variables with regard to traffic safety in general

In a first step of the analysis, a repeated measures MANOVA was performed on the variables attitude (traffic), subjective norm (traffic), perceived behavioral

control (traffic), behavioral intention (traffic) and behavior (traffic). A marginally significant multivariate within subject interaction effect was found: F(5,190) = 3.54, p = 0.09. It was decided upon to further analyse this marginal effect. This showed a significant univariate within subject interaction effect for subjective norm (traffic) (F(2,194) = 5.07, p = 0.01) and a marginally significant univariate within subject interaction effect for behavioral intention (traffic): F(2,194) = 2.42, p = 0.09.

For both of these variables, extra analyses were performed to better understand the (marginal) effects that arose. The possible significant difference between pre-test and post-test for each of these groups was examined by repeating the repeated measure MANOVA on the different groups separately (the Split File function in SPSS was used to separate the group results). Only the variables for which there is 1) no significant difference for the control group between pre-test and post-test and 2) a significant effect on either the live testimonial experimental group or the video testimonial experimental group or both, are considered to represent a noteworthy effect on the examined variables.

Figure 6 gives a visualisation of the evolution of the means for the difference groups for the variable subjective norm (traffic).

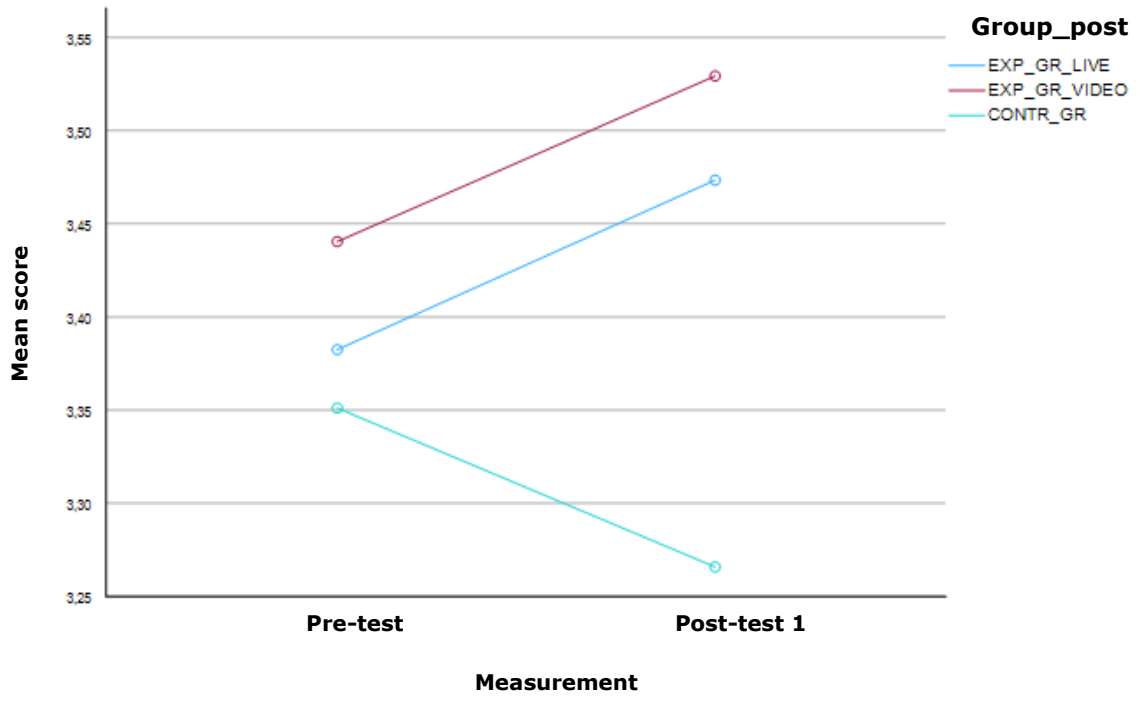

Figure 6 - Visualisation of mean scores of the variable subjective norm (traffic) in the pre-test and the first post-test

The repeated measures MANOVA for each group separately (Split File) showed that there is a significant difference between the means of the pre-test and the

post-test for the control group: F(5,60) = 2.77, p = 0.03 for the multivariate within subject effect and F(1,64) = 4.70, p = 0.03 for the univariate within subject effect with means decreasing from 3.35 to 3.27. Furthermore, a significant difference between the means of the pre-test and the post-test for the live testimonial experimental group was found: F(5,82) = 2.76, p = 0.02 for the multivariate within subject effect and F(1,86) = 5.8, p = 0.02 for the univariate within subject effect with means increasing from 3.38 to 3.47. However, there was no significant difference between the means of the pre-test and the post-test for the video testimonial experimental group: F(5,40) =1.35, p = 0.26 for the multivariate within subject effect. It can therefore be concluded that the effect that was shown in the repeated measures MANOVA is significant because there is a significant positive effect for the live testimonial experimental group, while the means of the control group also significantly.

The effect on the variable subjective norm (traffic) is therefore not taken into account.

Figure 7 gives a visualisation of the evolution of the means for the difference groups for the variable behavioral intention (traffic).

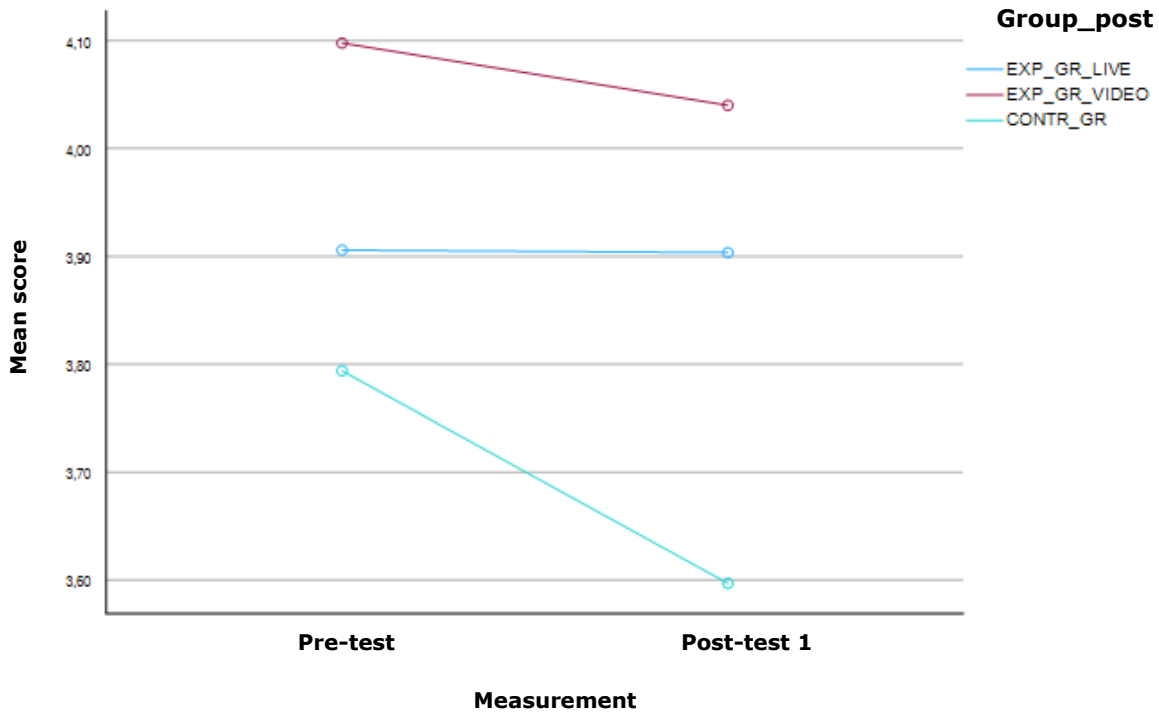

Figure 7 - Visualisation of mean scores of the variable behavioral intention (traffic) in the pre-test and the first post-test

The repeated measures MANOVA for each group separately (Split File) also showed that there is a significant difference between the means of the pre-test and the post-test for the control group: $F(5,60) = 2.77$, $p = 0.03$ for the multivariate within subject effect and $F(1,64) = 5.20$, $p = 0.03$ for the univariate within subject effect with means decreasing from 3.79 to 3.60. A significant difference between the means of the pre-test and the post-test for the live testimonial experimental group was not found: $F(5,82) = 2.77$, $p = 0.02$ for the multivariate within subject effect and $F(1,86) < 0.01$, $p = 0.96$ for the univariate within subject effect. There was also no significant difference between the means of the pre-test and the post-test for the video testimonial experimental group: $F(5,40) = 1.35$, $p = 0.26$ for the multivariate within subject effect. It can therefore be concluded that the marginally significant effect that was shown in the repeated measures MANOVA is caused by a significant decrease of the means of the control group. Furthermore, there is a significant difference between the three groups on the pre-test.

The effect on the variable behavioral intention (traffic) is therefore not taken into account. It can be concluded that the live and the video testimonials have no effect on the socio-cognitive and behavioral variables with regard to traffic safety in general.

In the first step of the analysis, the repeated measures MANOVA, the variables attitude (traffic), perceived behavioral control (traffic) and behavior (traffic) did not have a significant univariate within subject interaction effect: resp. $F(2,194) = 1.38$, $p = 0.25$; $(2,194) = 1.57$, $p = 0.21$; and $F(2,194) = 1.03$, $p = 0.36$. For these variables, the main effects for group (live and video testimonial experimental group and control group) and measurement (pre-test and post-test) are examined.

For the main effect for group, the multivariate between-subject effect for group appears to be significant ($F(10,382) = 4.67$, $p < 0.01$). For the variable behavior (traffic) the univariate between-subject effect for group is also significant: $F(2,194) = 6.97$, $p < 0.01$. This indicates that for both measurements the control group has a significantly lower average than the live and video testimonial experimental group.

When examining the main effect for measurement, the univariate within subject effect for the variable behavior (traffic) does also appear to be significant: $F(1,194) = 7.93$, $p = 0.01$. This indicates that for the three groups the mean score is significantly lower in the second measurement (post-test) than in the first measurement (pre-test).

For the variable attitude (traffic), the main effect for measurement, as presented by the univariate within subject effect, is also significant: $F(1,194) = 6.74$, $p = 0.01$. This indicates that for the three groups the mean score is significantly lower in the second measurement (post-test) than in the first measurement (pre-test).

For the variables attitude (traffic) and perceived behavioral control (traffic) the main effect for group is not significant: resp. $F(2,194) = 1.40$, $p = 0.25$ and $F(2,194) = 0.87$, $p = 0.42$. The main effect for measurement is also not significant for the variable perceived behavioral control: $F(1,194) = 0.02$, $p = 0.88$.

4.3.2 Effect of the live and video testimonial on socio-cognitive and behavioral variables with regard to traffic safety at railway crossings

As opposed to the variables with regard to traffic safety in general, the variables attitude (railway crossings), behavioral intention (railway crossings) and self efficacy were analysed separately, using a repeated measures univariate ANOVA. Whereas the variables with regard to traffic safety in general were treated as a group because they originate from a previous study (Cuenen et al., 2016), the variables with regard to railway crossings were constructed for this study. Therefore, assumptions on interconnection between them were not made.

When a significant univariate within subject interaction effect was found in the repeated measures univariate ANOVA for these variables, extra analyses were performed to better understand the (marginal) effects that arose. The possible significant difference between pre-test and post-test for each of these groups was examined by repeating the repeated measure univariate ANOVA on the different groups separately (the Split File function in SPSS was used to separate the group results). Only the variables for which there is 1) no significant difference for the control group between pre-test and post-test and 2) a significant effect on either the live testimonial experimental group or the video testimonial experimental group or both, are considered to represent a noteworthy effect on the examined variables.

For the variable attitude (railway crossings), a significant within subject interaction effect was found: $F(1,184) = 3.19$, $p = 0.04$.

Figure 8 gives a visualisation of the evolution of the means for the difference groups for the variable attitude (railway crossings).

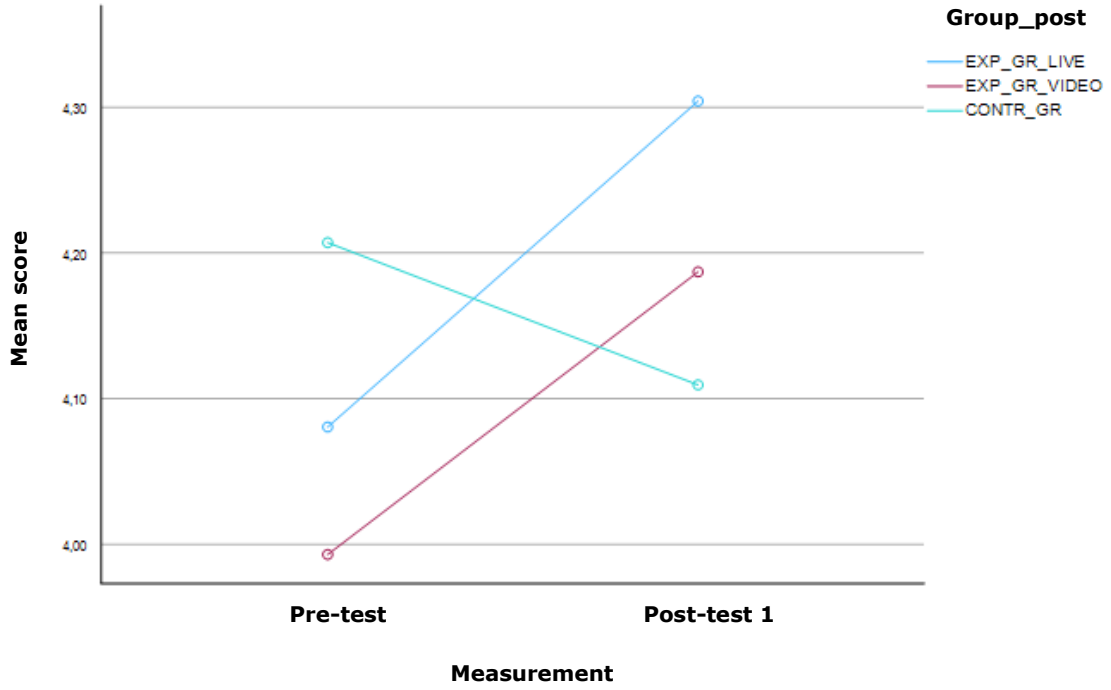

Figure 8 - Visualisation of mean scores of the variable attitude (railway crossings) in the pre-test and the first post-test

The repeated measures univariate ANOVA for each group separately (Split File) showed that there is no significant difference between the means of the pre-test and the post-test for the control group: F(1,59) =0.64, p = 0.43 for the within subject effect. However, a significant difference between the means of the pre-test and the post-test for the live testimonial experimental group was found: F(1,84) =9.39, p = 0.03 for the within subject effect with means increasing from 4.08 to 4.30. There was also a marginally significant difference between the means of the pre-test and the post-test for the video testimonial experimental group: F(1,41) =2.87, p = 0.10 for the within subject effect with means increasing from 3.99 to 4.19. It can therefore be concluded that the effect that was shown in the repeated measures univariate ANOVA is significant because there is a significant positive effect for the live testimonial experimental group and a marginally significant positive effect for the video testimonial experimental group. Phrased differently, the live testimonial has a significant positive effect on the attitude towards risky behavior at railway crossings of the respondents. The video testimonial has a marginally significant effect.

For the variable behavioral intention (railway crossings), a marginally significant within subject interaction effect was found: F(2,181) =2.85, p = 0.06.

Figure 9 gives a visualisation of the evolution of the means for the difference groups for the variable behavioral intention (railway crossings).

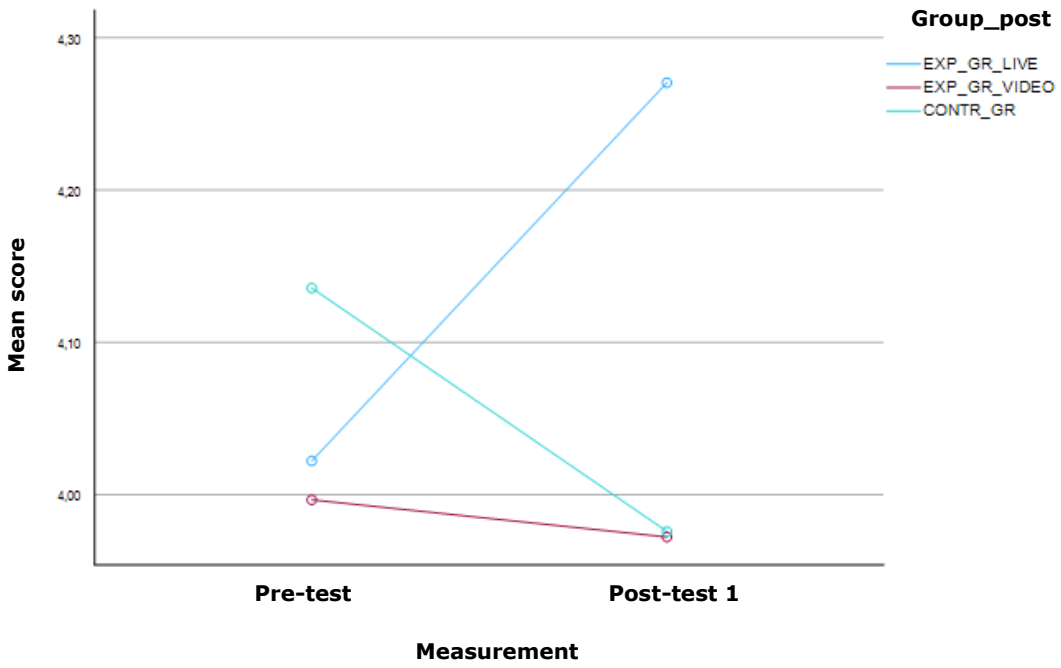

Figure 9 - Visualisation of mean scores of the variable behavioral intention (railway crossings) in the pre-test and the first post-test

The repeated measures univariate ANOVA for each group separately (Split File) showed that there is no significant difference between the means of the pre-test and the post-test for the control group: F(1,58) = 1.27, p = 0.27 for the within subject effect. However, a significant difference between the means of the pre-test and the post-test for the live testimonial experimental group was found: F(1,83) =4.63, p = 0.03 for the within subject effect with means increasing from 4.02 to 4.27. There was no significant difference between the means of the pre-test and the post-test for the video testimonial experimental group: F(1,40) =0.30, p = 0.86 for the within subject effect. It can therefore be concluded that the effect that was shown in the repeated measures univariate ANOVA is significant because there is a significant positive effect for the live testimonial experimental group. Phrased differently, the live testimonial has a significant positive effect on the behavioral intention towards risky behavior at railway crossings of the respondents. Such an effect is not found for the video testimonial.

For the variable self efficacy, no significant within subject interaction effect was found in the repeated measures univariate ANOVA: F(1,179) =0.17, p = 0.84. The effect on this variable is therefore not taken into account. The main effects for measurement and group were also not significant: resp. F(1,180) = 0.55, p = 0.46 for the within subject effect and F(1,180) = 1.93, p = 0.17 for the between-subject effect.

4.4 Effect evaluation: evaluating the effect of the live and video testimonials (pre-test-post-test analysis for the second post test)

A repeated measures univariate ANOVA for 3 measurements (pre-test, post-test 1 and post-test 2) and 3 groups (control group, live testimonial experimental group and video testimonial experimental group) was performed on the variables attitude (railway crossings) and behavioral intention (railway crossings), as these were the only variables on which a significant effect was shown after the first post-test (see paragraph 4.3).

For the variable attitude (railway crossings), no significant within subject interaction effect was found in the repeated measures univariate ANOVA: $F(3.59,125.52) = 0.54$, $p = 0.69$. The effect on this variable is therefore not taken into account. The main effect for measurement is significant: $F(1.79,125.52) = 4.25$, $p = 0.02$ for the within subject effect. A pairwise comparison learns that there is a significant main effect for measurement between the pre-test and the first post-test for all groups together. The mean score on the first measurement is lower than the mean score on the second measurement. $F(2,70) = 0.84$, $p = 0.44$ for the between-subject effect.

Figure 10 gives a visualisation of the evolution of the means for the difference groups for the variable attitude (railway crossings).

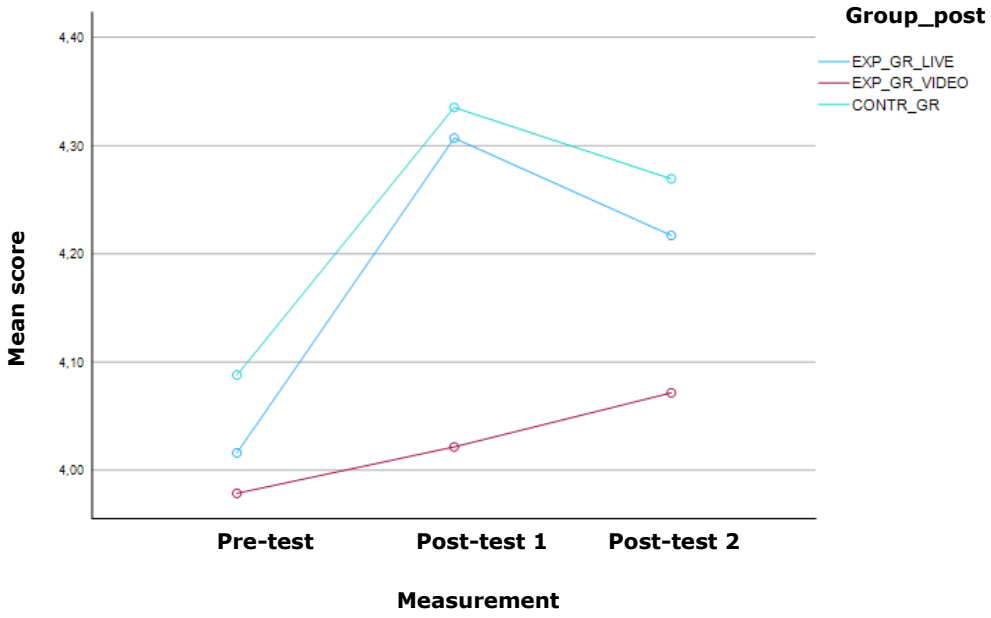

Figure 10 - Visualisation of mean scores of the variable attitude (railway crossings) in the pre-test, the first post-test and the second post-test

For the variable behavioral intention (railway crossings), a marginally significant within subject interaction effect was found: F(3.83,130.32) =2.40, p = 0.06.

Figure 11 gives a visualisation of the evolution of the means for the difference groups for the variable behavioral intention (railway crossings).

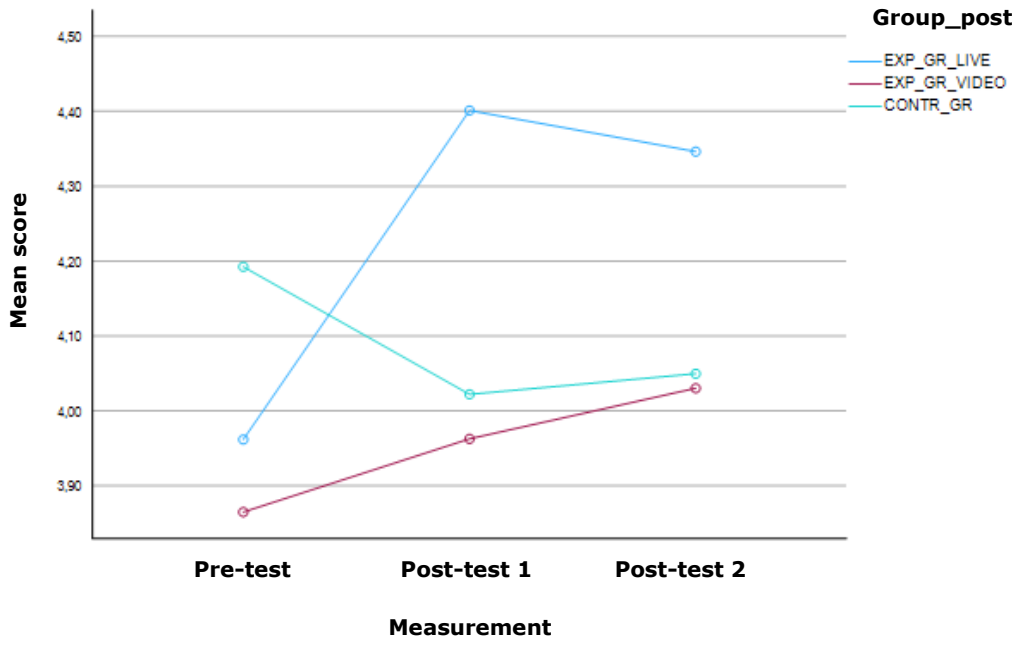

Figure 11 - Visualisation of mean scores of the variable behavioral intention (railway crossings) in the pre-test, the first post-test and the second post-test

The repeated measures univariate ANOVA for each group separately (Split File) showed that there is no significant difference between the means of the different measurements for the control group: F(1.96,48.87) =0.61, p = 0.55 for the within subject effect. However, a significant difference between the means of the different measurements for the live testimonial experimental group was found: F F(1.95,48.86) =6.62, p < 0.01 for the within subject effect with means increasing from 3.96 in the pre-test to 4.40 in the first post-test (which is a significant rise, p=0.01) and slightly decreasing to 4.36 in the second post-test (which is no significant decline, p=1.00). There was no significant difference between the means of the different measurements for the video testimonial experimental group: F(1.34,24.15) =0.40, p = 0.59 for the within subject effect. It can therefore be concluded that the effect that was shown in the repeated measures univariate ANOVA is significant because there is a significant positive effect for the live testimonial experimental group. Because the mean score remains stable between the first and the second post-test, it can be stated that the live testimonial has a significant positive effect on the behavioral intention towards risky behavior at

railway crossings of the respondents that remains stable after a month. Such an effect is not found for the video testimonial.

5 Discussion

As stated in chapter 2 Objectives and research questions, the two most important goals for this study are 1) to examine how serious the problem of unsafe behavior at railway crossings is among young people and therefore how great the need is for using testimonies as an intervention tool (measurement of behavior); 2) to examine which variables predict attitudes and behavior at railway crossings; 3) to carry out an evaluation of a live and video testimonial, in order to find out how they are assessed by the participants (process evaluation) and 4) to evaluate what effect these live and video testimonial have on (socio-cognitive determinants of) the behavior of young people at railway crossings (effect evaluation).

This chapter attempts to formulate an answer to all research questions that were formulated in paragraph 2.2. To improve clarity, this is done separately for the measurement of behavior, the process evaluation and the effect evaluation and for the different sub questions.

5.1 Measurement of (socio-cognitive determinants of) behavior in traffic in general and at railway crossings in particular

The key research question for the measurement of behavior in traffic in general and at railway crossings is:

"How serious is the problem of unsafe behavior at railway crossings among young people?"

The following sub questions are defined:

- How safe is/are the (socio-cognitive determinants of) behavior of the target group, for general road safety?
- Is there a significant difference in these/this (socio-cognitive determinants of) behavior in traffic in general between subgroups based on gender, grade and study domain?
- How safe is/are the (socio-cognitive determinants of) behavior of the target group, for safety at railway crossings in particular?
- Is there a significant difference in these/this (socio-cognitive determinants of) behavior at railway crossings between subgroups based on gender, grade and study domain?
- How high is the level of exposure of youth in Flanders to railway crossings?

5.1.1 Research question 1: How safe is/are the (socio-cognitive determinants of) behavior of the target group, for general road safety?

Based on the results of this study, it is difficult to determine if young people are safe in traffic or not. Quite a few respondents have already received a traffic fine and a third of them have been involved in an accident. The latter does not necessarily mean that the target group is unsafe in traffic. After all, it is not clear whether the respondents who experienced an accident actively participated in traffic themselves or as a passenger and, if they did actively participate in traffic themselves, whether they were at fault in the accident or not. Based on the scores on the socio-cognitive determinants of traffic behavior, it is also difficult to determine whether the target group of this study has safe attitudes and habits in traffic. After all, there is practically no basis for comparison with other age groups.

As the variable concerning traffic safety in general are based on the answers of the respondents on a 5-point Likert scale with exactly the same list of items as in Cuenen et al. (2016), it is useful to compare the mean scores of both studies. It must be taken into account that the mean scores on the variables in Ceunen et al. (2016) have the opposite meaning as the mean scores in this study. A higher score in Cuenen et al. (2016) means a less safety supportive attitude or behavior. In this study it is the other way around. On a 5-point scale, the minimum score is 1 and the maximum score is 5. A value of 5 on the first scale therefore corresponds to a value of 1 (=6-5) inverted scale. To reverse the scores, the mean score from Ceunen et al. (2016) must be subtracted from 6.

The (converted) mean score in Cuenen et al. (2016) is significantly higher (and thus safer) for attitude about traffic safety in general ($t(1419)=5.19$, $p<0.01$). However, the mean score for behavior in traffic in general in Cuenen et al. is significantly lower and thus less safe than in this study ($t(1419)=13.65$, $p<0.01$). These (counterintuitive) differences might be caused by differences in the target group. In Cuenen et al. (2016), only 3rd graders are included, and the distribution based on gender and study domain is more balanced than in this study. Cuenen et al (2016) consider the students in their study to be already quite road safety supportive.

5.1.2 Research question 2: Is there a significant difference in these/this (socio-cognitive determinants of) behavior in traffic in general between subgroups based on gender, grade and study domain?

What does clearly emerge from the results of this study is that older students (3rd grade) score better across the board than their younger fellow students (2nd grade). This is in line with Steinberg (2020), who indicates that the increased propensity towards risky decision making in adolescents only starts to decrease

from 14–15 years, an age category that corresponds to that of students in the 2nd grade. The only variable for which 2nd and 3rd graders do not differ is subjective norm (traffic). However, the score on this variable is very close for all subgroups examined. Also, when it comes to experience with receiving a fine or involvement in an accident, there are no differences between age groups. The safer behavior of the 3rd grade students may be offset by increased exposure and vulnerability. After all, the results indicate that older students cycle to school significantly more often. Wex et al. (2023) confirm that older students more often cycle to school.

In contrast with Cuenen et al. (2016) female students are not significantly more traffic safety supportive than male students on all examined variables. Only for attitude (traffic) and perceived behavior control (traffic) this is the case.

This contradicts what has been shown in many other studies, namely that engaging in risky behavior is more likely for men than for women, in life in general (Harris, 2006; Clancy et al., 2007) and for young men than for other road users in traffic in particular (Yagil, 1998; Heidstra, 2007 ; Paljat & Delhomme, 2012; Goldenbeld et al., 2018; Wang H. et al., 2018,; Wang C. et al., 2020).

The results also differ slightly from those from Ceunen et al. (2016) when looking at the differences between study domains. In this study, just as in Ceunen et al. (2016), it can be concluded that students of general education/throughflow finality and of technical education/double finality are significantly more road safety supportive than students of occupational education/labour market finality with regard to behavioral intention (traffic) and behavior (traffic). In contrast to Cuenen et al. (2016), this significant difference between study domains for the variables attitude (traffic) and subjective norm (traffic) does not show in this study. For this last variable, Cuenen et al. (2016) only showed a difference between general education and occupational education. For the variable perceived behavioral control (traffic), the results show that students from general education/throughflow finality are significantly more road safety supportive than students from technical education/double finality and occupational education/labour market finality. In Cuenen et al. (2016), no significant difference was found between the different study domains for this variable.

5.1.3 Research question 3: How safe is/are the (socio-cognitive determinants of) behavior of the target group, for safety at railway crossings in particular?

As with traffic safety in general, it is difficult to determine if young people are safe at railway crossings or not, based on the mean scores that emerge in this study on the socio-cognitive variables concerning behavior at railway crossing. Mean scores of 4.05 on attitude (railway crossings) and 4.50 on past behavior (railway crossings) seem quite high. However, they need to be viewed within a perspective

in order to be able to make sensible statements about safety at railway crossings. When looking at the seven different forms of risky behavior at railway crossings, that were presented separately to the students in the surveys and later aggregated into the different socio-cognitive variables, a better picture of the risky behavior of young people at railway crossings is obtained.

For example, 5.2% of the students do not think it is dangerous to cross a railway crossing when the red lights are flashing, and the barriers are completely closed. Moreover, 4.2% indicate that they have done it at least once a month for the past 6 months. In addition, even 12.2% indicate that they are likely or very likely to do so in the future. These percentages become even greater when looking at the transition phases where the barriers are raised or lowered and when looking at behavior or circumstances that cause distraction. For example, 8.7% do not think it is dangerous to cross a railway crossing when a train has just passed, but before the barriers are completely open and the red lights are still flashing, 5.2% have done it at least once a month for the past 6 months even 13.8% says they are likely or very likely to do so in the future. When looking at the risky behavior of crossing a railway crossing when hearing is impaired (e.g. listening to music through headphones), 14% do not think it is dangerous, 12.9% indicate they have done it at least once a month for the past 6 months and as many as 27.1% says they are likely or very likely to do so in the future.

Since the questions about past behavior and about the attitude and intention towards risky behavior at railway crossings are inspired by the Railspect study, which GfK carried out for Infrabel, it is worthwhile to compare the results of both studies. In the available cross-tables of the Railspect study the subgroup of 15 to 24-year-olds was considered for maximum comparability. When comparing it is immediately clear that the Railspect study shows safer results across the board. This applies to both attitude and past behavior (behavioral intention was not surveyed in that study). In the case of attitude, the share of respondents that considers the presented risk behavior rather not or not at all dangerous is considerably lower in the Railspect study than in this study. For past behavior, both the share of respondents who have done the behavior more than once per month over the past 6 months and the share of respondents who have done the behavior more than once per week over the past 6 months, are larger in this study than in the Railspect study. Since both studies were conducted online, the difference in results is probably caused by the difference in the age of the target group. This seems to show that risky behavior at railway crossings decreases even further after the 3rd grade of secondary education and thus that interventions in secondary school are very needed. The two studies also differ with regard to geographic focus. While this study only attempts to make a statement about Flemish young people and only conducts research among students in the province of Limburg, the Railspect study is organized nationally, with "only" 58% of the respondents living in Flanders. Circumstantial differences between the Belgian regions (Flanders, Brussels and Wallonia) might have an impact on the risky behavior at railway crossings.

5.1.4 Research question 4: Is there a significant difference in these/this (socio cognitive determinants of) behavior at railway crossings between subgroups based on gender, grade and study domain?

Male students tend to engage in risky behavior at railway crossings more than female students. This applies to their attitude towards (un)safe behavior and to past behavior. However, they score better than their female counterparts on self-efficacy, their own belief in their ability to behave safely at railway crossings. There are only limited significant differences when it comes to behavioral intention. Female students report a lower likelihood than male students of crossing a railroad crossing while using their smartphone. The increased engagement in risky behavior of males at railway crossings is confirmed by Clancy et al. (2007), Edquist et al. (2011), Freeman et al. (2013), Stefanova et al. (2015) and SAFER-LC D2.1 (2018).

Students in the 2nd grade exhibit a significantly less safe attitude, behavioral intention and self-efficacy at railway crossings. Only in terms of past behavior no significant difference is found between 2nd and 3rd grade students. When looking at crossing a railway crossing when hearing is impaired (e.g., by listening to music through headphones), 3rd grade students even did it more often in the past. Past behavior is of course partly determined by the extent to which students come into contact with railway crossings. Exposure is significantly higher for 3rd graders than for 2nd graders, both during trips between home and school and on other occasions. Clancy et al. (2007) found that familiarity with railway crossings is one of the main factors leading to accidents because of an increased complacency.

The increased engagement in risky behavior of 2nd graders at railway crossings can again be linked to the findings of Steinberg (2020), who stipulates that the increased inclination towards risky decision making in adolescents is at its peak at the age of 14–15 years, which corresponds with the age category of students in the 2nd grade. That this increased risk behavior for second graders also applies to railway crossings is consistent with the findings of Stefanova et al. (2015), that crossing a railway crossing behind a stopped train and after the gates are closed were associated with younger adults.

The results show no significant differences between the different study domains with regard to the socio-cognitive variables attitude, behavioral intention, past behavior and self-efficacy. When looking at the different types of behavior, do significant differences between the study domains can be seen, but no general direction of the difference can be determined. For example, throughflow finality students have a significantly safer attitude than labor market finality students towards crossing a railway crossing when the red lights are flashing, and the barriers are completely closed. However, labor market finality students have a significantly safer attitude than throughflow finality students towards crossing a

railway crossing when a train has just passed, but before the barriers are completely open and the red lights are still flashing. What is remarkable is that past behavior for all the different types of behavior is not significant across study domains.

5.1.5 Research question 5: How high is the level of exposure of youth in Flanders to railway crossings?

The need for interventions can also be demonstrated by considering young people's exposure to railway crossings. As mentioned earlier, Clancy et al. (2007) states that familiarity with railway crossings leads to increased complacency and to more accidents. The results of this study show that half of the respondents have to cross a railway crossing on the way to school. When crossing railway crossings in other circumstances than the commute to school is added to the equation, almost 80% of respondents is at least once in a while exposed to railway crossings. Almost 40% of the time this exposure happens either by foot, by bike or by mope. Also, nearly half of the respondents live within one kilometre of a railway crossing. The results of this study show that a students that are exposed to railway crossings, either on their (school or non-school) trips or because they live in the vicinity they live in the vicinity of a railway crossing, have shown more unsafe behavior (in the past) and in the case of living near a railway crossing also a less safe attitude towards risky behavior at railway crossings.

The high level of exposure is of course at least partially caused by the fact that both schools have been purposefully selected because of their proximity to a railway crossing. However, the list of schools located at a maximum distance of 400 meters from a railway crossing (see section 3.2) shows that the schools that participated in this study are not exceptional, even in a region with a relatively low density of the railway network.

5.2 Search for factors that predict attitudes and behavior at railway crossings

The key research question for the search into factors that predict attitudes and behavior at railway crossings, is:

"Which variables are able to predict attitudes, past behavior and behavioral intention at railway crossings?"

The following sub questions are defined:

- Which socio-demographical variables are able to predict attitudes, past behavior and behavioral intention at railway crossings?
- Which socio-cognitive variables are able to predict attitudes, past behavior and behavioral intention at railway crossings?

5.2.1 Research question 6: Which socio-demographical variables are able to predict attitudes, past behavior and behavioral intention at railway crossings?

The results of the linear regression analysis, show that the socio-demographical variables gender, grade and study domain are not good at predicting attitudes, past behavior and behavioral intention at railway crossings. The variables gender and study domain are not able to explain the variation in any of the examined dependent variables. The variable grade is positively correlated with past behavior at railway crossings. In other words, the higher the grade, the safer the behavior at railway crossings in the past. This indicates that 2nd graders are more at risk than 1st graders.

5.2.2 Research question 7: Which socio-cognitive variables are able to predict attitudes, past behavior and behavioral intention at railway crossings?

The Theory of Planned Behavior (Ajzen, 1985) was already mentioned in paragraph 1.2.1 as a widely applied framework to understand behavior. It states that a person's behavior is a result of this person's intention to perform that behavior, which is in turn a result of the person's attitudes, perceived behavioral control and subjective norms. This framework has often been applied in studies on road safety (e.g., Barton et al., 2016; Floreskul et al., 2016), even for studies on victim testimonials (e.g., Feenstra et al., 2014; Cuenen et al., 2016), but rarely in studies on (un)safe behavior at railway crossings. However, Baric et al. (2020) and Palat et al. (2017) have applied the Theory of Planned Behavior to behavior at railway crossings.

In the results of this study, the socio-cognitive variable attitude towards safety at railway crossings appears to be a good predictor of past behavior, but not of behavioral intention at railway crossings. This contradicts what emerges in Baric et al. (2020) and Palat et al. (2017), namely that attitude toward railway crossing risk significantly predicts intentions for risky driving behavior at railway crossings.

In addition, attitude towards traffic safety in general is a good predictor of both (un)safe attitude, (un)safe past behavior and behavioral intention towards (un)safe behavior at railway crossings. The relationships between attitude towards traffic safety in general and the three examined dependent variables is a positive

one. This is in line with what emerges in Baric et al. (2020), namely that attitude toward safety in traffic in general significantly predicts intentions for risky driving behavior at railway crossings. It is therefore important to focus not only on interventions aimed at changing attitudes about unsafe behavior at railway crossings, but also attitudes about road traffic safety in general.

Another good predictor is past behavior at railway crossings. It has a positive relationship with both the attitude towards safety at railway crossing and behavioral intention at railway crossings. The more a student has displayed (un)safe behavior in the past, the more (un)safe the attitude towards safety at railway crossings and the more the student intends to continue to display unsafe behavior at railway crossings in the future. It is therefore extra important to focus on changing the behavior of students at railway crossings by offering interventions, such as testimonials. This is in line with what Baric et al. (2020) found, namely that self-reported frequency of risky crossing was the main predictor of the intention to commit this violation again in the future.

Subjective norm (traffic) and perceived behavioral control (traffic) are socio-cognitive variables for which the results are contradictory. The independent variable subjective norm (traffic) has a positive relationship with the dependent variable attitude (railway crossings), and a negative relationship with the dependent variable past behavior (railway crossings). Palat et al (2017) indicate that subjective norm significantly predicts intentions for risky driving behavior at railway crossings, an effect that is not found in the results of this study. Perceived behavioral control (traffic) has a negative relationship with attitude (railway crossings), but a positive one with behavioral intention (railway crossings).

5.3 Process evaluation

The key research question for the process evaluation is:

"How do participants evaluate the presented live and video testimonials on cognitive and emotional aspects and some qualitative elements and which format do they prefer?"

The following sub questions are defined:

- How do the members of the target group assess the presented live testimonial on cognitive and emotional elements and some qualitative elements, such as duration, clarity and performance of the speaker?
- How do the members of the target group assess the presented video testimonial on cognitive and emotional elements and some qualitative

elements, such as duration, clarity and performance of the speaker? Is there a significant difference with the assessment of the live testimonial?

5.3.1 Research question 8: How do the members of the target group assess the presented live testimonial on cognitive and emotional elements and some qualitative elements, such as duration, clarity and performance of the speaker?

The live testimonial is rated very well, especially on the cognitive elements, such as credibility, importance, interestingness, usefulness and informativeness. Respondents also find the testimonial shocking, but not really disturbing and frightening.

One of the possible explanations for these good scores is the strong identification with the speaker. Feenstra et al. (2014) and Bojesen & Rayce (2020) state that identifiability is important for the personal susceptibility and confidence in one's own ability to avoid or prevent accidents in their own situation. In this study the identifiability seems to be very good: the speaker was not much older than the audience at the time of the accident, he comes from the same region as the audience, the accident happened on the way back from a party (which ties in with the audience's lifeworld), ... The humor that the speaker uses also contributes to the identifiability.

The mean scores for cognitive and emotional program impact of the live testimonial are respectively 4.18 and 3.82, indicating a significantly higher cognitive than emotional impact, with $t(109)=4.72$, $p<0.01$. This corresponds to the results of Cuenen et al. (2016), in which the respondents were also more cognitively than emotionally affected. The mean scores in that study were 1.36 and 2.16, which, once again, are based on a reverse 5-point scale as in this study. As for the variables concerning traffic safety in general, the mean scores Ceunen et al. (2016) must be subtracted from 6 in order to make a comparison (see also 5.1.1). The inverted mean score for cognitive program impact is 4.64, which is significantly higher than the mean score for the cognitive program impact for this study ($t(812)=8.14$, $p<0.01$). The inverted mean score for emotional program impact is 3.84, which is not significantly different than the mean score for the emotional program impact for this study ($t(812)=0.23$, $p=0.82$). The significantly higher emotional and cognitive impact for female students, which was found in Cuenen et al. (2016), was only (marginally) found for the emotional impact of the live testimonial in this study.

5.3.2 Research question 9: How do the members of the target group assess the presented video testimonial on cognitive and emotional elements and some qualitative elements, such as duration, clarity and performance of the speaker? Is there a significant difference with the assessment of the live testimonial?

From the results it is immediately clear that there is a notable difference between the live and video testimonials. The video testimonial scores much lower than the live testimonial. It is considered significantly less credible, important, interesting, useful, informativeness and also less shocking.

One of the possible explanations for the poor scores given by respondents to the video testimonial is that video is less personal. In a sense, there is a greater distance between the speaker and the viewer of the video because there is no direct contact. The message is less well conveyed, which is shown in the lower score on cognitive program impact, but the emotions also come across less well, which is reflected in a marginally significant difference in emotional program impact. The speaker also uses less humor, which is a strength of the live testimonial and part of the core message "whatever happens, stay positive."

The mean scores for cognitive and emotional program of the video testimonial impact are respectively 3.59 and 3.53, indicating no significant difference between cognitive and emotional impact, with $t56)=0.47$, $p=0.07$. This differs from the results from the live testimonial and from the results of Cuenen et al. (2016), in which the respondents were more cognitively than emotionally affected. The inverted mean score for cognitive program impact in that study is 4.64, which is significantly higher than the mean score for the cognitive program impact for this study ($t(759)=13.49$, $p<0.01$). The inverted mean score for emotional program impact is 3.84, which is significantly higher than the mean score for the emotional program impact for the video testimonial in this study ($t(759)=2.67$, $p=0.01$). The significantly higher emotional and cognitive impact for female students, which was found in Cuenen et al. (2016), was not found for the emotional impact of the video testimonial in this study.

Compared with respondents who followed the live testimonial, significantly less respondents that watched the video testimonial found the witness very good, clear and easy to understand. This is ultimately reflected in the significantly higher preference for live than for video testimonial.

Furthermore, the impact of the video testimonial is lower, both for cognitive and emotional impact. Significantly less students who watched the video testimonial found it credible, useful, interesting, important, informative and shocking than students who attended the live testimonial. When looking at the constructed variables cognitive and emotional program impact, it is not surprising that the video testimonial has a significantly lower impact for both aspects.

5.4 Effect evaluation

The key research question for the effect evaluation is:

- Can the presented live and/or video testimonial help to change the (socio-cognitive determinants of) behavior of the target group with regard to risky behavior at railway crossings?

The following sub questions are defined:

  - Can an effect of the live and/or video testimonial be observed immediately after offering these testimonials to the respondents?
  - Can an effect of the live and/or video testimonial be observed one month after offering these testimonials to the respondents?

5.4.1 Research question 10: Can an effect of the live and/or video testimonial be observed immediately after offering these testimonials to the respondents?

The results in paragraph 4.3.1 show that no significant effect was established on the variables with respect to traffic safety in general: attitude, subjective norm, perceived behavioral control, behavioral intention and behavior were not affected by the live nor the video testimonial. It can there for be concluded that the live and the video testimonials have no effect on the socio-cognitive and behavioral variables with regard to traffic safety in general.

With regard to safety at railway crossing, only three of the initial four variables were examined: attitude, self efficacy and behavioral intention. The variable past behavior was not examined, because incorrect answer categories were added in the first post-test and because past behavior that is surveyed over different periods (6 months, 1 week, 1 month) is difficult to compare.

The results show that the live testimonial has an immediate significant positive effect on both the attitude and the behavioral intention towards risky behavior at railway crossings of the respondents.

The video testimonial only has a marginally significant effect on attitude towards viewers risky behavior at railway crossings immediately after the presentation of the videos and no immediate significant effect on behavioral intention of the viewers.

To date, effect studies of road safety programs using video testimonials among youngsters are very scarce. No study was found in which the effect of video testimonials was examined on risky behavior at railway crossings.

For traffic behavior in general, Putranto & No (2017) indicate that 5 minute testimonial video (either performed by real accident victim or by professional artist) were able to change the behavioral intention of young Indonesian motorcyclists towards safe motorcycling behaviors such as buckling the chin strap of their helmet, wearing bright colour jacket, wearing gloves and shoes and obeying the speed limit. In other sectors, such as healthcare and general safety, more evidence can be found that video testimonials can have an effect on behaviors such as smoking by adolescents (Fitrianto et al., 2023), end-of-life-care by healthcare professionals (Mirarchi et al., 2017), patients fear reduction (Shor et al., 2023) and children's drowning prevention (Shen et al., 2016).

Effect studies of road safety programs using live testimonials among youngsters are easier to find. However, they also do not focus on traffic safety at railway crossing but look for the effect on traffic safety attitudes and behavior in general. The results of these studies are rather ambiguous.

King et al. (2008), Poulter & McKenna (2010), Glendon et al. (2014), and Ceunen et al. (2016) conducted research into the immediate effect of a live testimonial, by administering a post-test survey that was presented to the students shortly after the intervention. Like this study, King et al. (2008), Poulter & McKenna (2010) and Ceunen et al. (2016) found an immediate positive effect on attitude. However, for the last two studies, the effect was small. Glendon et al. (2014) even find a counterintuitive effect, namely attitudes that became less traffic safety supportive. However, in the study by Glendon et al. (2014), the live testimonial was part of a mixed program of interventions, making the comparison slightly less obvious.

The other variable that experiences an immediate significant effect from the live testimonial in this study, behavioral intervention, is only mentioned in the short-term effects by Ceunen et al. (2016). An immediately significant effect was also found in that study.

5.4.2 Research question 11: Can an effect of the live and/or video testimonial be observed one month after offering these testimonials to the respondents?

The effects one month after the testimonials were only examined for attitude and behavioral intention towards safety at railway crossing to determine whether the previously found effects immediately after the testimonials also persisted in the longer term. In other words, it is assumed that there are no effects on variables with respect to traffic safety in general and on self-efficacy in the long term, not for the live testimonial and not for the video testimonial.

The results of the second post-test show that there is no lasting effect on attitudes about safety at railway crossings for both the live and the video testimonial. However, the live testimonial does have a significant positive effect on the behavioral intention towards risky behavior at railway crossings that remains stable after a month. Such an effect is not found for the video testimonial.

A longer-term effect on behavioral intention of students towards traffic safety in general after a live testimonial is also found by Cuenen et al. (2016).

The lack of a lasting effect on attitudes towards safety at railway crossings is also evident in Poulter & McKenna (2010) and Ceunen et al. (2016), although this conclusion could only be made for female students in the latter study. A significant long-term effect was found for male students. King et al. (2008) also found a significant longer-term effect on attitudes. In Glendon et al. (2014) and Feenstra et. al (2014), the counterintuitive effect is found that attitudes become less traffic safety supportive in the longer term. However, Feenstra et al. (2014) also introduces the relative attitude, where traffic safety is ranked among six other health behaviors, such as "not smoking" and "not doing drugs". This relative attitude does experience a positive long-term effect of the live testimonial. It is important to mention that for all of the above-mentioned studies, the "long term" is defined slightly differently, ranging from 4 weeks to 6 months, which makes comparing difficult.

As is the case for the immediate effect of testimonials, studies about the effect of video testimonials are scarce or even non-existent. Studies on the effect of testimonials on the longer-term were also not found for safety at railway crossings.

The most important conclusion of the effect evaluation is that a live testimonial can play a role in bringing about a lasting change in risky behavior of young people at railway crossing. However, a video testimonial does not seem to be able to do this.

As previously mentioned under 5.2.2, one of the possible explanations for the poor effectiveness of the video testimonial is that the video format is less personal, with greater distance between the speaker and the viewer of the video because there is no direct contact.

However, the poor effectiveness of the video testimonial could also be due to its quality. The process evaluation showed that the sound quality was not perceived as good, and the videos looked less professional. This resulted in significant differences in the cognitive and emotional impact between the live and video testimonials. Significantly fewer students who watched the video testimonial found it credible, useful, interesting, important, informative and shocking than students who attended the live testimonial.

With a limited budget and little experience, the three videos were recorded and made available via YouTube in a short period of time. It is therefore not surprising that the quality is lower and that the videos appear less professional. According to Donovan et al. (1999), however, a low budget does not have to lead to a lesser effect. Low cost talking heads testimonials of 30 seconds performed equally as well as their far more expensive counterparts in this study on road safety advertising.

6 Limitations and future research

When designing and organizing the research and processing and analysing the collected data, a number of limitations were encountered, leading to the need for a cautious interpretation of the findings.

With regard to the testimonials, a lack of development time and available budget might have caused the video testimonial to appear less professional as it could have been when sufficient resources had been available.

The inexperience of the speaker with video testimonials, led to some notable differences between the live and the video testimonial that might have influenced the assessment of and the effect on respondents. More humor was used in the live testimonial than in the video testimonial. Furthermore, in the video testimonial no slides were used, in contrast with the live testimonial. However, most importantly, the respondents indicated the sound was not clear and thus that the speaker was not good comprehensible.

For this study, it was also decided upon that the live testimonial needed to be as close to the ones that the speaker had done before in secondary schools across the country, in order not to influence the possible results too much. The original main message of the speaker's testimonials is not per se traffic safety, but rather "positivity". The focus of the testimonial is also on the consequences, because the cause of the accident is not clear, because of the loss of memory of the victim and the lack of witnesses. In the story that is told, the focus is on revalidation and the life after and less on the life before (which might help in strengthening the identification of the audience with the speaker) and the accident itself (which might give the audience some valuable lessons on the behavioral elements that need to be change).

It is worth to mention that the live testimonial took longer than planned. Normally, there was only 30 minutes for the live testimonial, after which the students would fill in the follow-up survey in class. Eventually, the testimonial took almost a full class hour, which might have influenced the response rate, as respondents had little time to complete the survey in class and had to take the initiative to complete it in their own time. Furthermore, there was no more time for students to ask the speaker some questions, which is normal in a live testimonial environment and an advantage for live testimonials.

The combination of the application of convenience sampling for the experimental group and the difficulty to find and convinced schools to cooperate to the study for the control group, might have let to biases in the results. Many schools indicated that the cooperation in a study can be burdensome (especially in a longitudinal study), and most schools had other priorities at the time. This has led to the fact that the experimental and control group were not well balanced.

In the first post-test as well as in the second dataset there is a significantly higher proportion of female students in the control group than in the experimental group. There is also a significantly higher proportion of 3rd graders in the experimental group than in the control group. Finally, there is a significantly lower proportion of throughflow finality students and a significantly higher proportion of double finality and labor market finality students in the control group than in the experimental group.

There are also differences between the two schools when it comes to mobility options (e.g. location of the school, presence of a train station, availability of bus connections, …), railway track density in the area and location of important neighbouring residential zones in relation to the railway crossing(s) in the area; leading to differences in main mode choice and exposure to railway crossings. This might have had an influence on the results of the effect evaluation.

The loss of many cases in the process of merging the pre- and post-test data sets, was already discussed in paragraph 3.6.3. Only 197 of a possible 343 cases could be matched after the first post-test and only 77 of a possible 197 after the second post-test. The problem seemed to lie with the uncareful reading of the questions by the respondents and a number of actions were taken to detect some of the errors and correct them. Apart from the merging process, a lot of cases were also lost when a notable portion of the respondents of the experimental group mistakenly answered that they were not presented a testimonial, probably because of ambiguity of the specific question. The loss of a notable number of cases led to smaller sample sizes for the analyses and might have led to less significant results, for example in the process and effect evaluation.

Furthermore, an error was made in drawing up the answer categories for the scale about the frequency of past behavior at railway crossings at the first post-test, where the answer categories were incorrectly copied from the pre-test. The latter asked about behavior in the past 6 months, while the first post-test asked about behavior in the past week. The answer categories therefore did not correspond to the period highlighted in the question. However, because the periods over which past behavior was questioned differed between the different measurements, it was in any case difficult to compare past behavior between the different measurements.

Furthermore, there is the limitation of external validity of this study. The study makes statements about a specific target group and the respondents were found in a specific region with a rather limited density of the railway network. In addition, there is an overrepresentation of female students in the sample.

The question therefore arises whether the results can be generalized or extended to other target groups. However, one may also wonder whether the results would have been the same with a different testimonial. After all, every testimonial is unique.

Finally, there is a chance that respondents have given socially desirable answers to certain questions, which could, for example, give a more positive picture of past behavior and behavioral intention. After all, crossing railway crossings when the barriers are closed is a clearly illegal behavior and the questions are asked in a school environment, which may cause students to fear that teachers or school administrators will find out that they are engaging in certain illegal behavior, despite the fact that anonymity was assured at the beginning of the survey.

The following suggestions for further research can be made:

- With the data collected in this study: examine if the effectiveness of the testimonials differs for different subgroups, using covariates on a MANCOVA analysis for the effect evaluation of the first and second post test, such as gender or grade.
- It would be interesting to examine if the same conclusions on attitudes, behavior(al intention), assessment and effects of testimonials apply to people outside of the target group, for example first graders or elderly, and for people in another geographical region.
- It would also be interesting to examine if the same conclusions on attitudes, behavior(al intention), assessment and effects of testimonials would apply to other testimonials. Related to this matter, in a subsequent investigation, a video testimonial can be made in a more professional and attractive way, with more humor, images of the scene of the accident, of the victim before the accident, in the hospital and during rehabilitation and videos of near-accidents.
- Finally, as this study only suggests that live testimonials have a (lasting) effect on behavioral intentions, further research can be done the effect on actual behavior at level crossings and on other possible interventions that can improve behavior.

7 Recommendations

The following recommendations can be made to speakers and other providers of testimonials who want to promote safety at railway crossings and to school boards, especially those of schools located near a railway crossing.

If it is not already done at this moment, it is recommended to start providing some form of intervention that aims to change attitudes and behavioral intention at railway crossings. After all, this study shows that many young people are exposed to railway crossings, that many young people engage in unsafe behavior and that unsafe behavior in the past is a good predictor of both the attitude towards unsafe behavior at railway crossings and of future intentions to behave unsafely at railway crossings.

When considering this type of interventions, it is advisable to consider testimonials by victims, family members of victims, train drivers or other railway personnel. Live testimonials are preferred to video testimonials, although video testimonials can also be used to positively influence attitudes about unsafe behavior at railway crossings. However, because there is no long-term effect, these videos should be offered to the target group periodically.

When making video testimonials, attention needs to be pay attention to the quality of the videos (sound, visibility, graphs, framing). It is preferable to work with a professional production company. An attempt must also be made to make an emotional impact on the young people.

Images can be shown, for example of the location where the accident happened, of the victim at the hospital (or) during revalidation, but also of his or her life before the accident to increase identifiability. The testimonial can also be combined with footage of (near) accidents at railway crossings. This is also done in the effect study of Poulter & McKenna (2010).

It is important to focus not only on interventions aimed at changing attitudes about unsafe behavior at railway crossings, but also attitudes about road traffic safety in general, as these are a good predictor of intention of risky behavior at railway crossings.

While all students, regardless of gender, grade and study domain will benefit from testimonials, it is recommended to start at a young age and focus on male students. No distinctions need to be made between study domains.

8 Conclusion

In the past, little research has been done into the effects of testimonials as an instrument to reduce risky behavior at railway crossings, especially for video testimonials. The large sample size (n=763) in the pre-test of this study allows for an extensive measurement of behavior in traffic in general and at railway crossings in particular among Flemish 2nd and 3rd graders at secondary schools.

This measurement shows that young people are frequently exposed to railway crossings and risky behavior is quite common, both in attitude, past behavior and behavioral intention. This is even more the case for risky behaviors that cause distraction, such as using a smartphone or wearing headphones while crossing a railway crossing. There should be extra focus on male students and 2nd graders, as they are significantly less safe across the board.

The search for factors that predict attitudes and behavior at railway crossings reveals that the most important predictors are attitude towards traffic safety in general and past behavior at railway crossings, which is in line with what is found in the literature. Socio-demographical variables are not good at predicting attitudes, past behavior and behavioral intention at railway crossings, except for grade (only for past behavior).

The process evaluation, in which participants evaluated the presented live and video testimonials, shows that students clearly prefer live testimonials. They are perceived as more credible, useful, interesting, important, informative, humorous and shocking. The witness was also easier to understand. The video testimonial had a significantly lower cognitive and emotional impact. Lack of time, budget and experience might have led to a less professional video testimonial, which can be seen as one of the main limitations for this study.

The effect evaluation shows that the live testimonial has an immediate positive effect on both the attitude and the behavioral intention towards risky behavior at railway crossings. Only the effect on behavioral intention remains after a month. The video testimonial only has an immediate effect on attitude and not on behavioral intention. After a month, there is no trace of the effect on attitude.

The most important limitations of this study are differences between the experimental and control group on some important variables, the loss of quite some data in the merging process and concerns about external validity of the results and socially desirable answers. Further research is recommended. It is also recommended to schools and testimonial providers to implement interventions to reduce risky behavior of young people at railway crossings. Live testimonials are definitely recommended, because they appear to have a lasting effect on behavioral intention. It has not been proven that video testimonials have a similar effect. Further research should demonstrate whether professional video testimonials can achieve this.

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Annexe 1: Survey pre-test

Beste

Mijn naam is Ronald Wolfs en ik studeer Mobiliteitswetenschappen aan de Universiteit Hasselt. In het kader van mijn masterproef voer ik een studie uit naar het gedrag van jongeren nabij spooroverwegen. Een spooroverweg is een kruising tussen een weg en een spoorlijn. Deze is bijna altijd uitgerust met slagbomen, knipperlichten en een geluidssignaal (bel).

De deelname aan deze studie is vrijwillig en je hebt het recht om met de studie te stoppen zonder een reden hiervoor op te geven. Je antwoorden zullen anoniem verwerkt worden. Je hoef dus nergens je naam te schrijven. Op geen enkel moment in de studie zal iemand weten welke antwoorden je gegeven hebt. De resultaten van de studie zullen gedurende 2 jaar worden bijgehouden en na deze periode verwijderd worden.

Het invullen van deze vragenlijst duurt slechts 15 minuten. Er zijn geen goede of foute antwoorden, ik ben gewoon geïnteresseerd in jouw eerlijke persoonlijke mening. Indien er vragen zijn over situaties die niet op jou van toepassing zijn, probeer je dan voor te stellen dat het wel op jou van toepassing is. Bijvoorbeeld: indien de vraag over autorijden gaat en je rijdt nog niet met de auto, geef dan alsnog je mening hierover.

Alvast bedankt!

Q1 Gelieve eerst onderstaande in te vullen alvorens te starten met de vragenlijst.

Vul hier de eerste twee letters van je voornaam in. Bijvoorbeeld: Bart -> BA
_____

Vul hier de eerste twee letters van de voornaam van je moeder in. Bijvoorbeeld: Sophie -> SO
_____

Vul hier je geboortedag in. Bijvoorbeeld: 06
_____

Vul hier je geboortemaand in. Bijvoorbeeld: Januari -> 01
_____

Q2 Wat is je geslacht?

Mannelijk

Vrouwelijk

Non-binair/derde geslacht

Ik zeg dat liever niet

Q3 In welk jaar ben je geboren?

2004

2005

2006

2007

2008

2009

2010

Een ander jaar, namelijk:
_____

Q4 In welke school zit je?

Humaniora Kindsheid Jesu Hasselt
Atheneum Martinus Bilzen
Bovenbouw Sint-Michiel Leopoldsburg
WICO Campus Neerpelt
IKSO – Instituut voor Katholiek Secundair Onderwijs
Een andere school, namelijk:
_____

Q5 In welke jaar zit je?

3de middelbaar
4de middelbaar
5de middelbaar
6de middelbaar
7de middelbaar
Een ander jaar, namelijk:
_____

Q6 In welk studiedomein zit je?

Doorstroomfinaliteit (vroegere ASO)
Dubbele finaliteit (vroegere TSO en KSO)
Arbeidsmarktfinaliteit (vroegere BSO)
Weet ik niet

Q7 Met welk vervoermiddel verplaats je je het vaakst van thuis naar school? Gelieve slechts één bolletje aan te duiden. Als je bijvoorbeeld eerst met de fiets naar de bushalte rijdt en dan de bus neemt, duidt dan het vervoermiddel aan waarmee je het langst onderweg bent.

- Te voet
- Met de fiets
- Met de bromfiets
- Met de bus
- Met de trein
- Met de auto als passagier
- Met de auto als bestuurder
- Andere, namelijk:
  _____

Q8 Heb je een rijbewijs?

- Nee
- Ja, ik heb een voorlopig rijbewijs
- Ja, ik heb een definitief rijbewijs

Deze vraag weergeven:

If Q8 = Ja, ik heb een voorlopig rijbewijs

Or Q8 = Ja, ik heb een definitief rijbewijs

Q9 Welk (voorlopig) rijbewijs bezit je? Je mag meerdere antwoorden aanduiden.

- Categorie AM: bromfiets met een maximumsnelheid tussen 25 en 45 km/u
- Categorie A: motorfietsen
- Categorie B: wagens
- Categorie G: landbouwvoertuigen

Q10 Hoe vaak moet je op de weg van/naar school een spooroverweg oversteken?

- Nooit
- Maximaal 1 keer per maand
- Maximaal 1 keer per week
- Meer dan 1 keer per week
- Elke dag of bijna elke dag

Deze vraag weergeven:

If Q10 != Nooit

Q11 Met welk vervoermiddel moet je dan de spooroverweg oversteken? Je mag meerdere antwoorden aanduiden.

- Te voet
- Met de fiets
- Met de bromfiets
- Met de bus
- Met de auto als passagier
- Met de auto als bestuurder
- Andere, namelijk:

_____

Q12 Hoe vaak moet je op andere momenten (bijv. voor een hobby) een spooroverweg oversteken?

- Nooit
- Maximaal 1 keer per maand
- Maximaal 1 keer per week
- Meer dan 1 keer per week
- Elke dag of bijna elke dag

Deze vraag weergeven:

If Q12 != Nooit

Q13 Met welk vervoermiddel moet je dan de spooroverweg oversteken? Je mag meerdere antwoorden aanduiden.

Te voet

Met de fiets

Met de bromfiets

Met de bus

Met de auto als passagier

Met de auto als bestuurder

Andere, namelijk:
_____

Q14 Woon je in de buurt van een spooroverweg (binnen een straal van een kilometer, maximum 15 minuten wandelen of 5 minuten fietsen) ?

Ja

Nee

Weet ik niet

Q15 Heb je al ooit een verkeersboete gekregen?

Nee, nog nooit

Ja, maar slechts één keer

Ja, al meerdere keren

Deze vraag weergeven:

If Q15 != Nee, nog nooit

Q16 Waarvoor kreeg je al eens een boete? Je mag meerdere antwoorden aanduiden.

Te snel rijden

Zonder handen fietsen

Sporen oversteken op een plaats waar dit niet mocht

De weg oversteken op een plaats waar dit niet mocht

Door het rode licht rijden of wandelen

Rijden onder invloed van alcohol of drugs

Een spoorweg oversteken wanneer de slagbomen niet volledig open waren en de signalisatie actief was

Andere, namelijk:
_____

Q17 Ben je al ooit betrokken geweest in een verkeersongeval?

Nee, nog nooit

Ja, 1 keer

Ja, 2 keer

Ja, meer dan 2 keer

Deze vraag weergeven:

If Q17 != Nee, nog nooit

Q18 Waar vond dit verkeersongeval plaats? (meerdere antwoorden mogelijk indien meer dan 1 verkeersongeval)

Op een rotonde

Op een wegsegment

Aan een spooroverweg

Op een kruispunt met verkeerlichten

Op een kruispunt zonder verkeerslichten

Andere, namelijk:
_____

Q19a Hieronder vind je enkele uitspraken over verkeersveiligheid. Duid het antwoord aan dat het best overeenkomt met jouw mening.

	Helemaal niet mee eens	Eerder niet mee eens	Evenveel mee eens als niet mee eens	Eerder mee eens	Helemaal mee eens
Een fietshelm kan ernstige verwondingen voorkomen.					
Als ik me houd aan verkeersregels voel ik me veiliger.					
Als je bij het oversteken gebruik maakt van een zebrapad, heb je minder snel een verkeersongeval.					
Als je een fluorescerend vestje draagt, merken anderen je sneller op.					
Als ik voldoende afstand houd tijdens het fietsen, kan ik beter reageren op onverwachte gebeurtenissen.					
Een fietshelm dragen ziet er belachelijk uit.					
Een veiligheidsgordel dragen vind ik nogal vervelend.					

Q19b Hieronder vind je enkele uitspraken over verkeersveiligheid. Duid het antwoord aan dat het best overeenkomt met jouw mening.

	Helemaal niet mee eens	Eerder niet mee eens	Evenveel mee eens als niet mee eens	Eerder mee eens	Helemaal mee eens
Steeds opletten voor anderen in het verkeer is vermoeiend.					
Altijd de verkeersregels respecteren is saai.					
Door een fietshelm zie je het verkeer rondom minder goed.					
Gewoon de straat oversteken zonder te kijken gaat vlotter.					
Muziek beluisteren tijdens het fietsen is best rustgevend.					
Snel autorijden lijkt me best spannend.					
Snel rijden zorgt ervoor dat je vroeger op je bestemming geraakt.					

Q19c Hieronder vind je enkele uitspraken over verkeersveiligheid. Duid het antwoord aan dat het best overeenkomt met jouw mening.

	Helemaal niet mee eens	Eerder niet mee eens	Evenveel mee eens als niet mee eens	Eerder mee eens	Helemaal mee eens
Naast elkaar fietsen is leuker dan achter elkaar.					
Alcohol in het verkeer is dom.					
Als je telefoneert tijdens het fietsen, ben je minder aandachtig.					
Door het rood licht fietsen is onverantwoord.					
Meerijden met iemand onder invloed van drugs is gevaarlijk.					
Geen voorrang geven is egoïstisch.					
Snel fietsen geeft een kick.					

Q19d Hieronder vind je enkele uitspraken over verkeersveiligheid. Duid het antwoord aan dat het best overeenkomt met jouw mening.

	Helemaal niet mee eens	Eerder niet mee eens	Evenveel mee eens als niet mee eens	Eerder mee eens	Helemaal mee eens
Als je telefoneert tijdens het autorijden, reageer je trager.					
Met de auto door het rood licht rijden is levensgevaarlijk.					
Mijn vrienden dragen meestal een helm tijdens het fietsen.					
De meeste weggebruikers houden zich aan de verkeersregels.					
Mijn leeftijdsgenoten fietsen meestal niet gevaarlijk of agressief.					
Ik vind dat je altijd rekening moet houden met andere weggebruikers.					
In het verkeer moet je geduld kunnen hebben met anderen.					

Q19e Hieronder vind je enkele uitspraken over verkeersveiligheid. Duid het antwoord aan dat het best overeenkomt met jouw mening.

	Helemaal niet mee eens	Eerder niet mee eens	Evenveel mee eens als niet mee eens	Eerder mee eens	Helemaal mee eens
Mijn vrienden vinden dat je onder invloed van alcohol niet mag autorijden.					
De meeste mensen die ik ken vinden dat je gebruik moet maken van het zebrapad om over te steken.					
De meeste leeftijdsgenoten vinden dat je een fluorescerend vestje moet dragen op de fiets.					
De meeste mensen gebruiken hun smartphone niet tijdens het fietsen.					
Mijn ouders vinden het goed dat ik een veiligheidsgordel draag.					
Volgens mijn vrienden is fietsen onder invloed van alcohol dom.					
Ik vind het helemaal niet moeilijk om rekening te houden met andere weggebruikers.					

Q19f Hieronder vind je enkele uitspraken over verkeersveiligheid. Duid het antwoord aan dat het best overeenkomt met jouw mening.

	Helemaal niet mee eens	Eerder niet mee eens	Evenveel mee eens als niet mee eens	Eerder mee eens	Helemaal mee eens
Ik kan mij aan de verkeersregels houden, ook als alle andere weggebruikers dit niet doen.					
Veilig rijden is een kwestie van karakter. Wie ervoor kiest, kan het.					
Als ik op stap ga drink ik een pintje, ook al moet ik nog fietsen.					
Als ik gehaast ben, gebeurt het wel eens dat ik te snel rijd.					
Als ik plots hard moet remmen, is dit meestal de schuld van iemand anders.					
Als ik op een kruispunt geen ander verkeer zie, dan rijd ik bij oranje gewoon door.					
Als alle andere voetgangers oversteken bij een rood licht, blijf ik niet als enige staan.					

Q19g Hieronder vind je enkele uitspraken over verkeersveiligheid. Duid het antwoord aan dat het best overeenkomt met jouw mening.

	Helemaal niet mee eens	Eerder niet mee eens	Evenveel mee eens als niet mee eens	Eerder mee eens	Helemaal mee eens
Als ik naar de winkel om de hoek ga, vind ik een veiligheidsgordel niet nodig.					
Als ik met mijn vrienden wegga, zet ik liever geen fietshelm op.					
Als je met de auto op stap gaat kan een pintje of twee geen kwaad.					
Ik ben van plan om in de toekomst mijn helm op te zetten als ik fiets.					
Ik ben van plan om me in de toekomst aan de verkeersregels te houden.					
Ik ben van plan om in de toekomst rekening te houden met andere weggebruikers.					
Ik ben van plan om in de toekomst niet sneller te rijden dan toegestaan.					

Q19h Hieronder vind je enkele uitspraken over verkeersveiligheid. Duid het antwoord aan dat het best overeenkomt met jouw mening.

	Helemaal niet mee eens	Eerder niet mee eens	Evenveel mee eens als niet mee eens	Eerder mee eens	Helemaal mee eens
Ik ben van plan om in de toekomst mijn veiligheidsgordel te dragen.					
Op de fiets zet ik meestal mijn helm op.					
Ik houd me meestal wel aan de verkeersregels.					
In het verkeer houd ik meestal rekening met andere weggebruikers.					
Ik rijd meestal niet sneller dan toegestaan.					
Ik draag meestal mijn veiligheidsgordel.					

Q20 Kan je voor elk van de gedragingen in de volgende lijst aangeven in welke mate je dit type gedrag gevaarlijk vindt?

	Helemaal niet gevaarlijk	Niet echt gevaarlijk	Noch gevaarlijk, noch niet gevaarlijk	Gevaarlijk	Heel gevaarlijk
Een spooroverweg oversteken wanneer de rode lichten knipperen en de slagbomen volledig dicht zijn					
Een spooroverweg oversteken zonder goed naar de signalisatie gekeken te hebben					
Een spooroverweg oversteken wanneer het zicht beperkt is door slechte weersomstandigheden (bvb. door mist of regen)					
Een spooroverweg oversteken wanneer de rode lichten knipperen, maar voordat de slagbomen volledig dicht zijn					
Een spooroverweg oversteken wanneer er net een trein gepasseerd is, maar voordat de slagbomen volledig open zijn en de rode lichten nog knipperen					
Een spooroverweg oversteken wanneer het gehoor verhinderd is (bvb. door het luisteren naar muziek via een hoofdtelefoon)					
Een spooroverweg oversteken terwijl je op je smartphone bezig bent					

Q21 Hoe waarschijnlijk is het dat je volgende gedragingen in de toekomst zal doen?

	Zeer on-waarschijnlijk	Onwaar-schijnlijk	Noch waarschijnlijk noch onwaarschijnlijk	Waar-schijnlijk	Zeer waar-schijnlijk
Een spooroverweg oversteken wanneer de rode lichten knipperen en de slagbomen volledig dicht zijn					
Een spooroverweg oversteken zonder goed naar de signalisatie gekeken te hebben					
Een spooroverweg oversteken wanneer het zicht beperkt is door slechte weersomstandigheden (bvb. door mist of regen)					
Een spooroverweg oversteken wanneer de rode lichten knipperen, maar voordat de slagbomen volledig dicht zijn					
Een spooroverweg oversteken wanneer er net een trein gepasseerd is, maar voordat de slagbomen volledig open zijn en de rode lichten nog knipperen					
Een spooroverweg oversteken wanneer het gehoor verhinderd is (bvb. door het luisteren naar muziek via een hoofdtelefoon)					
Een spooroverweg oversteken terwijl je op je smartphone bezig bent					

Q22 Hoe vaak heb je in de afgelopen 6 maanden volgende gedragingen gesteld?

	Zelden tot nooit	Maximaal 1 keer per 2 maanden	Maximaal 1 keer per maand	Maximaal 1 keer per week	Meer dan 1 keer per week
Een spooroverweg oversteken wanneer de rode lichten knipperen en de slagbomen volledig dicht zijn					
Een spooroverweg oversteken zonder goed naar de signalisatie gekeken te hebben					
Een spooroverweg oversteken wanneer het zicht beperkt is door slechte weersomstandigheden (bvb. door mist of regen)					
Een spooroverweg oversteken wanneer de rode lichten knipperen, maar voordat de slagbomen volledig dicht zijn					
Een spooroverweg oversteken wanneer er net een trein gepasseerd is, maar voordat de slagbomen volledig open zijn en de rode lichten nog knipperen					
Een spooroverweg oversteken wanneer het gehoor verhinderd is (bvb. door het luisteren naar muziek via een hoofdtelefoon)					
Een spooroverweg oversteken terwijl je op je smartphone bezig bent					

Q23 Vergeleken met je leeftijdsgenoten van hetzelfde geslacht, hoe scoor je volgens jou op de volgende vaardigheden?

	Veel slechter	Slechter	Even Slecht / Goed	Beter	Veel beter
Verkeersregels aan spooroverwegen correct toepassen					
Inzicht in verkeerssituaties aan spooroverwegen					
Kennis van de verkeersregels aan spooroverwegen					
Weerstaan aan groepsdruk					
Weerstand bieden aan de verleiding tot risicovol gedrag					

Annexe 2: Additional questions for process evaluation

Q4 Woonde je onlangs op school een getuigenis bij van een slachtoffer van een verkeersongeval met een trein?

Ja

Nee

Deze vraag weergeven:

If Q4 = Ja

Q5 Woonde je deze getuigenis bij in de vorm van een lezing in het auditorium of in de vorm van korte video's?

In de vorm van een lezing in het auditorium

In de vorm van korte video's

Geen van beide, maar: _____

Deze vraag weergeven:

If Q5 = In de vorm van korte video's

Q6 Welke video's van deze getuigenis heb je gezien? Er zijn meerdere antwoorden mogelijk.

De eerste, met de schets van het ongeval

De tweede, over de tijd in het ziekenhuis en de revalidatie

De derde, over het leven na de revalidatie

Geen van de drie

Ik weet het niet

Deze vraag weergeven:

If Q5 = In de vorm van een lezing in het auditorium

Q7 Duid aan in hoeverre je het eens bent met onderstaande stellingen over de getuigenis

	Helemaal mee eens	Eerder mee eens	Evenveel mee eens als niet mee eens	Eerder niet mee eens	Helemaal niet mee eens
Ik vond het verhaal van de getuige geloofwaardig.					
Ik vond het verhaal van de getuige nuttig.					
Ik vond het verhaal van de getuige interessant.					
Ik vond het verhaal van de getuige belangrijk.					
Ik vond het verhaal van de getuige informatief.					
Ik vond het verhaal van de getuige schokkend.					
Ik zou de getuigenis liever via video hebben gevolgd dan live.					

Deze vraag weergeven:

If Q5 = In de vorm van korte video's

Q8 Duid aan in hoeverre je het eens bent met onderstaande stellingen over de getuigenis

	Helemaal mee eens	Eerder mee eens	Evenveel mee eens als niet mee eens	Eerder niet mee eens	Helemaal niet mee eens
Ik vond het verhaal van de getuige geloofwaardig.					
Ik vond het verhaal van de getuige nuttig.					
Ik vond het verhaal van de getuige interessant.					
Ik vond het verhaal van de getuige belangrijk.					
Ik vond het verhaal van de getuige informatief.					
Ik vond het verhaal van de getuige schokkend.					
Ik zou de getuigenis liever live hebben bijgewoond dan via video's.					

Deze vraag weergeven:

If Q4 = Ja

Q9 Duid aan in hoeverre je het eens bent met onderstaande stellingen over de getuigenis

	Helemaal mee eens	Eerder mee eens	Evenveel mee eens als niet mee eens	Eerder niet mee eens	Helemaal niet mee eens
Ik vond het verhaal van de getuige onrustwekkend.					
Ik vond het verhaal van de getuige beangstigend.					
Ik vond deze getuigenis eerder schokkend dan leerrijk.					
Ik vond de getuige zeer goed.					
Ik vond de getuige duidelijk en goed verstaanbaar.					

Deze vraag weergeven:

If Q5 = In de vorm van een lezing in het auditorium

Q10 Wat vond je van de duurtijd van de getuigenis?

Ik vond de duurtijd van ongeveer 30 minuten oké

Ik vond de duurtijd van ongeveer 30 minuten te lang

Ik vond de duurtijd van ongeveer 30 minuten te kort

Deze vraag weergeven:

If Q5 = In de vorm van korte video's

Q11 Wat vond je van de duurtijd van de getuigenis?

Ik vond de duurtijd van 3 keer ongeveer 10 minuten oké

Ik vond de duurtijd van 3 keer ongeveer 10 minuten te lang

Ik vond de duurtijd van 3 keer ongeveer 10 minuten te kort

Deze vraag weergeven:

If Q4 = Ja

Q12 Wat is je het meest bijgebleven van de getuigenis?

_____

Deze vraag weergeven:

If Q4 = Ja

Q13 Wat zou je toevoegen/aanpassen aan deze getuigenis?

_____

Annexe 3: Letter of consent for parents

Informatiebrief studie over risicogedrag aan spooroverwegen

Beste ouder

Mijn naam is Ronald Wolfs en ik studeer Mobiliteitswetenschappen aan de Universiteit Hasselt. In het kader van mijn masterproef voer ik een studie uit naar het gedrag van jongeren van 15 tot 18 jaar nabij spooroverwegen. Risicogedrag in de buurt van overwegen is een groot probleem in België. Volgens de gegevens van Infrabel, verloren tussen 2012 en 2022 55 mensen het leven en raakten 41 ernstig gewond bij 6.858 overwegincidenten. Naast de fysieke en mentale impact op de slachtoffers, hun families, vrienden en het spoorwegpersoneel, zijn overwegincidenten ook de oorzaak van aanzienlijke vertragingen op het Belgische spoorwegnet.

Het doel van deze studie is dan ook om te achterhalen hoe het risicogedrag aan spooroverwegen kan verminderd worden. Dit gebeurt aan de hand van de getuigenis van een slachtoffer van een ongeval met een trein. Daarnaast zullen de deelnemers zowel voor als na de getuigenis een vragenlijst invullen over hun attitudes met betrekking tot risicogedrag aan spooroverwegen en hun eigen gedrag in deze omgeving.

Weet dat bij toestemming:

- de deelname van uw kind vrijwillig is en uw kind het recht heeft om met het onderzoek te stoppen zonder een reden hiervoor op te geven.

- de anonieme resultaten van deze test gedurende 2 jaar worden bijgehouden en na deze periode verwijderd zullen worden.

- indien u vragen heeft, contact kan opnemen via ronald.wolfs@student.uhasselt.be.

- voor eventuele klachten of andere bezorgdheden omtrent de verwerking van persoonsgegevens u contact kan opnemen met de functionaris voor gegevensbescherming/data protection officer van de UHasselt: dpo@uhasselt.be

Indien u toch niet wenst dat uw kind zal deelnemen aan deze studie, dan kan u een mail sturen naar ronald.wolfs@student.uhasselt.be. Er wordt dan zeker met uw bezorgdheden rekening gehouden.?

Met vriendelijke groet,

Ronald Wolfs

Student Master Mobiliteitswetenschappen UHasselt