

## Traffic safety risks among Adolescent ATV Users in Norway

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### Abstract

All-terrain vehicles (ATVs) are commonly used by adolescents in rural Norway, but there has been little research on their driving behavior and accident rates. This project seeks to investigate common traits of adolescents' ATV use and how social norms affect risk-taking behavior.

Research on ATV use from several countries reveals a high accident rate with severe injuries and fatalities, for both work-related use and leisure use, and the majority of victims are male (Lin & Blessing, 2018; Lower, Peachey, & Fragar, 2022). Studies show that young drivers tend to overestimate their driving skills and underestimate the risks of ATV use (Adams, Aitken, Mullins, Miller, & Graham, 2013). Teenagers, particularly males, are more prone to risk-taking behavior than adults (Denning & Jennissen, 2016), and peer pressure and group norms are important factors (K. Nilsson, 2016). Statistics from Norway show a high increase in ATV accidents in the last decade, and that the majority of victims are male teenagers (Iversen & Njå, 2022).

The data in this study consist of focus group interviews with young ATV users and their parents in separate sessions at four different locations in Norway, which were small towns or rural areas with a high rate of ATV use. The interviews focused on their opinions about safety, driving behavior, modifying the ATVs, and social aspects of ATV use. Preliminary analyses suggest that it is quite common to modify an ATV to make it drive faster than the law permits. They think this is safer, as it enables them to avoid being passed by cars in a dangerous manner when driving on public roads. The respondents' fathers seemed to be more aware of this than their mothers, but don't see it as a problem.

The purpose of the project is to contribute to the development of safety courses and other safety measures for ATV users and to give advice on public regulations.

*Keywords:* ATV, UTV, risk-taking, group norms, power increase, driving behavior

### 1. Introduction

The term ATV (all-terrain vehicle) encompasses a wide range of vehicles, from four-wheel mopeds and motorcycles to competition vehicles, as well

as tractors for use in agriculture and forestry, or construction. ATVs and utility terrain vehicles (UTVs) are commonly used in farming and industrial settings, and for leisure use, particularly

in rural and small-town areas (Adil, Konstantinou, Porter, & Dolan, 2017; Fawcett, Tsang, Taheri, Belton, & Widder, 2016; Khorsandi et al., 2021). The vehicles are used all over Norway but have a greater influence in rural and small-town areas than in the larger cities. There are approximately 94,000 road-registered ATVs and UTVs in Norway, an increase of 40% since 2015 (Iversen & Njå, 2022). In the same period, ATV accidents increased by 75 %, and 50% of ATV users involve in various kinds of extreme behavior in traffic, which is the highest for any road user category (Iversen & Njå, 2022). About 70-90 % of the victims are men, most of them aged 15-17 (ibid).

### 1.1. ATV/UTV regulations in Norway

ATVs and UTVs are not separate driver's license classes in the EU's third driver's license directive (EUR-Lex, 2006). There are three categories of ATV/UTV for road use: moped, heavy motorcycle, and tractor. mopeds are a maximum of 50 cubic meters with a maximum speed of 45 km/h. Anything larger than 50 cubic meters is registered as a heavy motorcycle or tractor. Heavy motorcycles have no speed limit but they do have a maximum power of 15 KW (Lovdata, 2023a).

Tractor-registered ATVs have no power limit but the speed limit is 40 km/h. Some of these vehicles can be registered for two people. Helmets are not required on tractor ATVs. ATVs and UTVs can be legally driven anywhere it is legal to drive a car or motorcycle. Those registered as mopeds are not allowed to be driven on class A or B motorways.

If the vehicle is registered as a tractor (T3), anyone with a tractor driver's license (from the age of 16) or a car driver's license can drive it. If it is registered as a motorcycle, the driver must have class B or higher. ATVs registered as mopeds can be driven from the age of 16 with a moped license or by anyone with a regular driver's license for a car (Lovdata, 2023b). ATVs registered as heavy motorcycles can be driven with a class B, C, or D driver's license (Lovdata, 2023b).

### 1.2 Driver training

The Norwegian model of driver training is based on the GDE Matrix. The training is divided into compulsory and non-compulsory training

(Lovdata, 2023b). After all compulsory training has been completed and the theoretical test has been passed, the trainee can be prepared for a practical driving test. Moped ATVs only require a theoretical test. Motorcycle and tractor ATVs require both a theoretical and a practical driving test. The vast majority of ATVs in Norway are registered as tractors, and we will therefore describe this class specifically.

#### 1.2.1 Tractor Training in Norway

Tractor training is regulated through driver training regulations (Lovdata, 2023b) and the curriculum for class T (NPRA, 2019).

The training consists of a basic traffic course and driving lessons, which also include the securing and marking of cargo (NPRA, 2019). Upon successful completion of the theoretical test class T, a practical test is taken on a tractor with a connected trailer. The tractor for the driving test must have four wheels, be registered for two people, have a design speed of between 38 and 50 km/h, have a clutch pedal, and have a permissible total weight of at least 7,000 kg. The trailer must have a permissible total weight of over 4,000 kg. The practical driving test consists of a minimum of checking before driving, connecting and disconnecting the trailer, performing a safety check, driving in traffic, and reversing (Lovdata, 2023b).

### 2 ATV accidents

Studies from the USA, Canada, Australia, New Zealand, England, Scotland, and Sweden reveal a high number of injuries related to ATV and UTV use, both fatal and non-fatal (Adil et al., 2017; Fawcett et al., 2016). The majority of accidents are single accidents in which the rider is thrown off the vehicle or becomes stuck under the rolled-over vehicle (Lin & Blessing, 2018). Accidents on public roads are often collisions, with other vehicles or a stationary object, while off-road accidents are more often roll-overs (Hall, Bixler, Helmkamp, Kraner, & Kaplan, 2009).

Several studies in the USA indicate that the risk of ATV accidents is higher on public roads and that accidents are more serious on tarmac roads than on gravel (Denning & Jennissen, 2016; Khorsandi et al., 2021). ATVs and UTVs are designed for off-road driving and have characteristics that make

them less suitable for driving on tarmac (Denning & Jennissen, 2016; Fawcett et al., 2016). Still, driving on tarmacked public roads is commonplace, particularly among young riders (Denning & Jennissen, 2016; Lin & Blessing, 2018).

## 2.1 Type of Injuries

Injuries to arms, legs, head, and face are most common for ATV/UTV accidents in general (Adil et al., 2017). The more serious injuries are bone fractures, head injuries, and injuries to soft tissue (Allen et al., 2022; Lin & Blessing, 2018). The majority of fatalities are due to head injuries, followed by suffocation and injuries in the chest region (Adams et al., 2013; Lower et al., 2022). Suffocation is more common on farms, while head injuries dominate in leisure driving accidents (Lower et al., 2022).

## 2.2 Male Adolescents and Young Men

Most of the victims are men (Denning & Jennissen, 2016; Fawcett et al., 2016; Khorsandi et al., 2021). When it comes to leisure driving, most of the deceased are adolescents or young men, but for work-related use, most of the casualties are adult men (Khorsandi et al., 2021).

## 2.3 Risk factors

Known risk factors when it comes to ATV and UTV use are riding with a passenger on a vehicle designed for one person, driving on public roads, children riding vehicles designed for adults, lack of formal training, lack of safety equipment, high speed, driving on steep slopes and hills, and modifying the vehicle (Qin, Denning, & Jennissen, 2019). Driving with a passenger is a risk factor because it reduces the vehicle's stability and makes it more difficult to maintain control (Khorsandi et al., 2021).

## 2.4 Helmet

There are great variations in the rules for helmet use. In Canada, helmets are required by law in three of the thirteen provinces, and in the USA the rules vary from state to state (Fawcett et al., 2016). In Norway, helmet use is mandatory if the ATV is registered as a motorcycle or moped, but not if it's registered as a tractor. The fatality rate is much lower in accidents where the rider is wearing a helmet, independent of other factors (Allen et al.,

2022; Denning & Jennissen, 2016; Irwin, Mihulkova, Berkeley, & Tone, 2022).

### 2.4.1 Reasons for not Wearing a Helmet

Several studies have investigated why adolescents and young adults choose not to wear a helmet. The main reasons they give are peer pressure, getting looks, being more comfortable without it, and thinking that helmets won't help them in an accident anyway (Adams et al., 2013; Irwin et al., 2022). Many think that helmets are too warm and heavy and that they reduce their driving abilities (Adams et al., 2013). Sometimes they simply forgot or were in a hurry, or were tired (Irwin et al., 2022).

Some studies have also found that many simply don't think that ATV usage is dangerous, and therefore there is no need for a helmet (Adams et al., 2013; Wymore, Denning, Hoogerwerf, Wetjen, & Jennissen, 2020). In one study, the parents said that the only way to get the young ones to wear a helmet would be to introduce a strict rule of "no helmet, no riding" (Wymore et al., 2020).

Social norms can also discourage helmet use. Social norms can be defined as a set of unwritten rules for how to behave and speak in a social group (Irwin et al., 2022). Teenagers in an American study said they thought most people don't use helmets while driving ATVs, and that they didn't want to stand out in the group, regardless of what would be the best choice concerning safety (Adams et al., 2013). However, they also said that they would probably use a helmet if everyone else was using one and if their parents did (Adams et al., 2013). With this in mind, one can discuss whether social norms can be a strategy to increase helmet use. Helmet use was also higher among those who had undergone some sort of safety course for ATVs (Irwin et al., 2022).

Teenagers and young adults are generally more prone to taking chances, especially males (Denning & Jennissen, 2016). Risk-taking among young people is often modeled by influential persons in their social environment and peer pressure is an important factor (M. Nilsson, 2019). Teenagers make bolder and more risky choices when they are with peers compared to when they are alone (Westaby & Lowe, 2005). This includes doing stunts and tricks to show off in front of friends but also riding with a passenger as part of the social relationship (Khorsandi et al., 2021).

## 2.5. The effects of safety training

Safety courses have had various results. In New Zealand, attempts to change farmers' ATV use through educational materials, safety courses, and unannounced farm inspections have been ineffective (Clay, Treharne, Hay-Smith, & Milosavljevic, 2014). Other studies indicate that those who have had safety training are more likely to wear a helmet and are less inclined to drive with passengers and on tarmacked roads (Irwin et al., 2022; Khorsandi et al., 2021).

One study found that participants who had been in an ATV accident or engaged in hazardous driving were less likely than others to use what they had learned on the safety course (Jennissen et al., 2015). The study concluded that teenagers who have used ATVs for some time without any safety training have been accustomed to some negative driving habits and are less likely to acknowledge that they are exposing themselves to risk (Jennissen et al., 2015).

## 3. Methodology

### 3.1. Participants

#### 3.1.1. *ATV/UTV users*

The informants in this study were users of ATVs and UTVs, aged between 16 and 18 years. They live in small towns and rural areas in the counties of Troms and Finnmark and Trøndelag. The informants in Troms and Finnmark mainly used UTVs, while informants in Trøndelag mainly used ATVs.

We had five focus groups in four different locations, with a total of 23 participants (14 boys and 9 girls). We recruited the informants by purposeful sampling, as we wanted young ATV/UTV users. We contacted various traffic schools that offer training for tractors, and they gave us access to informants matching the criteria. We chose which traffic schools to contact partly through the network of our university, and Trygg Trafikk, Norway's largest road safety organization.

### 3.2. Interviews

We conducted focus group interviews with 4-6 informants and two moderators. 4-8 participants are generally considered the most effective group size, as a larger number of participants can make them nervous and less willing to share (Howitt & Cramer, 2010). The interviews took place in a known area for them, like a classroom at their school or a training facility. The interviews lasted for about 60 minutes. The interviews were recorded and later transcribed by hired assistants.

We chose focus groups over individual interviews because it is an effective technique for exploring the attitudes of the participants (Howitt & Cramer, 2010; Onwuegbuzie, Dickinson, Leech, & Zoran, 2009). The purpose is to provide an informal setting where the participants can discuss a matter that is important to them and feel safe to share information (Howitt & Cramer, 2010; Onwuegbuzie et al., 2009). This opens up interactions between the participants, which allows us to examine not only what people think but how they think and why they think that way (Howitt & Cramer, 2010). This is relevant when interviewing young ATV/UTV users, as this vehicle is important for them, both for practical and social reasons, and we also need to talk about the part of their driving that is not according to official rules and regulations.

#### 3.2.1 *Interview guide*

The interviews followed a semi-structured interview guide. The informants first got to talk freely about their interest in ATVs and what they used the vehicle for. Then the questions narrowed in on more specific topics, such as their opinions about the training and the tractor driving test, their use of helmets and other safety equipment, their parent's role, the engine power of their vehicles, and driving style, both when they drive alone and when they drive together with others.

### 3.3. Ethics

The data collection and storing process have been approved by Sikt (Norwegian Agency for Shared Services in Education and Research). We have written approval from the participants and their parents, as they are under 18. They have been informed about the purpose of the study, and that they can withdraw from the study at any time. The interviews were sound recorded, not video, and transcribed without any identifying information, and the recordings were erased. The hired assistants who transcribed the interviews have all signed non-disclosure agreements.

### 4. Results

Based on the interviews, three main risk factors appeared related to safety among ATV users (see Table 1).

Table 1 Factors related to safety and risk among ATV users in Norway

| Risk factors                            | Illustrative explanation   |
|---|--|
| 1 Increasing engine power               | All vehicles owned or used by the informants have increased the effect above legal limits.                             |
| 2 Lack of specific training and testing | The training and testing on tractors do not have enough relevance to the vehicle they will be using                    |
| 3 Low helmet use                        | Helmets are used to a greater extent to protect themselves from the weather and wind than for a traffic safety effect. |

#### 4.1. Increasing engine power

Most of the informants in this study use ATVs and UTVs that are legally registered as tractors. The maximum permissible speed for tractors is 40 km/h. The majority of the informants said they had modified the vehicle to go faster than this. Some of the vehicles had a relatively modest power increase to 60 km/h, while other vehicles had a significant power increase and could go as fast as 100 km/h. The modifications were done by using different keys, software downloads, or mechanical changes. We obtained information from dealers of ATVs and UTVs in Troms and Finnmark. They explain how to increase the effect in the following way: *“There are many ways to do this. Different keys give different effects. Programming tools and mechanical changes. Something called a SpeedoHealer is very popular. Then you talk about plugging into the wiring, which cheats this control unit that shows it goes at 60. So you drive at 60 km/h and it also shows 30 on the speedometer. You have a higher speed then.”* The users of ATVs and UTVs often have a conscious relationship with this. One of the informants said: *“I have three different keys, so I have one that goes to 42 or something like that, I also have one that goes to 75 and I also have one that goes to 107 or something like that.”* The reason they gave for the increase in power was to be able to follow the flow of traffic to a greater extent. They felt unsafe in mixed traffic as most vehicles would pass them, which the informants felt was very risky. One of the participants gave an example from one time he was riding together with a friend, and other motorists were angry with them for driving slow: *“The police were [there], so he had 40 blocked and we drove (...) in the 70 zone, it only went 40 and people behind honked and flashed their lights because they thought we were idiots driving 40.”*

A different motivation for the power increase was to be able to skid and play around with the vehicle. When asked about legal concerns around the illegal increase in power, they knew that they could be stopped by both the police and the Norwegian Roads Administration and that this could have implications for the continued use of the vehicle or their own driver's license. Most answered that the chance of being checked was relatively low. Some of the informants had been stopped by the police with vehicles that had had their power increased, but this resulted only in verbal warnings or that the vehicle had to be presented for a technical



inspection at the Norwegian Road Administration.

#### 4.2. Lack of specific training and testing

The informants had completed tractor training, which gives them a license with the right to legally drive ATVs and UTVs. The training takes place in classrooms and with a tractor vehicle. The theory part deals with the specific vehicle's characteristics when it comes to driving on public roads and farmland and forest terrain. The informants thought the tractor training course lacked relevance for ATVs and UTVs. As one of them pointed out: *"Most of what we learned in theory, we won't be able to use. When you take tractor theory, you learn how to drive with a fork and all that, and you won't be able to use that."*

All the informants felt that the practical training had little grounding in ATV and UTV use, but some also saw the benefit of having a driver's license for a tractor. Some lived on farms and used tractors there, while others used tractors for plowing snow and other practical tasks. One of the informants said, *"The training has been good. You have learned the traffic rules, we also had a first aid course, and you can use that if you come across such a situation. He was good at teaching and understood what he meant straight away. Learned to drive a tractor."*

Most of the informants believed that the training should have been aimed more at the vehicle they were going to use. Several pointed out that the weight and height of a tractor are very different from the smaller ATV/UTV vehicles. They also thought that the practical driving test with a tractor had little transfer value when it comes to driving ATVs and UTVs but saw the traffic part as useful. They failed to see the purpose of connecting and disconnecting the trailer and reversing, which was mandatory in the practical driving test.

#### 4.3. Low helmet use

Helmets are not required when the ATV or UTV is registered as a tractor. Many of the informants believed that this could well be a requirement. Despite this, many of them did not use a helmet. Some of the informants believed that helmets did not have a significant safety benefit on shorter trips in the local area, like riding to school or leisure activities. One of the informants said, *"I*

*always wear a helmet, but not on short trips. It is disgusting to wear, and it affects the hairstyle. It also fogs, so I often choose not to wear a helmet."*

Some wore helmets because their parents ordered them to. Others used helmets on longer trips, not for safety reasons, but because the helmet protected them against weather and wind. ATVs and UTVs are used throughout the year, and many of the informants would use helmets in the winter months because of the cold and other weather-related challenges. *"I wear a helmet in the winter. My face quickly gets cold if I don't wear a helmet."* The informants who lived further away from school and leisure activities used helmets more often than those who lived near the school.

### 5. Discussion

Despite the common use of ATVs and the high accident rate in Norway, there is a lack of research focused on examining the risk factors associated with ATV use in a Norwegian context. The focus of the present study is to investigate common risk factors and the role of social norms affecting risk-taking behavior among young ATV users.

The interviews with the young ATV users revealed three main challenges related to traffic safety. The first challenge is that most of the informants increase the engine power of their ATVs. They do this for two reasons: First, they think it is safer to have a similar speed to the other vehicles in traffic. If they drive too slowly, other motorists will become irritated and impatient and will pass them in an unsafe manner. Second, it appears that peer influence is a factor. These findings indicate that there is a need for increased focus by both the Norwegian traffic safety work and safety research on the problem of increasing the power of ATVs illegally.

The second main challenge appears in the area of training and testing related to ATVs. The training that is currently given to learner drivers who will drive ATVs and UTVs is mainly tractor training. In a few cases, ATV training follows moped or motorcycle training (Lovdata 2023a). The EU's regulations (EUR-Lex 2006) describe different driver's license classes but have not defined 4-wheelers as a separate class. The informants cast a critical spotlight on this in terms of theoretical learning, the theoretical test, practical learning, and the final driving test. The

informants stated that in the training and testing in the curricula, the tractor is particularly referred to as a work tool in agriculture and forestry. The training required for tractors does not necessarily match the characteristics and use of ATVs. Therefore, the informants stated a need for separate training, both theoretical and practical, for ATVs. Also, most stated that they lack knowledge about ATVs in the current training system. There is also a need to create curricula and driving tests that correspond specifically to ATV use.

International studies show that helmet use is low among ATV riders (Adams et al., 2013; Irwin et al., 2022). However, helmet use is positively associated with a lower mortality rate compared to accidents where the driver is not wearing a helmet, regardless of other factors (Allen et al., 2022; Denning & Jennissen, 2016; Irwin et al., 2022). In line with previous studies, the present study indicates that low helmet use is one of the main safety challenges among ATV users in Norway. According to Norwegian law, helmets are mandatory when driving an ATV registered as a motorcycle, but not if it is registered as a tractor (Lovdata 2023b). This can create confusion and/or indifference among the drivers of ATVs (NPR, 2015). This study found that several of the informants wear helmets but not always for safety reasons. Some wear a helmet because their parents tell them to, and some wear a helmet for protection against wind and cold weather conditions. It appears that most of the informants do not use helmets for short trips, such as between home and school and leisure activities, since they think the accident risk is lower for short distances.

To our knowledge, the present study is the first one to focus on traffic safety risks among ATV users in Norway, thus our findings are expected to contribute to filling an important gap by developing some traffic safety measures for reducing risks among ATV users. Such measures and changes may mean that the police and the Norwegian Public Roads Administration should have a greater focus on regulating these vehicles. The ATVs are often driven to and from school and inspection activities could be intensified on these routes. Curricula should be developed to directly target the vehicle class. Theoretical training and safety courses that focus on the risk of overturning and skidding should become part of the tractor training if the individual learner drivers are to use driver's license class T for ATVs and

UTVs. The theoretical and practical driving test should contain elements that relate to ATVs and UTVs. Alternatively, a separate vehicle class should be introduced for ATVs and UTVs. A helmet requirement for open tractors should be introduced. If this is not possible, a helmet requirement should be introduced for ATV users regardless of the area of use. Although the findings indicate the main safety challenges related to ATV use among young people, there is a need for quantitative studies that map the safety challenges among larger groups of users. Therefore, the authors plan to conduct a large survey study targeting ATV users based on the present findings.

## 6. Conclusions

The main conclusions of the study are as follows:

- Most of the informants stated that they increase the engine power of ATVs illegally due to peer influence and certain safety concerns.
- There is a need for separate training adapted specifically for ATV use.
- Helmet use among ATV users is low because it is not mandated by law and the informants do not perceive it as crucial for their safety.

These findings indicate that to reduce risks among ATV users, there is a need for the Norwegian road authorities and traffic safety researchers to focus on these topics.

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