

# Let's Talk About Helmets?! Using design research to make helmets cool again for 12-17 year olds



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## ABSTRACT

The Netherlands is known for its cycling culture, characterized by an extensive cycling infrastructure, focussing heavily on road safety. And is known for the highest number of bicycles per capita worldwide. However, the country also has the lowest rate of bicycle helmet usage, with only 1% of adolescents aged 12–17 regularly wearing helmets. This paper investigates how design research can uncover the reasons behind this low adoption rate and evaluate the potential of an awareness campaign to increase helmet use within this demographic.

The study adopts a field-like experimental approach, focusing on the initial stage of behavioural change. A comparative analysis was conducted in two settings, the school and home environments, through an awareness workshop that combined informing, reflecting, and co-design methodologies. The results indicate that the school environment is more effective in promoting awareness, as it aligns better with existing campaigns and the preferred modes of communication for the target group.

Additionally, the findings highlight three key features that could inform future helmet designs. This paper concludes by emphasizing the need for further research to explore the development of broader campaigns aimed at fostering voluntary helmet use among adolescents.

## KEYWORDS

Design research, behavioural change, workshop development, strategic campaigns, bicycle helmet, future workshop, co-design

## INTRODUCTION

Cycling is an integral part of Dutch culture, with bicycles serving as a main mode of transportation for millions of people every day. The Netherlands has an extensive cycling infrastructure, not only promoting cycling itself, but it also contributes to a strong perception of safety among cyclists [25]. Despite these positive aspects of cycling, helmet usage remains remarkably low. In total only 5% of Dutch male cyclists and 3% of female cyclists wears a bicycle helmet [1]. This percentage is particularly among children aged 12 to 17 which is only 1%. This demographic represents a critical age group, as they often navigate increasingly complex traffic situations, ride at higher speeds on e-bikes or fat bikes and are statistically more likely to engage in risky behaviours compared to younger children or adults [23]

Artsen voor veilig fietsen “Doctors for safe cycling” is one of the loudest voices, when it comes to participatory helmet usage. Backing their argument with experiences from the field, their position as doctor is at the forefront of accidents. They see that for every severe cycling accident 33% has head or brain damage [12]. This percentage is even 60% for the age-group 0–29.

One of the key reasons for this low adoption rate is the cultural perception of helmets. Helmets are often associated with inconvenience, uncool aesthetics, and a perceived lack of necessity due to the safety of Dutch cycling infrastructure [20]. However, as the popularity of high-speed e-bikes and fat bikes rises, so does the risk of severe accidents among young cyclists [21,22]

This research report explores how design can find strategies to increase helmet usage among teenagers in the Netherlands. Starting with the understanding why individuals prefer to not wear a helmet and finding similar cases and their approach. Furthermore, this report explores different possible solutions, and finally reports on a designed workshop. The research aims to propose steps and recommendations for the development of a future campaign in the Netherlands to increase the rate of bicycle helmet users.

RELATED WORKS

*Why no helmet?*

There are several reasons not to wear a helmet and has been a topic of study for several years. Throughout the years reasoning behind why people do not wear helmets has stayed somewhat the same. In an American study from Finoff e.a.[2], 2001 some reasons were given, like helmets are: uncomfortable, hot, annoying, not needed, and I do not have one. Furthermore, adolescents and children highly consider bullying and the social stigma behind helmet use, finally, there are clear indications that people do not find themselves at risk.

A survey study performed by Villamor et al. [4] in 2008 focussed on an older target group, in total 258 parents. This group reported a similar response when asked why they do not wear a helmet. With the most frequent answer of 40% being 'I have never thought of wearing a helmet', followed by 'Poor appearance' 28%. Furthermore, most respondents (69% professional), (48% personal) have had experience with bicycle accidents. However, the majority of 96% report that this did not change their behaviour.

More recent work from the KU Leuven [3] and Piotrowski [5] received similar comments on why adolescents dislike wearing a helmet reinforces the idea of peer pressure and a cultural stigma play a large role. Adolescents fear that while wearing helmets their friends will make fun of them. The respondents know that a helmet add to the safety, yet the benefits do not counter the perceived 'coolness'. These papers acknowledge the influence of parents, if parents show helmet wearing behaviour, their children are more likely to accept a helmet.

In short, adolescents do not want to wear helmets this comes from a combination of social pressures, physical discomfort, and a misjudgement of risks. A Fear of negative peer judgment and bullying leads to conforming to norms that favour appearance. Furthermore, discomfort related to bad fit, sweating, and concerns about appearance further reinforces these negative attitudes. Additionally, adolescents underestimate the dangers of cycling without a helmet, perceiving severe accidents as unlikely. This means that these factors together create significant barriers to helmet adoption, highlighting that designed interventions should address both the social and physical challenges associated with helmet use.

These findings all contribute towards an empathy map, which is a crucial part of understanding the problem. Such a map is specifically for a problem concerning behavioural problems. Figure 1 below shows the empathy map, and it can be found in appendix in its full size, including a stakeholder map. This map highlights the contradictory behaviour, and that normalizing bicycle helmets is the key towards usage.

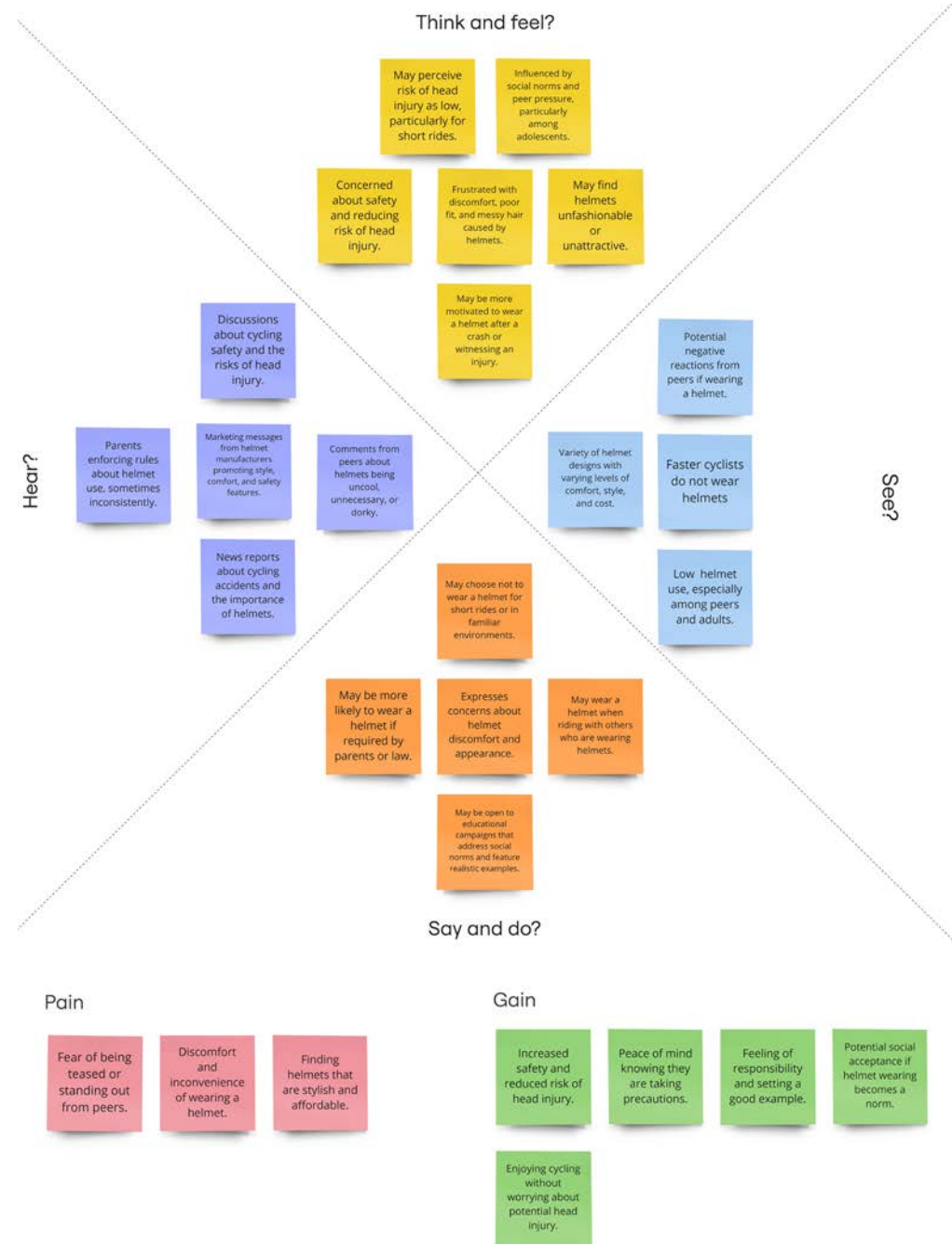


FIG01. Empathy map

### The Danish case

The debate of helmet mandate is not something exclusively to the Netherlands. Several countries have had mandating laws in effect or highly advised it to the public. The Dutch government actively tries to not mandate helmets [27], as they argue that enforcing bicycle helmet rules will cost the care system more, as more people will take an alternative based on research [28].

A similar case to the Netherlands is Denmark, where helmet usage was around 6% in 2004. The country managed to increase this percentage towards 50% in 2022 [24,26], without helmet legislation. In addition, the percentage amongst school children rose from 33% in 2004 to 79% in 2022. Denmark has a similar cycling culture as it has one of the most cyclists per capita [7], and that makes it a perfect case as a source of inspiration.

The Danish approach heavily relied on a combination of 3 main elements [8]. Figure 2 shows how these elements together have led to a successful outcome.

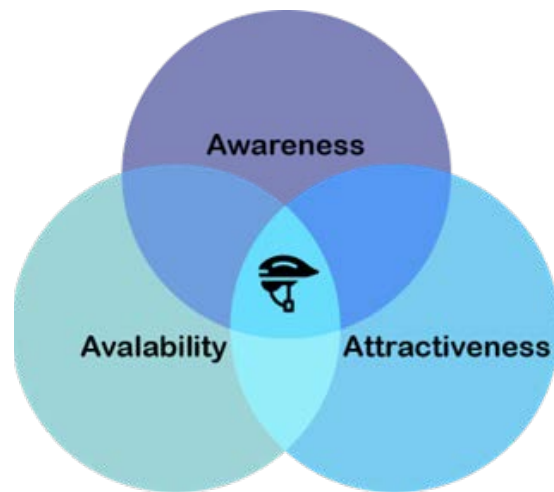


FIG02. Three identified elements Denmark case.

- **Awareness** – informing about the injury reducing effect of bicycle helmets
- **Availability** – making bicycle helmets easy to get and cheap to buy
- **Attractiveness** – improving design and working on making it a normal, sensible and attractive thing to wear a helmet, including being a role model for others, especially for children and grandchildren

Since this process started in 2004, the design bicycle helmets have developed drastically. The helmets used to be heavy, ugly, and not much variety in design. Today's standards are much lighter more variety in design, which is partially due to Denmark's pressure. The Danish approach can be seen as a process, and not one singular act or action that changed the behaviour of millions. Denmark continuously invests in providing educational materials, and helmets for schools. Where they combine their bicycle exam with extra exposure to helmets. Suggesting wearing a helmet is the smartest choice for the exam.

In 2009 Denmark challenged designers to design cheap and limited-edition helmets, which were sold at supermarket. In addition, a nationwide design competition was created, where individuals could send in their design. This initiative got widespread media attention. From 2014–2020 Denmark launched a campaign called 'annoying parents' portraying parents as the problem, challenging them to talk about the topic, make agreements and most importantly wear a helmet yourself. In 2014 already 46% of the target group reported to have had a talk about helmets in their home [9]. Finally, a campaign in 2021 known as the Viking campaign. This campaign focussed on male adult cyclists. This campaign ridicules the excuses we all make, which are not logically. Reportedly 74% of the target group found the campaign appealing to them and 34% wanted to buy a helmet afterwards [10]. In conclusion these campaigns all targeted different groups and have different levels of intensity. One thing is clear throughout these campaigns, the depiction of helmets is normal, and people not wearing helmets are portrayed as the odd ones out. Denmark used a consistent and constant narrative for the bicycle helmet to increase the voluntary percentage of helmet wearers in around 20 years.

## METHODS

This research project can be described as two phases, where the first phase of the project aimed to create clear understanding of the problem statement and the design field. The second phase of the project focused on finding a fitting solution that are in line with the findings of the first phase of the project, where a field [11] like approach is used to conduct and document research. Within this approach several design probes were created and tested with peers and fellow students, quick and early iterations only consisted of conversations, and eventually a more robust prototype is tested. Through a field methodology the prototype and design research are process driven, meaning its research contribution can be seen as an exploration of possibilities, in combination with the scoping of the design space.

## DESIGN PROCESS

For this project a double diamond design process was used. Figure 3 shows a rough flow of the project in separate phases. The first phase mainly focuses on defining the scope, finding several musts and pointers of success. The second phase mainly focuses on developing a fitting solution according to findings from the first phase. The third and final phase is the further development and testing of the prototype/envisioned solution. This phase is left open, since a lab like approach is used, and findings from this project mainly result in recommendations.



FIG03. Design research process



The project had a quite open design brief with a clear problem statement. How do we make helmets more popular for ages 12-17? A consideration to make helmets more popular might directly be to simply redesign a helmet, there must be a flaw in its design, right? Though this might be valid for some countries, the Netherlands is simply not a fitting context for a new helmet design.

In this project phase, a substantial amount of time was spent on discovering the project scope. This project is based in the Netherlands, and this already gives several clear design boundaries. Through literature reviews, on several topics, the boundaries are quite clear. Studies from SWOV [12], mare [13], and other researchers show an already extensive amount of knowledge on the effectiveness of helmets, both in the Netherlands and other countries. In addition, several studies researched limitations to helmets, like reasons to not wear one, and what distinguishes a good from a bad helmet.

Furthermore, expert interviews with trauma scientists, ANWB and Veilig Verkeer acknowledged that the Netherlands is an exceptional case, where enforcing helmets will be counterproductive. All parties involved acknowledge the importance of helmets and say wearing one is a good endeavour. Yet ANWB and veilig verkeer Nederland clearly state this is a choice and have no direct campaigns for promoting helmet use. According to them showing some helmets in advertisements is the most they can do for now.

Scoping out the design boundaries, finding expert opinions, and discovering similar cases, lead to a well-defined direction, and current standing of the Netherlands in a shift towards more helmets. The Dutch make the argument for helmets but are reluctant to put plans in action and ideas in motion. A great example is the work of D&B [D&B] where they have scoped out a phased plan facilitating the behavioural change towards a society where helmets are the norm. In figure 4 an identified phased approach is shown, where it is emphasised that a good basis is needed before moving to the next phase, meaning there is a need for normalisation.



**FIG04.** Phased approach for succes, where the Netherlands is still in the first phase

#### *From problem statement to awareness*

With the conclusion of the first phase, the research question was revisited. How do we make helmets cool for the age group 12-17?

For now, the assumption is made that the design of the bicycle helmet itself is are not flawed, they can always improve. But findings about public opinion suggest that the taboo on the helmet, which is the case in the Netherlands, weights more in the low adaptation. Awareness can improve this by in some manner showing people their own behaviour, what option they have or what a helmet adds to their life. This led to the definition of the how might we question. How might we create more awareness of helmet use and options amongst children aged 12-17 in the Netherlands trough an awareness campaign?

During the second phase of this project several ideas were formed. All contributing towards the creation of awareness, as a part of a campaign. Ideas such as experiencing an environment where everyone wears a helmet, create more risk awareness, and co-design using generative AI. An overview of these can be found in appendix C. These ideas are backed by some suggestions made in a research report from MARE [13] and D&B [15], where the researchers argued that feasibility and desirability of several interventions. Trough ideation and quick validation with peers several one idea was worked out in more detail, the awareness workshop. A workshop can easily be part of a bigger campaign, and directly tackle a target group.

The third and final phase of the project focussed on refining the workshop, by performing it and collecting feedback, and experiences. Firstly, by conducting the workshop on more several peers that are close, and afterwards going to a high-school and several homes to perform the workshop in two different environments.

This workshop is created with one main reason, that is to create awareness of bicycle helmets amongst the participants, a second outcome are features or design directions for future helmets. The workshop should be seen as an introduction to the topic bicycle helmets, for many of this target group the first moments of conversation about bicycle helmets.

A great inspiration towards reaching this workshop were some examples of already existing workshops, especially applied for awareness creation. One of these is split the risk [6], which is targeted at high- and preschool students in the Netherlands. In this workshop students learned about their flawed risk perception by doing a little experiment and filling in a questionnaire. It is not only this workshop that is part of a greater initiative in the Netherlands, many more workshops, guest lectures and other activities that are organised a sold to high schools [16]. These workshops are sold to totally traffic, indicating a market.

The workshop is set up in 4 distinct parts. The first part is an introduction which consists of a worksheet. The second part is an information session, where the actual topic is introduced, the third part is a co-creation workshop where participants are challenged to draw their helmet of the future. And the final part is a reflective worksheet, concluding the workshop with an invite to think about helmets more often. The entire worksheet can be found in appendix d, and the script in appendix e.

The first part of the workshop is not simply a worksheet to introduce the topic of helmets and find out what the participants think about them. The first set of questions like: Do you cycle to school, or other places? And do you wear a helmet why or why not? Invite the participant to look at their own behaviour, and how others perceive you wearing a helmet. The final set of questions focus on activity related and physical reasons why people do not want to wear a helmet.

The questions have been crafted in such a manner that it builds up towards a moment of realisation where the weird paradox of safety, the excuse of it does not happen to me, are tested and exposed. The main goal of these questions is to reflectively tap into the main reasons why people do not wear a helmet and invite to critically think about their own behaviour. Additionally, the questions are roughly based on several presented in [2]. A second result of this worksheet is a method to quantify the behaviour, given the thought behind these questions, an organiser of a workshop can collect these opinions as a means of data collection. This is similar how Veilig verkeer Nederland uses some of their 'initiatives' as a means of data collection. This again adds to the feasibility and marketability of the workshop.

The second part of the workshop is designed to inform and shift participant perspective and provide the first steps of awareness. Part of the presentation there are several slides showing some of the shift's sports have made when it comes to helmet adaptation. Highlighting that the goal of the sport is not to need the helmet, but rather there as a safety mechanism. This demonstrates how normalisation and, in some cases, mandating can normalize helmet wearing, preparing the participant to critically think about their own helmet wearing behaviour.

The final part of the presentation introduces several helmet designs, several which are well known, and others that are more futuristic or embedded technologies. This highlights the options you have, but also plays a bit into one of the most common reasons to not wear a helmet. Namely the fact that a helmet is impractical, ugly, and not considered stylish.

The third part of the workshop is a co-creation session which prompts participants to think about the desirability and attractiveness of the helmet. At the end of the presentation helmets are shown, which act as a design probe or trigger. Addition-

ally, several prompts are given to the participants, which are simple questions that help them for brainstorming. The co-creation starts with 5 minutes of brainstorming, participants are invited to think about these prompts, think out loud and shoot ideas.

Afterwards there is 15-20 minutes of sketching. Where the participants are encouraged to generate as many sketches as possible. There is a connection between sketching and retaining knowledge, meaning this sketching will increase the memorability of the entire session [17]. An additional outcome of the sketching session is a list of key features a helmet may have. Co-creation is a great method to quickly gather user feedback and ideas [19].

It allows us to create overview of what participants find important with helmets. This offers later opportunities for value creation. Gathering information of how participants look at bicycle helmets, and their own designs can guide designers to design for attractiveness of the helmet. This means that the entirety of the workshop can be seen a workshop that introduces awareness and finds points of interest in terms of attractiveness.

The final part of the workshop is a moment of critical reflection, based on their helmet design and relate it back to their own creation. This part is designed to not only measure an outcome of the workshop, but also to invite the participants to look back at their own wearing behaviour and challenge them to critically look at their design, and the concept of wearing a bicycle helmet in general.

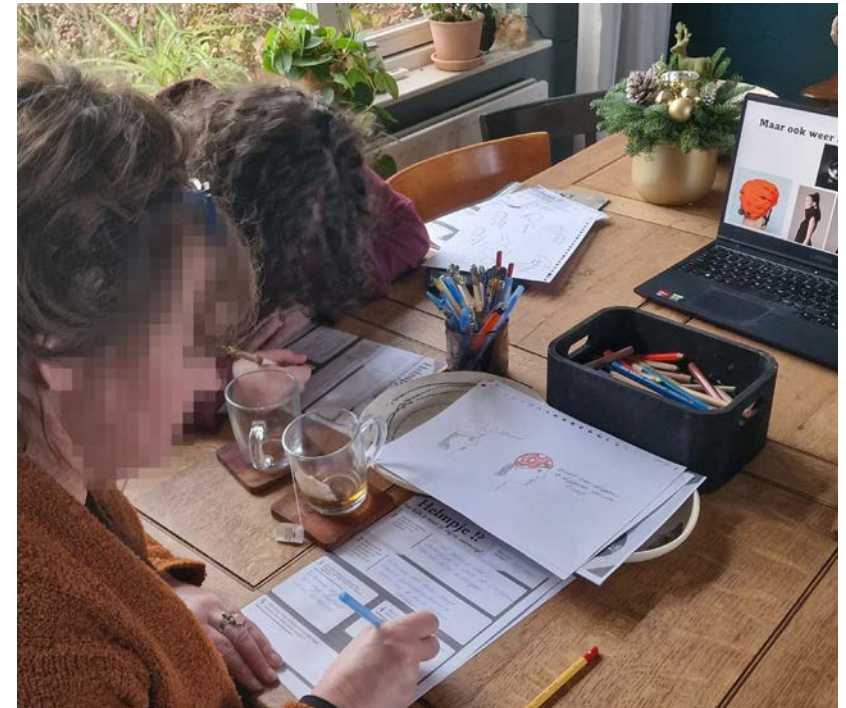


FIG05. An depiction of the workshop in a home setting

### Workshop and worksheet

Besides highlighting the contradictions in the Dutch cycling culture, and identifying which steps to take, this research also tries an intervention for the proposed target group. This research tries to list several recommendations, that help future research into a successful behavioural change and give clear indications whether the proposed workshop is a good first step in making a bicycle helmet more popular in the Netherlands.

The workshop is conducted in several sessions, one session in front of a high school class with a total of 18 students. The students were all in the age of 14-16 and are studying at VMBO. The second set of sessions are conducted with two sets of parents and children, resulting in a total of 4 participants.

Amongst students there was a small split in answers when questioned about whether a bicycle helmet adds to your safety. 10 participants reported yes, and 7 no. In the follow up 'question do you think a helmet actually make a difference?' the distribution was 11 to yes, and 7 to no. Two switched from yes to no, with the argument that a helmet does not protect everything. Two students also switched from no to yes, with the exact same argument but flipped 'at least it protects your head'. When asked if they think there is a difference between wearing a helmet whilst cycling, and skiing and skating. Three reported there is no difference. Other participants argued that skiing and skating is more dangerous due to higher speed and more chances to fall.

One of the final questions of the worksheet was, what have you learned during this workshop. From the total 20 participants, 9 reported to have learned about safety and 7 nothing at all. Other answers were about the options and the fact that we do not wear that many helmets. When the workshop is performed with parents and children together all children all participants reported similar answers in terms of safety. They all agree that a helmets added benefit is safety and that it will make a difference in an accident.

Several students had a hard time coping to the topic of bicycle helmets. As one said 'Waarom zou ik een helm ontwerpen als ik er toch nooit eentje draag' Translated: Why should I design a helmet when I never wear one. This again reinforces the need for such a workshop, participants simply do not see themselves wearing a helmet, such options are alien to them. As already expected, the overall reception of the topic, lets design a bicycle helmet was very low. It might be since this age group tends overestimate themselves, and really fall in the 'I am better than the others' attitude, which is one of the biggest reasons to not wear a helmet.

### Helmet features

A second outcome of this workshop are features of helmets end users might want. Of course, these features are a result of top-level ideation, meaning they should be taken with a grain of salt. But they do align with reported limitations of a helmet. Furthermore, students found it hard to forget about conventional helmet designs, they tend to stick to what they know. The appearance of a helmet is something that we all know and identify as a product that works. It is not surprising that the shape of the helmet is something that is a must, without its shape the head is not protected optimally.

There are several interesting key features from the designs to take home from the session. Image 5 shows a collage of several sketches made during the workshop. Though they are simple the sketches do give an indication what is desirable in a helmet.



FIG05. Collage of sketches made during the workshops

Three distinct desired features stick out, which are expressed in several designs. The need for personalisation, as several participants stressed the need for a helmet that fits what they find interesting, like a nice brand they identify with or features that are found on their favourite animals. The second need is the need of comfort. Several sketches made tried to tackle the limitations with comfortable wearing, trying to solve bad smells, and ruining your hair. And finally, there is a need of novelty, several participants incorporated interesting technologies such as Bluetooth speakers, vr goggles, heating or smell repellent.

In the end the design of a helmet has improved drastically over time, more and more designs have entered the market. Each design tries to target a specific user group, playing into the need for novelty and personalisation. As for the need for comfort, helmet manufacturers are trying their best to make helmets as light, cool, and hair friendly as possible. These findings only further reinstate the constant need for development in the field of helmets. The findings do suggest that better designs do not directly correlate more helmet usage in the Netherlands.

## DISCUSSION & LIMITATIONS

In the first this project some clear elements of success were defined, where the focus lied on the creation of awareness. The second phase focussed on the development of a suitable design/prototype that could facilitate this awareness and be meaningful, and easily adoptable. A solid argument can be made that the project should have focussed on combining all three elements. Though Denmark hasn't done that either, they argue that the entirety of a whole campaign should incorporate these three elements as a facilitator of success. An important note to make is that this workshop should be seen as a beginning point, similar how in the Denmark case the start was to inform the public.

The workshop might create more awareness, although this is not statistically proven, partly due to the nature of this study. During the execution of the workshop, it got quite evident that several participants reported quite low on being informed about the safety benefits, reassuring the idea that beginning with a workshop. These findings clearly back-up earlier statements that the Netherlands is still not over the beginning phase of the behavioural change. Critically looking at the three defined elements from the Danish campaign, one can argue that this workshop includes possibly all three elements, where awareness is the main target, and others are byproducts.

For this project the focus heavily relied on finding a fitting solution for the age group 12-17, and having awareness workshops is something that fits the age-group. Though these are crafted to solve and inform on different topics concerning road safety. Due to the cultural taboo around helmets, and the harsh age group, it can be argued that targeting this workshop at 12-17-year-olds is not the best fit. This age group is diverse and could be more specific. Trough experience with the workshop, there is evidence that a more suiting group might be 8th grade middle school, and 1st grade high school, narrowing down the age group to around 11-14 years.

This workshop is conducted as a one off, meaning the targeted group is exposed to the topic bicycle helmets once. They can think about it more often, but for how long does this effect last. An easy and valid argument to make, this workshop is designed to be part of a bigger campaign, and there is evidence that several bodies strategies towards more bicycle helmet campaigns already. By placing the workshop as an intervention at the beginning of creating awareness and a normalising idea of helmets, further exposure of helmets from other sources only strengthens the experience. Therefore, the workshop may be seen as a later memory that will be triggered by other exposure to helmets. Though there is no clear evidence, from anecdotal experience, participants remembered the workshop one week later when exposed to bicycle helmets. The 8th grade also has het verkeersexamen [23], the workshop can be done several weeks before, where during the exam, the option of helmets is available. By combining these together, the effects from both sessions strengthen each other over a longer period.

Finding participants for the study has been a difficult task, a total of 20 participants will not give any significant evidence, and results are only speculative. Finding a school that is interested in fascinating an experiment is not easy. When proposing something like this workshop to a school they of course need to find a reason to fit it into their educational program. For this project, almost every high school in Eindhoven was contacted, and several in Nijmegen, in addition It does not mean that in a future phase this workshop will not be adopted by any school. If a larger entity like veilig verkeer Nederland, or others will pick up on this, the topic will be more enforced upon schools.

The lack of participants makes it also near impossible to scientifically conclude anything, the setup of the study would have benefited from a more lab-like approach.

Additionally measuring longer lasting effects for an increase in awareness for a certain topic requires a longitudinal study, and not a one of as to proposed in this design research. Not to say that the result may pose a valid solution, due to the fact it is easy to spread, adapt and perform for the targeted group.

The societal challenge of this project might have been too big to work out as design research project. By eliminating the idea to re-design the helmet, a more challenging project emerged. One key must of this project is feasibility, where the solution could be easily adopted, and used by the public, further increasing the complexity. By staying true to what is possible feasible and focussing

## CONCLUSION

This project aimed to report on what is required to start a behavioural change within the Netherlands. Trough research and design several options are discovered and tested out in a field-like approach. This project aimed to find discover trough a design methodology, how this societal issue can be tackled. A direct outcome of this research is a designed awareness workshop where students are informed and creatively challenged to think and talk about helmets.

Trough a field like research and design methodology an awareness workshop is crafted. This workshop is tested on two different modes of intervention, one in a classroom setting and the other in a home setting, focussing on the two most important environments. The classroom setting workshop poses more opportunities as this is easy to combine with already existing campaigns and initiatives, further strengthening exposure and performability ensuring longer lasting effects. The workshop is a result of a trade of from desirability, feasibility, and viability.

This workshop can be adopted nationwide preferably in the 8th grade of middle school, or the 1 grade of high school. This age group is more susceptible to small nudges in behaviour and experiencing serious conversations about helmets at a younger age further normalise the idea of such helmets. Moreover, the workshop has several other outcomes, from the co-creation 3 distinct needs could be considered in helmet design. These are the need for personalisation, comfort and novelty. Finally, the workshop can create a way to quantify current trends in the target group. This outcome is like other awareness campaigns, that are currently hosted by veilig verkeer nederland.

The workshop should not be a one off and should be part of a larger national campaign. This report identified that the Netherlands is still at the beginning of the normalisation of helmets. Which means that having an interactive, reflective, and creative workshop can be a first step into normalising the idea of helmets on the streets. To start changing our attitude towards helmets, we must talk about helmets.



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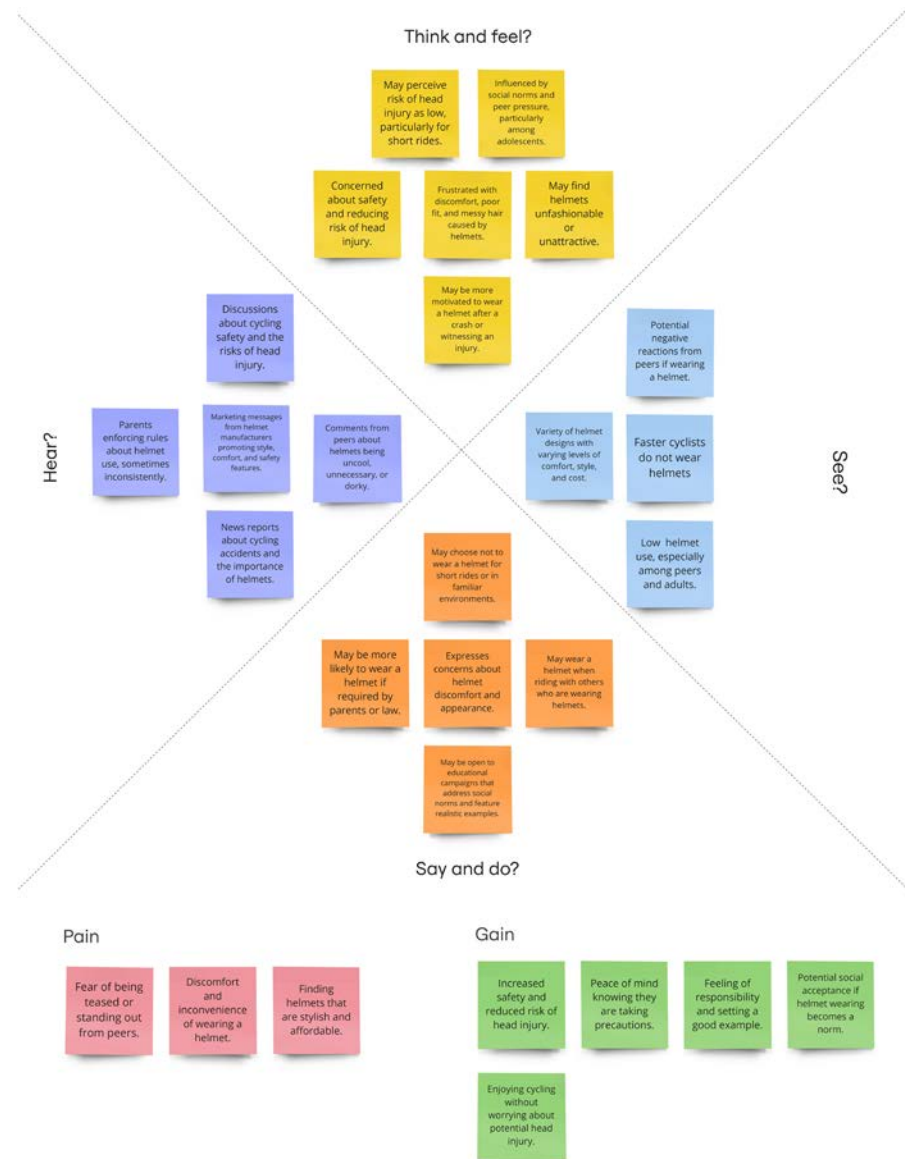
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## REFERENCES

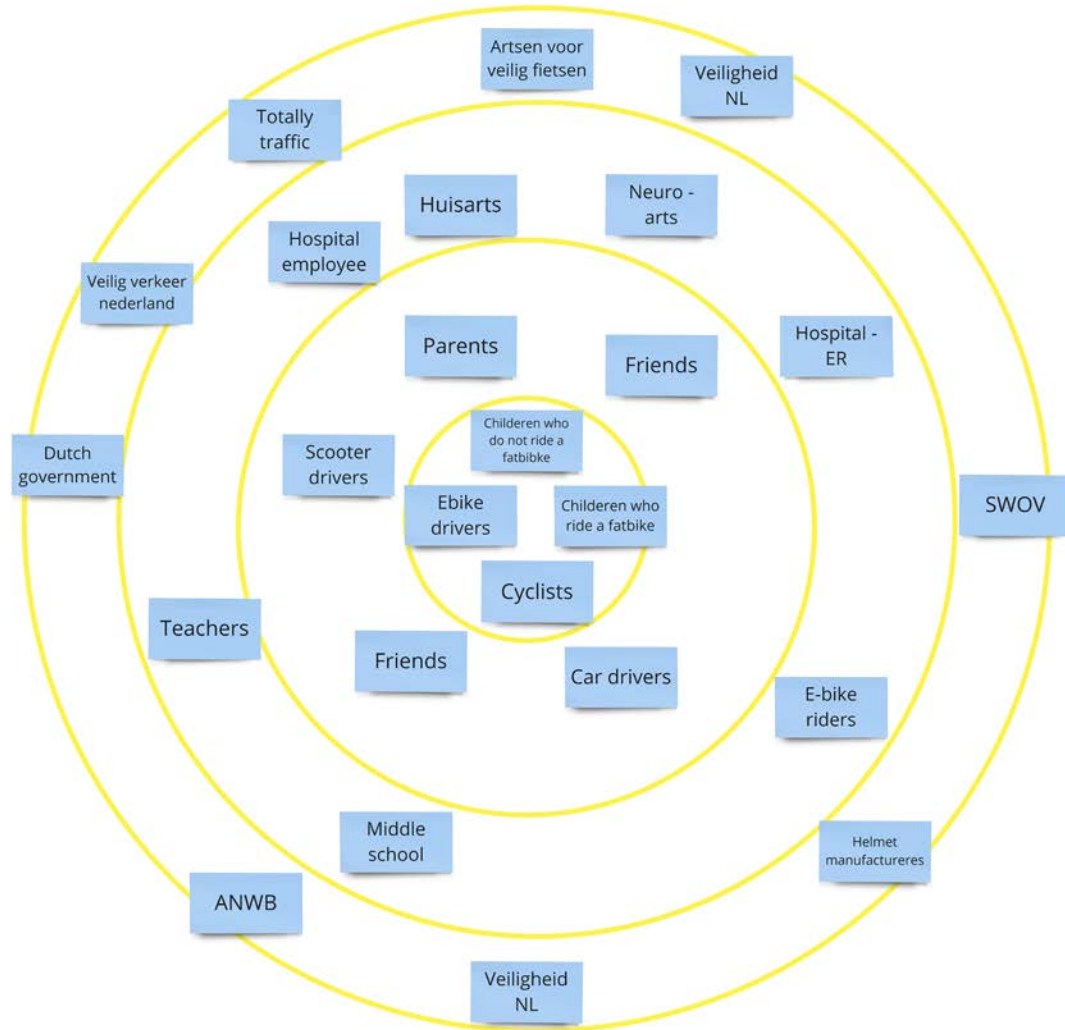
- [1] RWS (2023). Vervolgmeting apparaatgebruik & 0-meting helm-dracht fietsers - meting 2023. Rijkswaterstaat, Den Haag.
- [2] Finnoff, J. T., Laskowski, E. R., Altman, K. L., & Diehl, N. N. (2001). Barriers to Bicycle Helmet Use. *Pediatrics*, 108(1), e4. <https://doi.org/10.1542/peds.108.1.e4>
- [3] Verlinde, L., Verlinde, F., Van Doren, S., De Coninck, D., & Toelen, J. (2024). Cycle safe or cycle cool? Adolescents' views on bicycle helmet use and injury prevention campaigns in Belgium. *Injury Prevention*.
- [4] Villamor, E., Hammer, S., & Martinez Olaizola, A. (2008). Barriers to bicycle helmet use among Dutch paediatricians. *Child: care, health and development*, 34(6), 743-747.
- [5] Piotrowski, C. C., Warda, L., Pankratz, C., Dubberley, K., Russell, K., Assam, H., & Carevic, M. (2020). The perspectives of young people on barriers to and facilitators of bicycle helmet and booster seat use. *Child Care Health Dev*, 46(5), 591-598. <https://doi.org/10.1111/cch.12791>
- [6] <https://www.veiligheid.nl/kennisaanbod/lespakket/leer-risicovol-verkeersgedrag-herkennen-met-split-risk>
- [7] P. Schepers, M. Helbich, M. Hagenzieker, B. de Geus, M. Dozza, N. Agerholm, ..., R. Aldred The development of cycling in European countries since 1990
- [8]. Sølund Ehlers, P. (2022). How the Danish cyclists were convinced to use a bicycle helmet - without a law. Paper presented at FERSI Conference, 6 and 7 October 2022, The Hague.
- [9] Danish Road Safety Council. *Nederen forældre (2014-2020)*. <https://www.sikkertrafik.dk/tiltoppen/kampagner/tidligere-kampagner/nederen-foraeldre-2014-2020/>
- [10] Evaluation of the helmet campaign 2021, Epinion on behalf of the Danish Road Safety Council
- [11] Koskinen, I., Zimmerman, J., Binder, T., Redstrom, J., & Wensveen, S. (2013). Design research through practice: From the lab, field, and showroom. *IEEE Transactions on Professional Communication*, 56(3), 262-263.
- [12] SWOV (2024). *Fietsshelmen*. SWOV-factsheet, mei 2024, SWOV, Den Haag.
- [13] MARE (2023). *Gedragbepalende factoren vrijwillig gebruik van een fietshelm*. MARE, Amsterdam.
- [14]. Towner, E., Dowswell, T., Burkes, M., Dickinson, H., et al. (2002). Bicycle helmets - a review of their effectiveness: a critical review of the literature. *Road Safety Research Report No. 30*.
- [16] Totally traffic, <https://totallytraffic.bvlbrabant.nl/>
- [17] Pfister, R. A., & Eppler, M. J. (2012). The benefits of sketching for

- knowledge management. *Journal of Knowledge Management*, 16(2), 372-382.
- [15] D&B (2023). *Advies voor de ontwikkeling van een gedragsstrategie vrijwillig gebruik van de fietshelm*. Dijksterhuis & van Baaren, Nijmegen.
- [19] Ramaswamy, V., & Ozcan, K. (2018). What is co-creation? An interactional creation framework and its implications for value creation. *Journal of business research*, 84, 196-205.
- [20] Lajunen, T. (2016). Barriers and facilitators of bicycle helmet use among children and their parents. In: *Transportation Research Part F: Traffic Psychology and Behaviour*, vol. 41, p. 294-301.
- [21]. Aarts, L.T., Wijlhuizen, G.J., Gebhard, S.E., Goldenbeld, C., et al. (2021). *Achtergronden bij De Staat van de Verkeersveiligheid 2021*. De jaarlijkse monitor. R-2021-21A. SWOV, Den Haag.
- [22]. Bos, N.M., Houwing, S. & Stipdonk, H.L. (2016). *Ernstig verkeersgewonden 2015*. Schatting van het aantal ernstig verkeersgewonden in 2015. R-2016-13. SWOV, Den Haag
- [23] Richter, M. (2010). *Risk behaviour in adolescence*. Springer Fachmedien.
- [24] *Cyclist surveys 2013, 2017, 2021*, Epinion on behalf of The Danish Road Safety Council
- [25] Pucher, J. & Dijkstra, L. (2003) Promoting safe walking and cycling to improve public health: lessons from the Netherlands and Germany. *American Journal of Public Health*, 93, 1509-1516.
- [26] Olsson, B. (2023). Increased bicycle helmet use in the absence of mandatory bicycle helmet legislation: Prevalence and trends from longitudinal observational studies on the use of bicycle helmets among cyclists in Denmark 2004-2022. *Journal of safety research*, 87, 54-63.
- [27] Ministerie van Infrastructuur en Waterstaat, (2024) *Strategie voor het promoten van vrijwillig gebruik van de fietshelm*
- [28] Olivier, J., Esmæiilikia, M. & Grzebieta, R. (2018). Bicycle helmets: Systematic reviews on legislation, effects of legislation on cycling exposure, and risk compensation. School of Mathematics and Statistics, Transport and Road Safety Research Centre; UNSW, Sydney.

## APPENDIX A - empathy map







How do we make Bicycle Helmets More Popular for Children Aged 12-17 in the Netherlands?



# Helmpje !?

Zet jij hem ooit op?

Wat is je leeftijd?

1 Fiets jij vaak naar school of andere plaatsen

- Ja  
 Nee

2 Draag je wel eens een fietshelm?  
Waarom wel of niet?

---

3 Hoe denk je dat andere leerlingen zouden reageren als je een fietshelm zou dragen?

4 Als je aan een fietshelm denkt, wat zijn de eerste woorden die in je opkomen?

---

5 Wat zijn volgens jou de voor- en nadelen van het dragen van een fietshelm?

---

6 Fietshelmen zijn belangrijk voor de veiligheid.

---

- Eens  
 Oneens



**7** Denk je dat een helm echt verschil maakt bij een ongeluk? Waarom wel of niet?

---



**8** Hebben je ouders, vrienden of leraren ooit gezegd dat je een helm moet dragen? Zo ja, wat vind je daarvan?

---



**9** In welke situaties buiten het fietsen draag je een helm of zou je er een dragen?

---

**10** Wat is volgens jou het verschil tussen het dragen van een helm bij fietsen en bijvoorbeeld skaten of skiën?

---

**11** Stel je voor: je fietshelm verandert in iets dat je echt graag draagt. Wat zou dat zijn en waarom?

---



# Helmpje !?

## Hoe kijk je naar je eigen ontwerp?

Wat is je leeftijd?

1 Wat heb je vandaag geleerd over het dragen van een fietshelm?

2 Denk je dat je eerder een helm zou dragen na deze sessie? Waarom wel of niet?

3 In welke situatie vind je het dragen van een helm het meest logisch?

---

4 Wat is de belangrijkste functie van jouw helmontwerp?

---

5 Hoe zorgt jouw ontwerp ervoor dat meer mensen een helm willen dragen?

---

**6** Zou je jouw eigen ontwerp willen dragen? Waarom wel of niet?

---

**7** Wat zou de grootste reden zijn waarom mensen geen helm dragen, denk je?

**8** Ruimte voor opmerkingen:

## Appendix E - Study procedure & worksheets

*This file is translated with Chat-GPT (the original is in dutch)*

### Introduction and Warm-Up with Classmates

"Welcome, everyone, to this short session. Today, we're going to tackle a very interesting topic. Many of you have probably seen or heard the recent news about helmet use in the Netherlands.

Today, we'll embark on an adventure around the bicycle helmet, exploring why so few people in the Netherlands wear one.

To start, I'm curious about how you view helmets and whether you use one. We'll begin with a worksheet that you'll complete on your own. Afterwards, we'll briefly discuss the answers as a group—though, of course, you're not required to share if you don't want to."

---

### Pre-Session Worksheet

1. Do you often cycle to school or other places?
    - Yes
    - No
  2. Do you ever wear a bicycle helmet? Why or why not?
  3. What do you think other students would say if you wore a bicycle helmet?
  4. When you think of a bicycle helmet, what are the first words that come to mind?
  5. What do you think are the advantages and disadvantages of wearing a bicycle helmet?
  6. Bicycle helmets are important for safety.
    - Agree
    - Disagree
  7. Do you think a helmet really makes a difference in an accident? Why or why not?
  8. Have your parents, friends, or teachers ever told you to wear a helmet? If so, what do you think about that?
  9. In what situations outside of cycling do you wear a helmet or would you wear one?
  10. What do you think is the difference between wearing a helmet for cycling and, for example, skating or skiing?
  11. Imagine your bicycle helmet turns into something you would really love to wear. What would it be and why?
- 

### Information Session

"Thank you for completing the worksheet—that was the most boring part of today. Now, let's dive into some class-wide questions and a presentation.

- Who here wears a bicycle helmet? Why or why not?
- Let's discuss briefly, keeping it short.



We'll also throw in some statements for discussion:

- 'A bicycle helmet is only for beginners.'
- 'If you're a skilled cyclist, you don't need a helmet.'

Next, we'll present some slides with statistics and visuals, using data from Veiligheid NL (Safety NL) as a source. We'll compare accidents with and without helmets, using numbers or videos."

---

## Interactive Activities

### 1. Reaction Time Test with Distractions

**Objective:** Demonstrate how distractions affect reaction time.

**Execution:**

- Students pair up, one holding a ball at shoulder height.
- The ball is dropped randomly, and the other tries to catch it as quickly as possible.
- Test this first without distractions, then while reading a text message.

**Reflection:** Discuss how distractions impacted their reaction time and link this to cycling safety.

### 2. Scenario Cards with Choices

**Objective:** Reflect on risky situations and decision-making.

**Execution:**

- Groups receive cards with scenarios (e.g., cycling without lights at night).
- Rank choices from "least risky" to "most risky," then rate each choice's risk (1–5).

**Reflection:** Discuss how minor decisions can lead to dangerous situations.

---

## Co-Creation Session

"Now that you know more about what a helmet can do, it's time to get creative. You'll design your own helmet! Let's pretend we're in the future, where anything is possible. Imagine a helmet that emits scents to warn others, integrates AR goggles, or turns into a hoodie.

Here's your question:

*Imagine your bicycle helmet becomes something you love to wear (like a cap, hat, or headphones). What would it be, and why?*

Before sketching, brainstorm for five minutes—individually or in groups. Remember, there are no wrong answers!"

### Materials for Co-Creation:

- Paper, pencils, colored markers, glue
- Magazines for cutouts
- Scissors

After designing, students sketch their ideas and share. Features and attractiveness will be the focus.

---

### Post-Session Worksheet

1. What did you learn today about wearing a bicycle helmet?
  2. Do you think you are more likely to wear a helmet after this session? Why or why not?
  3. In what situation do you think wearing a helmet makes the most sense?
  4. What is the most important feature of your helmet design?
  5. How does your design encourage more people to wear a helmet?
  6. Would you want to wear your own design? Why or why not?
  7. What do you think is the biggest reason people don't wear a helmet?
  8. Space for comments.
- 

### Session Goals

1. **Insight into Helmet Features:** Analyze trends in designs (shape, material, color, etc.).
2. **Perception Shift:** Assess whether participants' views on helmets change post-session.
3. **Behavioral Awareness:** Highlight risks of cycling without helmets and benefits of wearing one.
4. **Attractiveness:** Identify key features that make helmets more appealing.

Thank you for participating in this session. Before we end, let's reflect briefly:

- How has this session changed your view on bicycle helmets?
  - What was the most surprising or new information for you?
  - How likely are you to wear a helmet now, especially if others around you do?
  - What should change about helmets to make you wear one?
- 

This approach aligns with the co-creation framework and aims to foster safety awareness, creativity, and practical insights into helmet use.