

Exploring the relationship between personality factors, general aggression, negative attitudes towards cyclists and aggressive driving behaviour towards cyclists

Kavit Thakrar¹⁰

Abstract

Literature surrounding the field of traffic psychology has focused on aggressive driving behaviour towards drivers. This is an important phenomenon to consider, given the link between aggression and crash involvement. However, literature surrounding aggressive driving behaviour towards cyclists is limited. Research has either been based in countries outside the UK and/or research has not explored personality factors and aggressive driving behaviour towards cyclists. This makes applying findings from past research difficult, especially when considering the impact of specific personality traits and negative attitudes, which are separate psychological dimensions. In this research, using Hierarchical Multiple Regression, we show that extraversion ($\beta = .253$, $t(101) = 2.83$, $p < .001$), general aggression ($\beta = .363$, $t(101) = 3.19$, $p < .005$) and negative attitudes ($\beta = .512$, $t(101) = 5.27$, $p < .001$) significantly increases aggressive driving behaviour towards cyclists. In simple terms, higher levels of extraversion, general aggression and negative attitudes towards cyclists are associated with higher levels of road aggression towards cyclists. Whilst this research has practical and theoretical implications in terms of providing a platform to improve driver and cyclist interaction and providing support to various theoretical frameworks which have been used extensively in the traffic psychology field, future research avenues should be considered as this research does not provide reasons for the aggression. In this respect, future research should consider employing a qualitative experimental design.

Keywords. Aggression, driving behaviour, cyclists, personality, attitudes, general aggression, car users

Introduction

Research was conducted, as part of my dissertation, for my BSc Psychology with Counselling course, as a platform to explore the factors which influence aggressive driving behaviour towards cyclists. Literature has focused on aggressive driving behaviour towards car users, and whilst this highlights the role of various psychological factors which may increase aggression, the scope to apply these findings to cyclists is extremely limited. My research aimed to explore the relationship between personality factors, namely neuroticism and extraversion (based on theoretical and applied research considerations), general aggression, attitudes towards cyclists and aggressive driving behaviour towards cyclists. My quantitative research study is the first to examine the factors which are associated with aggressive driving behaviour towards cyclists in the United Kingdom. This is important, considering that past research has established that there are differences in drivers' behaviour in different cultures (Özkan et al, 2006).

¹⁰ Contact details: kavit_beatbox09@hotmail.co.uk

Literature Review

The relationship between personality factors and aggressive driving behaviour has been well documented from past research, which indicates that neuroticism and extraversion increase aggressive driving behaviour (Aniței et al., 2014; Jovanović et al., 2011; Vazquez, 2013). Recent research from Thorrisen (2013) suggests that in Norway neuroticism and extraversion increase aggressive driving behaviour towards cyclists. Thorrisen's (2013) research provides a foundation to explore the link between personality factors and aggressive driving behaviour towards cyclists. To the best of my knowledge, it was the first study to explore aggressive driving behaviour towards cyclists, before I conducted my research. Nonetheless, my research was necessary as Thorrisen's (2013) findings cannot be applied to a UK based target population, due to the aforementioned cultural differences in driver behaviour.

General aggression is another psychological factor which has been explored extensively within the field of traffic psychology; yet, research has not provided an indication to the extent to which general aggression contributes to aggressive driving behaviour towards cyclists. Lajunen and Parker (2001) suggest that general aggression does indeed increase aggressive responses towards other car users. Whilst this provides advancement in academic and psychological knowledge, it does not provide knowledge about the role of general aggression in shaping aggressive driving behaviour towards cyclists. With this in mind, my research establishes the contribution of general aggression in shaping aggressive driving behaviour towards cyclists.

Fruhen and Flin (2015) findings show that negative attitudes towards cyclists increase aggressive driving behaviour towards cyclists. This is fundamentally significant in the field of the traffic psychology, especially as Fruhen and Flin's (2015) study was based in the UK. In this case, the question to why I explored attitudes towards cyclists may have crossed your mind. Whilst there is a long list of reasons, the main reason is because attitudes were not considered alongside the other important psychological factors in Fruhen and Flin's (2015) research. Hence, the combinational contribution of the collective independent variables (i.e, personality & general aggression) is unknown when viewing the phenomenon of aggressive driving behaviour towards cyclists using Fruhen and Flin's (2015) research as a framework.

Methods

I used a correlation design, where participants completed five questionnaires online. The participants ranged in terms of demographics, and the age range was from 18-69 years. In terms of ethical considerations, I adhered to the British Psychological Society (2009) guidelines: informed consent, right to withdraw, anonymity and confidentiality. Moreover, my study was approved by the Research and ethics council. As part of this approval, I was required to submit an application for research approval that discussed the rationale for the research, the type of participants that the study was aimed for (individuals over the age of 18 who hold a Full UK driving license), the potential risks to participants (mainly minor psychological risks which were addressed with ways to reduce such risks) and ways to meet the ethical guidelines.

Findings

The findings of my study were analysed using hierarchical multiple regression. This regression analysis is commonly used when analysing the association between variables, that is, the independent variables and the dependent variable. In my research, the independent variables were negative attitudes towards cyclists, personality factors (neuroticism & extraversion) and general aggression. The dependent variable was aggressive driving behaviour towards cyclists. The regression analysis provided the amount of variance in aggressive driving behaviour, which could be explained by the individual independent variables and independent variables as a collective. This was used to support and explain specific theoretical frameworks/explanations and as a form of research support for past research studies.

Before performing any regression analysis, certain statistical assumptions must be met to ensure that the analysis is accurate and reliable. First, my sample size of 109 participants met the general guidelines for multiple regression analysis (Green, 1991). Second, the data was normally distributed, no outliers were identified and multicollinearity assumptions were met. In step one, age, gender and weekly mileage were entered as control variables. As past research has shown

the impact of these control variables on aggressive driving behaviour, it was clear that the variables would need to be controlled, in order to reduce the likelihood of unexplained variance and misleading results. In step two of the multiple regression analysis, attitudes towards cyclists, general aggression, neuroticism and extraversion were entered collectively to provide the overall explained variance of the combination of the predictors.

The findings were significant indeed, as they provided general support to past research and theory. Below are the original statistics from my dissertation (Thakrar, 2018)

Higher age was associated with higher levels of aggressive driving behaviour towards cyclists ($\beta = .002$, $t(101) = 3.37$, $P < .001$). Gender was not found to be associated with aggressive driving behaviour towards cyclists ($\beta = .020$, $t(101) = .771$, $P > .005$). Weekly mileage was not significantly associated with aggressive driving behaviour towards cyclists ($\beta = .035$, $t(101) = .025$, $P > .005$). The results of the hierarchical multiple regression are shown in Table 1. There was a significant model effect, with general aggression, attitudes towards cyclists, neuroticism and extraversion accounting for 37% of variance in aggressive driving behaviour towards cyclists, $R^2 = .37$, $F(7,101) = 8.58$, $p < .001$.

Table 1: Hierarchical multiple regression for age, gender, weekly mileage, personality factors, general aggression, attitudes towards cyclists and aggressive driving behaviour towards cyclists

Variable	Beta	R ² change, %	Total R ² , %	F change
Block 1:		1	1	34.8
Age	.000			
Gender	0.18			
Weekly mileage	0.35			
Block 2		36.3	37.3	14.6**
Neuroticism	.000			
Extraversion	0.43			
Attitudes towards cyclists	0.14			
General aggression	0.11			

* $p < 0.01$, ** $p < 0.001$

Higher levels of general aggression were associated with more aggressive driving behaviour towards cyclists ($\beta = .363$, $t(101) = 3.19$, $p < .005$). General aggression was assessed using Buss and Perry's (1992) aggression questionnaire (Appendix Part A). This questionnaire consists of twenty-nine items with higher scores implying higher levels of general aggression. The questions related to different forms of general aggression, including physical aggression and emotional aggression. Similarly, negative attitudes towards cyclists significantly predicted aggressive driving behaviour towards cyclists ($\beta = .512$, $t(101) = 5.27$, $p < .001$). The attitudes towards cyclists scale was used to measure attitudes; this consisted of eleven items (Rissel et al., 2002). These questions asked about the cyclists' entitlement to use the road and cyclists' behaviour (Appendix Part B). Higher extraversion was significantly associated with higher levels of aggressive driving behaviour

towards cyclists ($\beta = .253$, $t(101) = 2.83$, $p < .001$). Neuroticism was a non-significant predictor of aggressive driving behaviour towards cyclists ($\beta = .001$, $t(101) = .014$, $p > .005$). The personality dimensions, neuroticism and extraversion were measured using the mini-pip scale, containing eight items (Donnellan et al., 2006). These questions asked participants to rate different personality characteristics on a scale from 1 to 7, and measured traits such as mood, emotions, thrill seeking and sociability (Appendix Part C). The dependent variable, aggressive driving behaviour towards cyclists, was measured using the driver's anger indicators' scale (DAIS) (Özkan & Lajunen, 2005). This questionnaire contained twelve items and measured different facets of driver aggression towards cyclists (Appendix Part D). Table 2 shows the standardised beta values, demonstrating that attitudes towards cyclists was the strongest predictor of aggressive driving behaviour.

Table 2: Standardised regression coefficients for the independent variables as predictors of aggressive driving behaviour towards cyclists, after controlling for age, gender

Predictors	Beta	<i>t</i>	<i>p</i>
Neuroticism	0.01	0.14	0.99
Extraversion	0.25	2.83	0.06
Attitudes towards cyclists	0.51	5.27	.000
General aggression	0.36	3.19	0.02

Discussion

The main aim of my research was to investigate the relationship between general aggression, attitudes towards cyclists, neuroticism, extraversion and aggressive driving behaviour towards cyclists. My predictions were partly validated with the results demonstrating that as a collective model the independent variables are significant predictors of aggressive driving behaviour towards cyclists. Thus, the collective model was validated. Simply put, the independent variables as a collective model significantly predict aggressive driving behaviour towards cyclists. My finding relating to the association between neuroticism and aggressive driving behaviour is somewhat surprising, as it suggests that neuroticism does not significantly predict aggressive driving behaviour.

My study demonstrates that negative attitudes towards cyclists are associated with aggressive driving behaviour towards cyclists. In simple terms, this means that if an individual has high levels of negativity towards cyclists, they are statistically more likely to explicitly show aggression on the road towards cyclists. This is reasonable, considering the past research

trends which have shown that negative attitudes increase aggressive driving behaviour towards cyclists. My study builds on Fruhen and Flin's (2015) shortcomings by exploring general aggression and personality factors, in addition to negative attitudes. Thus, my study can explain a higher amount of unexplained variance and advances knowledge in the traffic psychology field. My study supports the general trend that attitudes increase aggression. This in itself can be applied to the general behaviour field of psychology.

Likewise, my predictions relating to personality factors were partly supported by my findings. Extraversion was significantly associated with aggressive driving behaviour towards cyclists- implying that individuals who are high in extraversion are statistically more likely to display aggressive driving behaviour towards cyclists. Nonetheless, neuroticism was a non-significant predictor, thus implying that individuals who have neurotic traits are not statistically more likely to be aggressive towards cyclists on the road. The finding relating to extraversion is similar to previous research findings (e.g., Aniței et al., 2014; Jovanović et al., 2011; Vazquez, 2013). The

finding relating to neuroticism is different from previous research, and provides an alternative perspective on neuroticism. Whilst it is clear that this finding is ground-breaking, it does not prove that neuroticism does not increase aggressive driving behaviour towards cyclists. Further research should still continue to explore the role of neuroticism in shaping aggressive driving behaviour towards cyclists, as it is clear from previous literature that neuroticism is a key predictor. The reason for the present finding could stem from the sizable contribution of the extraversion and/or general aggression to shaping aggressive driving behaviour. Simply put, after controlling for extraversion and general aggression the role of neuroticism may not be statistically significant. Therefore, future research should still include extraversion and general aggression using an experimental quasi design, but should include neuroticism in a separate regression model to further explore the individual contribution of neuroticism. If the finding relating to neuroticism is replicated in future research, this would provide further research support for the present study and could inform intervention ideas by reducing the emphasis on neuroticism.

My hypothesis relating to general aggression has been met. The present findings suggest that individuals who demonstrate high levels of general aggression are more likely to display aggressive driving behaviour towards cyclists. This follows the trend of past literature (Lajunen & Parker, 2001). As the present study was the first to explore the role of general aggression and aggressive driving behaviour towards cyclists in the UK, the present findings advance current knowledge and provide a clear pathway for future research ideas. To illustrate, future research could explore the relationship

between general aggression and aggressive driving behaviour towards cyclists, using a driving stimulator and an experimental design. This future research design would provide deeper insight as to whether or not general aggression is the key factor in generating aggressive driving behaviour towards cyclists or is moderated by a correlational relationship with one or more important independent variables. Indeed, this would have far reaching implications for policy makers and government initiatives which aim to reduce aggression towards cyclists, as policies can be specifically targeted towards reducing specific factors which cause the aggression. In the long term, this is likely to lead to better road interactions between car drivers and cyclists; will lead to fewer injuries/fatalities.

In terms of the control variables, there were mixed findings relating to the individual association with aggressive driving behaviour towards cyclists. First, gender (male/female coded as 0/1 correspondingly) was not found to be associated with aggressive driving behaviour towards cyclists. This was unexpected, as past research has suggested that males display more aggression on the road (e.g., Fruhen & Flin, 2015; González-Iglesias et al., 2012).

Similarly, weekly mileage was not found to be associated with aggressive driving behaviour towards cyclists. A plausible explanation for this surprising result was the main sample population. To illustrate, as the study was primarily conducted in a university setting, participants were younger adults. Younger individuals do not typically tend to accrue high mileage on a weekly basis, due to factors such as studying, high insurance costs for younger drivers and general maintenance costs of

running a car. A possible explanation for this finding, could, however stem from the duration of the mileage measured. In the present study, weekly mileage was measured. In previous literature, annual mileage has been measured opposed to weekly mileage (e.g., Fruhen & Flin, 2015). In this respect, future research should continue the trend of measuring annual mileage, as this is arguably a more robust and accurate measurement of mileage. This is due to mileage fluctuating on a week by week basis. Annual mileage is fixed for a specific year. However, it is unlikely that participants would remember how many miles they have done precisely, as they may drive multiple vehicles or not have access to this information at the time of participation.

Theoretical implications

Many theories can explain why negative attitudes towards cyclists increase aggressive driving behaviour towards cyclists, but only one theoretical framework can explain this relationship with the element on negativity increasing aggression, as opposed to positivity: the theory of planned behaviour. This theory postulates that behavioural responses are determined by attitudes, norms and perceived behavioural controls (Ajzen, 1991). As such, this theory assumes that negative attitudes will lead to poor behavioural outcomes. In the world of traffic psychology, this means the outcomes will be typically directed towards the target of the attitudes (e.g., cyclists).

Research results support the main theoretical tenants of the Frustration Aggression Model (FAM) that emphasises the importance of personality and unfolding events (Shinar, 1998) to a moderate extent. My findings highlight the role of personality factors in increasing

aggressive driving behaviour towards cyclists. As such, my study suggests that the interaction between extraversion and negative road events can lead a driver to display outwards aggression towards a cyclist. However, my study does not lend full theoretical support to the FAM, as neuroticism was not found to be significantly associated with aggressive driving behaviour towards cyclists. This highlights the role of other factors in shaping aggressive driving behaviour, and implies that future research should not principally focus on personality factors. Other psychological factors are also equally important to consider.

The General Aggression Model (GAM) claims that there are three main factors which cause aggressive outcomes: biological, situational and individual: in particular, the individual's state of mind, when the individual's decision-making skills interact with a current situation (Anderson & Carnagey, 2004). As such, a main theoretical assumption of the GAM is that general aggression from an individual is likely to be the result of internal states, personality characteristics and bad decision making. My findings lend theoretical support to the GAM, and highlight the role of general aggression in shaping aggression towards cyclists. This theoretical support is ground-breaking, as the present study is the believed to be the first to explore general aggression in relation to aggressive driving behaviour towards cyclists in the UK. From this perspective, the present study highlights the importance of individual driver's general aggression, and suggests that the hostility and anger may not be directly aimed at cyclist but may be the result of other factors. For example, the aggression may be the result of being slowed down by the cyclist, as opposed to direct and personal aggression.

Strengths and limitations of present study

The present study has much strength, both methodological and theoretical. First, the present study explores the role of general aggression and aggressive driving behaviour towards cyclists. This is ground-breaking, as this is the first study within the field of traffic psychology, to investigate both variables; using cyclists as the target group. Second, this study used well established psychometric measurements to investigate the factors. This means the study is both highly internally valid and reliable. Third, 109 participants were included in the final regression analysis: this meets current statistical guidelines and suggests that the findings can be generalised to the wider population.

However, the present study had a few limitations. First, a correlational design was used. To illustrate, participants were asked to fill in a questionnaire and random allocation was not deployed. As such, an association was only established. Thus, we cannot confirm whether the independent variables cause aggressive driving behaviour towards cyclists. Future research avenues should consider using an experimental design, as this will detect any cause and effect relationships after controlling for interactions between variables. Second, the study used a questionnaire design. Thus, the data was self-reported aggression. Vigil-Colet et al. (2012) argue that self-reported aggression levels are affected by social desirability. This

suggests that participants may have under reported levels of aggression. On this basis, the association between the variables could be stronger, depending on the internal effects of the social desirability.

Conclusions

We can make many conclusions from the present study. First, negative attitudes towards cyclists can increase aggressive driving behaviour towards cyclists. This suggests that negative attitudes should be targeted in interventions aimed at reducing aggressive driving behaviour towards cyclists. Second, extraversion can increase aggressive driving behaviour towards cyclists. Whilst extraversion need not be reduced in everyday life, specific traits can be targeted in interventions. In this respect, traits such as impulsivity should be further explored in future research to identify specific traits which increase aggressive driving behaviour towards cyclists. Third, general aggression can increase aggressive driving behaviour towards cyclists. This is not surprising, as general aggression concerns everyday aggression (e.g., an individual who is generally aggressive in various situations). Reducing general aggression in interventions may prove difficult, considering that general aggression may not be directly aimed at cyclists. In order to have more robust implications for intervention ideas, specific dimensions of general aggression should be explored further.

Appendix: Questionnaire

Part A: Aggressive behaviour

Instructions:

Using the 5 point scale shown below, indicate how uncharacteristic or characteristic each of the following statements in in describing you. Place your rating to the right of the statement

- 1- Extremely uncharacteristic of me
- 2- Somewhat uncharacteristic of me
- 3- Neither uncharacteristic or characteristic of me
- 4- Somewhat characteristic of me
- 5- Extremely characteristic of me

- | | |
|---|--|
| 1. Some of my friend think I am a hot head | 16. I can think of no good person for ever hitting a person |
| 2. If I have to resort to violence to protect my rights, I will | 17. At times I feel I have gotten a raw deal out of life |
| 3. When people are especially nice to me, I wonder what they want | 18. I have trouble controlling my temper |
| 4. I tell my friend openly when I disagree with them | 19. When frustrated, I let my irritation show |
| 5. I have become so made I have broken things | 20. I sometimes feel that people are laughing at me behind me back |
| 6. I can't help getting into arguments when people disagree with me | 21. I often find myself disagreeing with people |
| 7. I wonder why somethings I feel so bitter about things | 22. If somebody hits me, I hit back |
| 8. Once in a while, I can't control the urge to strike another person | 23. I somethings feel like a powder keg ready to explode |
| 9. I am an even-tempered person | 24. Other people always seem to get the breaks |
| 10. I am suspicious of overly friendly strangers | 25. There are people who pushed me so far we came to blows. |
| 11. I have threatened people I know | 26. 26. I know that "Friends" talk about me behind my back |
| 12. I flare up quickly but get over it quickly | 27. My friends say that I am somewhat argumentative |
| 13. Given enough provocation, I may hit another person | 28. Sometimes I fly of the handle for no good reason |
| 14. When people annoy me, I may tell them what I think of them | 29. I get into fights a little more than the average person |
| 15. I am sometimes eaten up with jealousy | |

Part B. Attitudes Towards Cyclists-

Instructions: Use the 5 Point scale ranging from strongly disagree to Strongly agree set out below each statement.

It is very frustrating sharing the road with cyclists

Strongly Disagree

Disagree

Neither Disagree or agree

Agree

Strongly Agree



Cyclists should not be able to ride on main roads (without cycle tracks) during peak hours

Strongly Disagree	Disagree	Neither Disagree or agree	Agree	Strongly Agree
☐	☐	☐	☐	☐

Many cyclists take no notice to road rules

Strongly Disagree	Disagree	Neither Disagree or agree	Agree	Strongly Agree
☐	☐	☐	☐	☐

Most cyclists are aware of other road users and keep out of their way

Strongly Disagree	Disagree	Neither Disagree or agree	Agree	Strongly Agree
☐	☐	☐	☐	☐

It is safer for cyclists to keep to the left of the lane

Strongly Disagree	Disagree	Neither Disagree or agree	Agree	Strongly Agree
☐	☐	☐	☐	☐

Drivers are not trained to look out for cyclists

Strongly Disagree	Disagree	Neither Disagree or agree	Agree	Strongly Agree
☐	☐	☐	☐	☐

Cyclists are courteous on the road to motorists

Strongly Disagree	Disagree	Neither Disagree or agree	Agree	Strongly Agree
☐	☐	☐	☐	☐

Many cyclists on the road have not learnt to ride properly

Strongly Disagree	Disagree	Neither Disagree or agree	Agree	Strongly Agree
☐	☐	☐	☐	☐

Motorists need to be educated to give cyclists a fair go on the road

Strongly Disagree	Disagree	Neither Disagree or agree	Agree	Strongly Agree
☐	☐	☐	☐	☐

If cyclists want equal rights on the road they should pay registration fees or road taxes

Strongly Disagree	Disagree	Neither Disagree or agree	Agree	Strongly Agree
☐	☐	☐	☐	☐

Drivers should change lanes when overtaking cyclists rather than veering around them

Strongly Disagree	Disagree	Neither Disagree or agree	Agree	Strongly Agree
☐	☐	☐	☐	☐

Part C- Personality (Extraversion and Neuroticism)

Instructions: This part of the questionnaire measures your personality. Please indicate the number that best represents how each statement describes you.

Have frequent mood swings

1- Very Inaccurate 2 3 4 5 6 7- Very accurate

☐ ☐ ☐ ☐ ☐ ☐ ☐

Am relaxed most of the time

1- Very Inaccurate 2 3 4 5 6 7- Very accurate

☐ ☐ ☐ ☐ ☐ ☐ ☐

Get upset easily

1- Very Inaccurate 2 3 4 5 6 7- Very accurate

☐ ☐ ☐ ☐ ☐ ☐ ☐

Seldom feel blue

1- Very Inaccurate 2 3 4 5 6 7- Very accurate

☐ ☐ ☐ ☐ ☐ ☐ ☐

Am the life of the party

1- Very Inaccurate 2 3 4 5 6 7- Very accurate

☐ ☐ ☐ ☐ ☐ ☐ ☐

Don't talk a lot

1- Very Inaccurate 2 3 4 5 6 7- Very accurate

☐ ☐ ☐ ☐ ☐ ☐ ☐

Keep in the background

1- Very Inaccurate 2 3 4 5 6 7- Very accurate

☐ ☐ ☐ ☐ ☐ ☐ ☐

Talk to a lot of different people at parties

1- Very Inaccurate 2 3 4 5 6 7- Very accurate

☐ ☐ ☐ ☐ ☐ ☐ ☐

Part D - Aggressive driving behaviour towards cyclists

The following question relates to interactions with cyclists. How often have you committed to these behaviours towards cyclists?

Cut up

1-Never 2 3 4 5- Nearly all the time

☐ ☐ ☐ ☐ ☐

Swore/verbally abused

1-Never 2 3 4 5- Nearly all the time

☐ ☐ ☐ ☐ ☐

Sounded horn

1-Never	2	3	4	5- Nearly all the time
☐	☐	☐	☐	☐

Made a hand gesture

1-Never	2	3	4	5- Nearly all the time
☐	☐	☐	☐	☐

Threatened verbally

1-Never	2	3	4	5- Nearly all the time
☐	☐	☐	☐	☐

Flashed

1-Never	2	3	4	5- Nearly all the time
☐	☐	☐	☐	☐

Physically attacked

1-Never	2	3	4	5- Nearly all the time
☐	☐	☐	☐	☐

Chased

1-Never	2	3	4	5- Nearly all the time
☐	☐	☐	☐	☐

Rammed a cyclist

1-Never	2	3	4	5- Nearly all the time
☐	☐	☐	☐	☐

Threatened physically

1-Never	2	3	4	5- Nearly all the time
☐	☐	☐	☐	☐

Hugged the rear

1-Never	2	3	4	5- Nearly all the time
☐	☐	☐	☐	☐

Prevented or obstructed from manoeuvring the bicycle

1-Never	2	3	4	5- Nearly all the time
☐	☐	☐	☐	☐

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