3. Results

3.1 Attitudes Towards Wolf Recovery over Time

3.1.1 Results of Total Publications

The final database of German print media used in this analysis contained n= 5356 relevant articles. The number of publications across the period increased constantly throughout the years, with the least news publications about wild wolves occurring in 2010 (n = 65) and 2011 (n=96), and the most in 2019 (n=1327). News coverage dropped steeply in 2020, with only n=296 relevant stories (Figure 1).

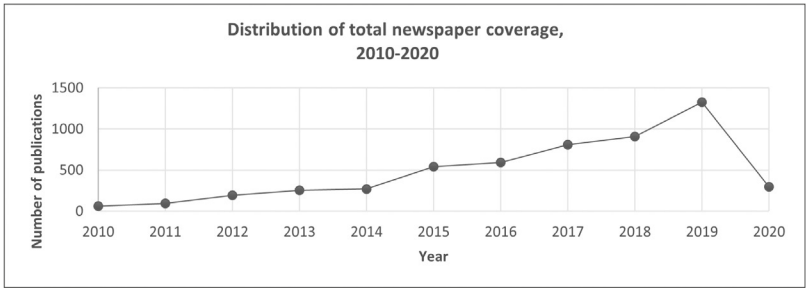

Figure 1: Volume of total stories about wolf reintroduction in Germany across the period 2010 to 2020

Data compilation of German newspaper coverage into positive and negative attitudinal expressions is helpful in terms of providing an overall picture of the discourse about wild wolves returning to Germany. The stratified random sample of n=550 articles contained n=4519 relevant attitudinal

expressions of all newspaper publications across the nation, of which 48.33 % (n=2184) were positive and 42.31 % (n=1912) were negative (Figure 2). The attitudinal expressions measuring 'ambivalence, polarisation and uncertainty' amounted to 9.36 % (n = 423). The results indicate a slight majority of positive attitudinal expressions towards wolves in Germany.

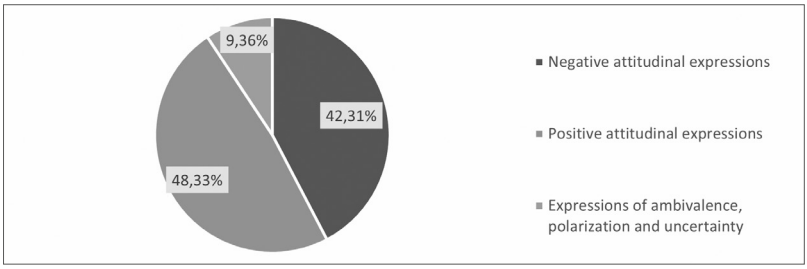

Figure 2: Percentage of all positive and negative attitudinal expressions about the presence of wild wolves in Germany and related expressions of ambivalence, polarisation and uncertainty across the period 2010 to 2020

Separating positive and negative attitude expressions into two groups of categories reveals which attitudes were repeatedly stated in the news and also carves out the differences between the categories. Proportionally, the number of attitudinal expressions between the categories remained relatively even over the examined period (Figure 3). Overall, public discourse focused on the conflict between livestock farming and wolf protection, and whether wolves should be killed/controlled or reintroduced. From 2016 to 2017 there was a strong increase in negative attitudinal expressions. An examination of the single categories shows a strong positive correlation between the negative categories 'wolves are bad and unwelcome', 'wolves are harmful to humans' 'wolves kill livestock', 'cattle need better protection', 'wolves should be killed or controlled', 'cattle is well-protected' and 'ambivalence/polarisation/uncertainty'. For a detailed view of the time trends of the single categories, the correlation analysis and a graphical overview, see 'Appendix D'.

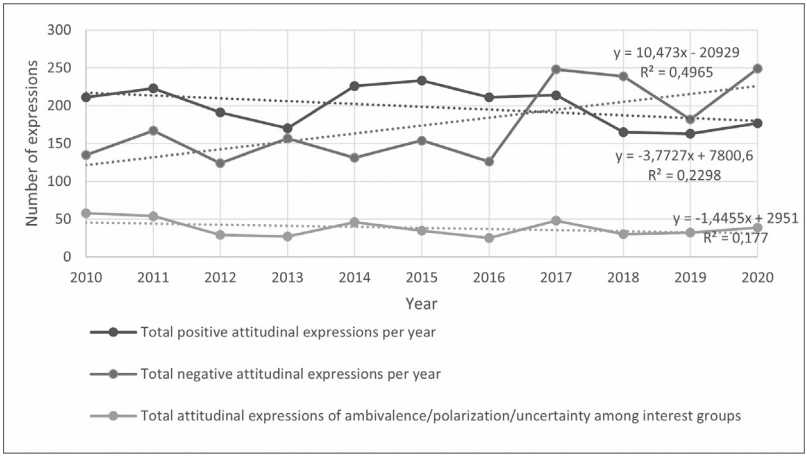

Figure 3: Overview of positive and negative attitudinal expressions of total publications about wolf presence in the German news media from 2010 to 2020 and the expressions of the category 'ambivalence/polarisation/uncertainty'

The most frequently used positive attitudinal expressions throughout the examined decade were from the judgment-category 'wolves should be managed / protected / introduced' (38.14 %), and the attitude-category 'wolves are good and welcome', amounting to 30.04 %, respectively. These values were followed by beliefs that 'wolves are not harmful to humans or human activity' (18.36 %) and 'cattle is well-protected', accounting for 9.48 %. The least expressed positive category was the belief that 'wolves positively impact ecosystems' (3.98 %). For a graphical overview of the aggregated positive and negative results of the total publications sample, see 'Appendix E'.

Of all negative attitudinal expressions, those most mentioned originated in the belief-categories 'cattle need better protection' (23.33 %) and 'wolves kill livestock' (21.60 %). This was followed relatively closely by the attitude 'wolves are bad and unwelcome' with 20.55 % and the judgement-category 'wolves should be killed or controlled' amounting to 18.15 %. The two belief-categories least mentioned were 'wolves are harmful to humans or disrupt human activity' (13.70 %) and 'wolves negatively impact ecosystems' (2.67 %). 'Ambivalence/polarisation/uncertainty' made up 9.36 % of the total attitudinal expressions counted.

A linear regression analysis was performed, to test the statistical significance ($p < .05$) of these trends in attitudinal expressions, with the number of attitudinal expressions from total publications as the dependent variable (y) and the examined period (2010 to 2020) as the independent variable (x).

Table 1: Results of regression analysis of attitudinal expressions in total publications, 2010 to 2020, showing a strong significance in negative attitudinal expressions (p<.05; F>F crit).

	R	R^2	F	F crit	df	B	t	p
Negative attitudinal expressions	.70	.50	8.87	.02	1	10.47	2.98	.02
Positive attitudinal expressions	.48	.23	2.69	0.14	1	−3.78	−1.64	.14

The results indicate that, on average, negative attitude expressions about the return of wild wolves to Germany increased by 10.47 expressions per year (Table 1, Figures 4 and 5).

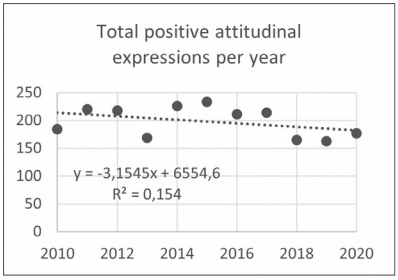

Figure 4: Scatter plot of total positive attitudinal expressions, 2010–2020

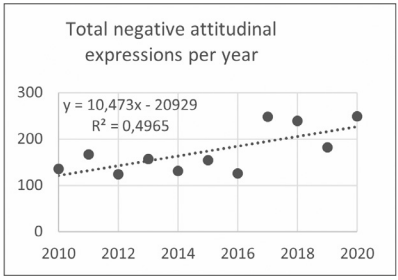

Figure 5: Scatter plot of total negative attitudinal expressions, 2010–2020

The null hypothesis stated that there would be no significant change in the number of attitudinal expressions towards wild wolves returning to Germany in total publications over the examined period. The alternative hypothesis was that negative attitudinal expressions about wolf return to Germany would increase over the measured decade. The results indicate that negative attitudinal expressions have changed over time. More pre-

cisely, the results show increasing negative attitudinal expressions over the period. Thus, the null hypothesis is rejected, and the alternative hypothesis is accepted.

3.1.2 Results of National Publications

The final number of publications in national German newspaper publications was n= 1163 articles. The number of publications steadily increased throughout the examined period, starting with n=22 articles in 2010 (Figure 6). This number increased to n= 340 news stories in 2019 and dropped in 2020 to n=128.

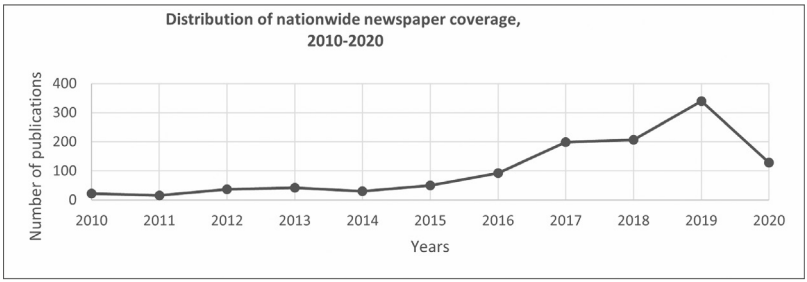

Figure 6: Distribution of nationwide publications, 2010–2020

The sample used to analyse the overall trend in attitudinal expressions towards wolves from national newspapers comprised n= 110 publications and produced n=955 relevant attitudinal expressions. Overall, the results indicate a majority of positive attitudinal expressions towards wolves in Germany for national newspaper publications (Figure 7). Where 39.16 % (n=374) were negative, 46.07 % (n=440) were positive. The attitudinal expressions measuring 'ambivalence/polarisation/uncertainty' amounted to 14.76 % (n=141).

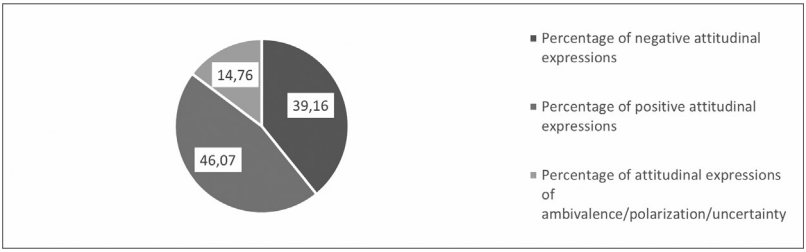

Figure 7: Percentage of positive and negative attitudinal expressions about wolf presence in Germany and related expressions of ambivalence, polarisation and uncertainty from nationwide publications across the period 2010 to 2020

Positive attitudinal expressions about wolf presence in Germany peaked in 2016 (14.09 %) and levelled out at 5.68 % in 2020, while negative attitudinal expressions increased to 13.90 % in 2016 and declined to 8.56 % at the end of the decade (Figure 8).

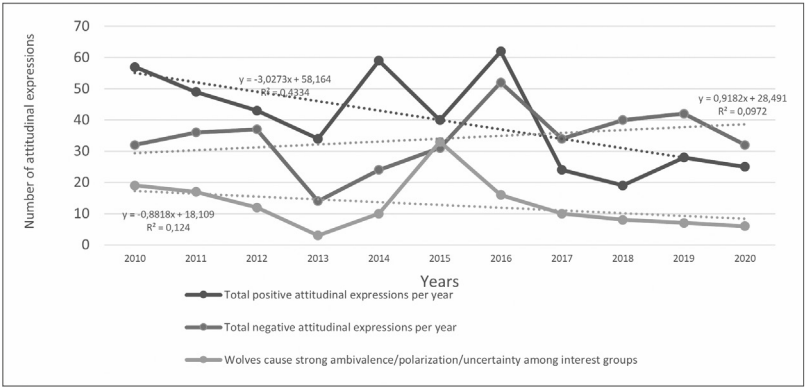

Figure 8: Overview of attitudinal expressions of all positive and negative attitudinal expressions about wolf recovery in Germany across national newspapers including the expressions of ambivalence, polarisation, and uncertainty, 2010 to 2020

The category 'ambivalence/polarisation/uncertainty' was at its highest in 2015 (23.40 %) and declined over the remaining time to 4.26 % in 2020. Separation into positive and negative categories shows that the proportions among the categories was not always even throughout the exam-

ined period (Figures 9 and 10). Positive attitudinal expressions dominated in the first half of the decade, however, the effect switched in the second half with negative attitudinal expressions controlling the narrative. Aggregated results of positive and negative attitudinal results can be viewed in 'Appendix F'.

The most frequently used positive attitudinal expressions throughout the examined decade originated from the judgment category 'Wolves should be managed/protected/introduced' with 48.64 % and the attitude category 'Wolves are good and welcome' with 27.50 %, followed by the beliefs that 'wolves are not harmful to humans or positively impact humans' (11.82 %) and 'Cattle is well-protected' (8.64 %). The least frequent attitudinal expression was "wolves positively impact ecosystems" with 3.41 %.

With 24.6 %, the category 'wolves should be killed or controlled' accounted for the most frequently named negative attitudinal expressions, followed by 'wolves kill livestock' (22.19 %). The category 'cattle need better protection' amounted to 19.79 % and 'wolves are bad and unwelcome' counted 19.52 %. The least frequent negative attitudinal expressions originated from the categories 'wolves are harmful to humans and human activity or disrupt human activity' with 12.57 % and 'wolves negatively impact ecosystems' (1.34 %).

In order to test the statistical significance ($p < .05$) of time trends in attitudinal expressions in national newspapers, a linear regression analysis was conducted with the number of attitudinal expressions from national publications as the dependent variable (y) and 'time' as the independent variable (x). The results indicate that, on average, with every passing year, positive attitudinal expressions about wolves returning to Germany decreased by 3.03 expressions (Table 2, Figures 24 and 25). The null hypothesis stated that there will be no significant change in the number of attitudinal expressions of wolf return to Germany in national publications over the examined period. The alternative hypothesis was that the number of attitudinal expressions of wolf return to Germany in national publications will change over the examined period. As the results indicate decreasing positive attitudinal expressions over the period, the null hypothesis is rejected, and the alternative hypothesis is accepted.

Table 2: Results of regression analysis of national attitudinal expressions about wolf return to Germany, 2010 to 2020

Variable	R	R^2	t	df	B	p
Total negative attitudinal expressions	.31	.10	.98	1	.92	.35
Total positive attitudinal expressions	.66	.43	−2.62	1	−3.03	.03

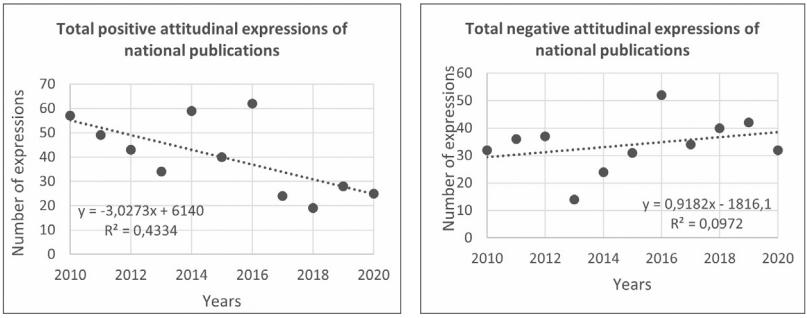

Figure 9: (left): Scatter plot of positive attitudinal expressions of nationwide publications over the ten-year period, 2010-2020; (right): Scatter plot of negative attitudinal expressions of nationwide publications over the ten-year period

This research question has set out to investigate whether attitudes towards wolves in Germany are changing over time. This was performed by examining a sample including all newspapers across the nation and through a sample of all national newspaper publications. The results indicate an increasing trend in negative and a decreasing trend in positive attitudes towards wolves in Germany within the measured timeframe (2010 to 2020).

3.2 Analysis of regional trends

3.2.1 Results of attitudes towards wolves across regions

The final number of publications from NRW and ST were n=756 and n=382, respectively. The number of publications increased throughout the examined period with only n=12 articles covering wolf return in the NRW sample and n=0 articles published in Saxony-Anhalt (Figure 10). NRW publications peaked in 2019 with n=205 stories before news coverage of wild wolves fell to n=68 in 2020, whereas for Saxony-Anhalt, publications were highest in 2017 and then subsided to n=10 articles in 2020. As for Berlin, there were a total of n= 234 publications. 2010 counted only 9 articles, whereas the number increased constantly throughout the decade. Publications peaked in 2018 and decreased again to n=10 in 2020.

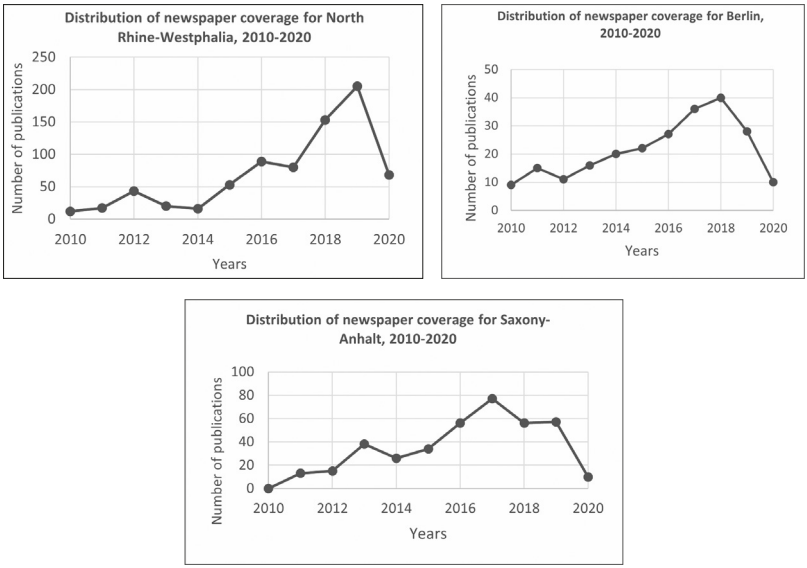

Figure 10: Distribution of newspaper coverage about wolf return for North Rhine-Westphalia, Saxony-Anhalt and for Berlin, 2010 2020

The results for all three federal states indicate a majority of positive attitudinal expressions towards wolf return over the measured period (Figure 11). The NRW sample contained n=814 relevant attitudinal expressions, of which 57.25 % (n=466) were positive and 30.96 % (n=252) were negative. The total attitudinal expressions measuring 'ambivalence, polarisation and uncertainty' amounted to 11.79 % (n = 96). The Saxony-Anhalt sample resulted in n=931 relevant attitudinal expressions.

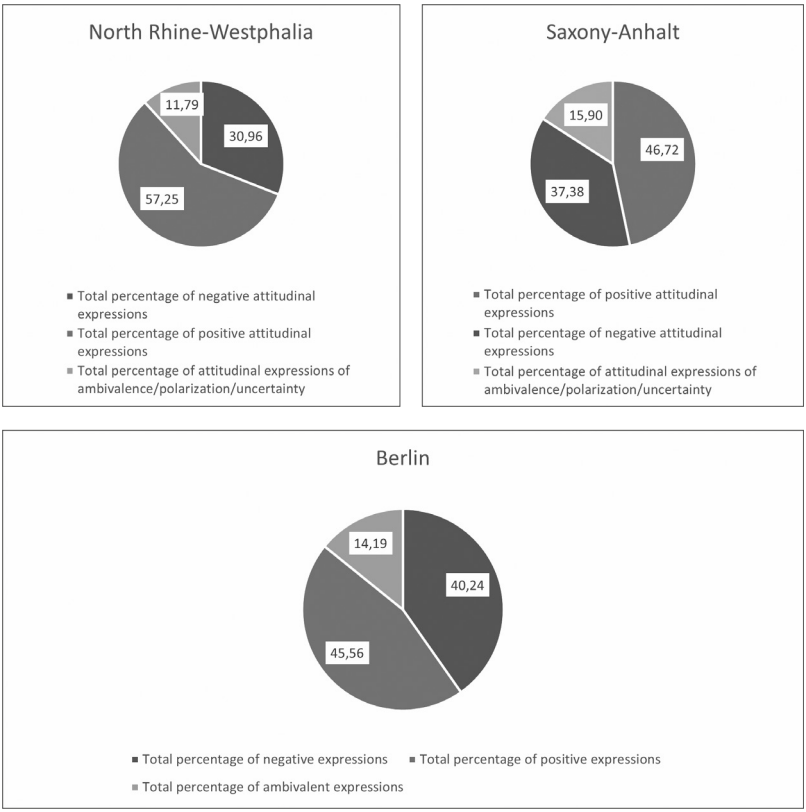

Figure 11: News coverage about wolf presence in Germany from North Rhine-Westphalia (top left), Saxony-Anhalt (top right), and Berlin (bottom) 2010–2020

The number of positive attitudinal expressions was 46.72 % (n=435), whereas 37.38 % (n=348) were negative. 'Ambivalence/polarisation/uncertainty' amounted to 15.9 % (n=148). The Berlin sample counted n=1240 attitudinal expressions, of which 45.56 % (n=565) were positive and 40.24 % (n=499) were negative. The category 'ambivalence/polarisation/uncertainty' amounted to 14.19 % (n=176).

Positive attitudinal expressions about wolf presence in Germany peaked in NRW in 2018 with 11.16 % and was at its lowest in 2010 and 2016 with 7.51 % (Figure 12). Negative attitudinal expressions of the region were at its highest in 2019 (18.25 %) and lowest in 2011 (1.98 %). The most attitudinal expressions of 'ambivalence/polarisation/uncertainty' in NRW were measured in 2015 with 17.71 % and the least was counted in 2010 (4.17 %). 2011 had no attitudinal expressions in that category for NRW.

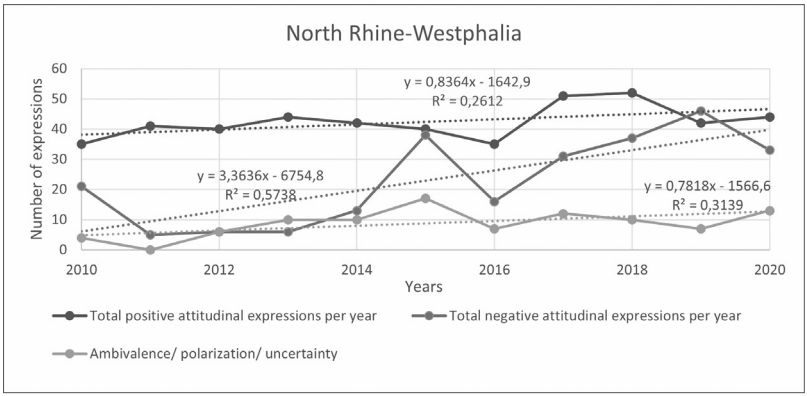

Figure 12: Overview of attitudinal expressions of all positive and negative attitudinal expressions about wolf recovery in North Rhine-Westphalia including the expressions of ambivalence, polarisation, and uncertainty, 2010 to 2020

The most positive attitudinal expressions in ST were counted in 2014 (14.02 %) and were lowest in 2020 (5.06 %) (Figure 13).

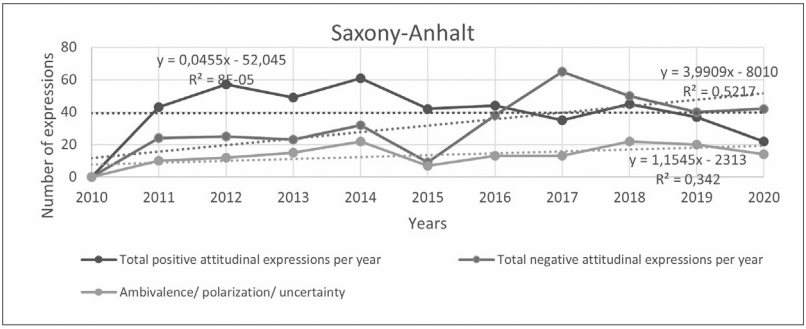

Figure 13: Overview of attitudinal expressions of all positive and negative attitudinal expressions about wolf recovery in Saxony-Anhalt including the expressions of ambivalence, polarisation, and uncertainty, 2010 to 2020

The most negative attitudes in ST were counted in 2017 (18.68 %) and 2015 had the least negative expressions about wolves (2.59 %). In 2014 and 2018, expressions of 'ambivalence/ polarisation/ uncertainty' peaked at 14.86 % and were at their lowest in 2011 with 6.76 %. There were no articles available about wolf recovery in Germany for ST for the year 2010 (n=0).

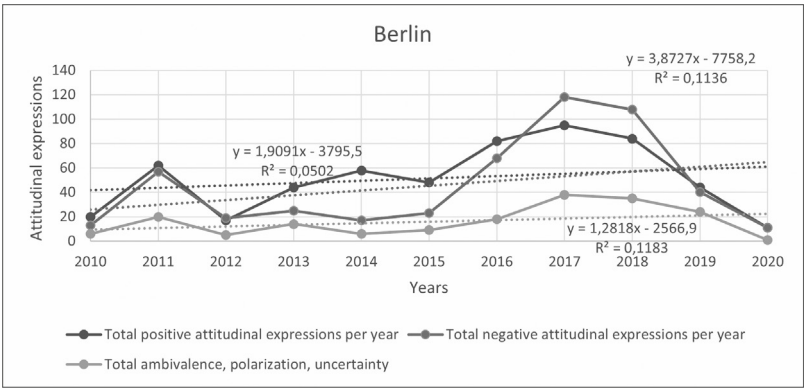

Figure 14: Overview of attitudinal expressions of all positive and negative attitudinal expressions about wolf recovery in Berlin including the expressions of ambivalence, polarisation and uncertainty, 2010–2020

The Berlin sample accounted for 23.65 % of negative attitudinal expressions in 2017 and 2.2 % in 2020 (Figure 14). The most positive attitudinal expressions were counted in 2017 with 16.81 % and the least in 2020 with 1.95 %. 'Ambivalence/polarization/uncertainty' accounted for 21.59 % in 2017 and there was only one expression in that category in 2020.

Separation into single groups of positive and negative categories shows that proportionally, positive attitudinal expressions in all three federal states were relatively even over the examined decade (Figure 14), whereas negative attitudinal expressions varied being proportionally lower in all three federal states in the first half of the decade and increased strongly in the second half. An overview of aggregated results of positive and negative attitudinal expressions of all three federal states can be viewed in 'Appendix G'.

In NRW, the most frequently used positive attitudinal expressions throughout the examined decade were from the judgment category 'wolves should be managed/protected/introduced' (40.13 %) and the attitude category 'wolves are good and welcome' (34.12 %). It was followed by the beliefs that 'wolves are not harmful to humans (17.38 %). The least expressed categories were the belief categories 'cattle is well-protected' (4.51 %) and 'wolves positively impact ecosystems' (3.86 %).

Of all negative attitudinal expressions, the ones most mentioned originated in the belief-categories 'cattle need better protection' (25.40 %) and 'wolves kill livestock' (23.41 %), followed by the attitude that 'wolves are bad and unwelcome' (19.84 %) and the judgment that 'wolves should be killed or controlled' (16.67 %) and the belief that 'wolves are harmful to humans and disrupt human activity' (13.89 %). The least mentioned negative expression was 'wolves negatively impact ecosystems' (0.79 %).

In ST, the most frequent positive attitudinal expressions originated from the judgment category 'wolves should be managed/protected/introduced' with 37.93 % and the attitude 'wolves are good and welcome' (31.72 %). The belief that 'wolves are not harmful to humans' (17.47 %) was followed by 'cattle is well-protected' (10.80 %). The least mentioned category was 'wolves positively impact ecosystems' (2.07 %).

With 24.14 %, the category 'wolves kill livestock' was the most mentioned negative attitudinal expression, followed by 'cattle need better protection' with 23.85 %. 'Wolves should be killed or controlled' amounted to

20.11 % of negative expressions, followed by 'wolves are bad and unwelcome' with 18.10 %. The least mentioned negative categories in the ST sample were 'wolves are harmful to humans' with 10.34 % and 'wolves negatively impact ecosystems' (3.45 %).

As for the Berlin sample, the judgment 'wolves should be managed/protected/introduced' amounted for nearly half of all positive attitudinal expressions (49.20 %), followed by 'wolves are good and welcome' 22.83 % and 'wolves are not harmful to humans' 16.99 %. 'Cattle is well-protected' counted 7.96 % and the least expressed category was 'wolves positively impact ecosystems' with 3.01 %.

From the negative categories among the Berlin sample, 'wolves should be killed or controlled' and 'wolves kill livestock' were the main attitudes expressed with 28.46 % and 23.45 %, respectively. 'Cattle needs better protection' followed with 21.64 % and 'wolves are bad and unwelcome' with 13.83 %. The least expressed categories in Berlin were 'wolves are harmful to humans' (11.02 %) and wolves negatively impact ecosystems' (1.60 %).

It was hypothesized there would be no difference in attitudinal expressions depending on the region where the expression was measured, i. e. in regions with no wolves and no wolf experience and many wolves and a lot of wolf experience. Also, it was hypothesized that these attitudinal expressions would not differ over time and there would be no interaction between the two factors 'time' and 'region'.

The results show that there are significant differences in attitudinal expressions over the measured period as well as between the three regions (Table 5; $p<0.05$). The results for interaction between the two factors 'time' and 'regions' are also significant. Therefore, the null hypotheses are rejected in all three cases and the alternative hypotheses are accepted.

Table 5: Results of two-way ANOVA of the three specified regions (no/some/a lot of wolves) over time (2010 to 2020)

	df	F	P-value	Crit. F-value
Factor time	10	5.88255506	4.80733E-05	2.132503754
Factor region	2	6.552412323	0.004014808	3.284917651
Interaction btw time & region	20	2.604973196	0.0071735	1.897668509

In order to examine these results more closely, the attitudinal expressions of all three regions were aggregated into positive and negative categories and the mean value of each region was presented graphically (Figures 15–17).

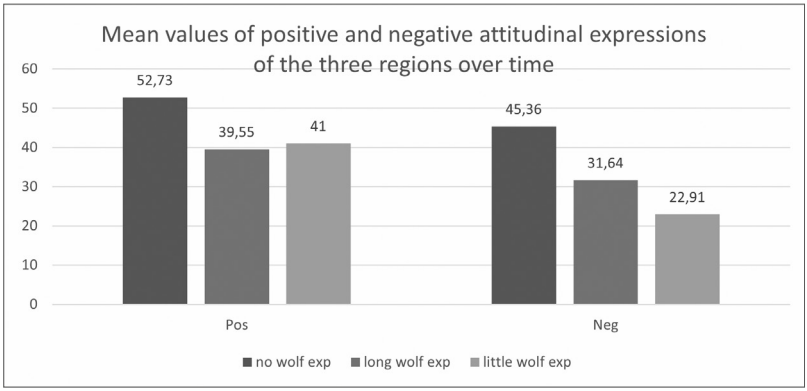

Figure 15: Difference in mean values of attitudinal expressions of the three regions with different levels of wolf experience in Germany over time, 2010 to 2020

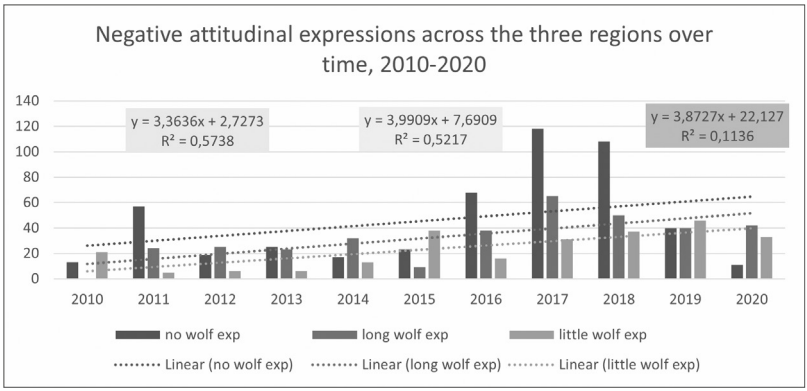

Figure 16: Negative attitudinal expressions across the three regions over time, 2010 to 2020

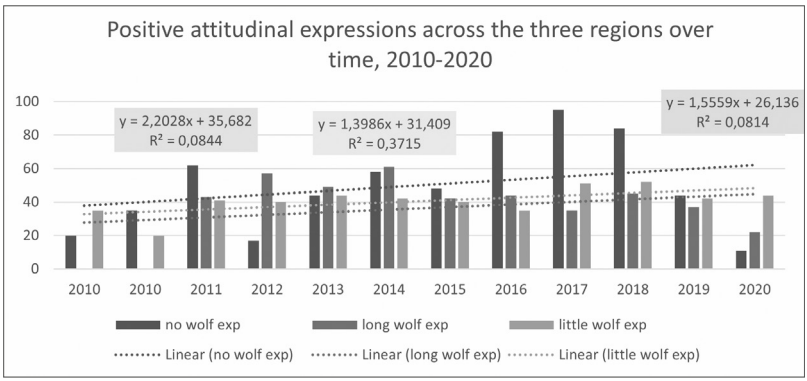

Figure 17: Positive attitudinal expressions across the three regions over time, 2010 to 2020

The results show a difference in positive attitudinal expressions between the region with no wolf experience and the two regions with wolf experience. There appears to be no difference between the positive attitudes of the two regions with wolf experience. There is a difference in negative attitudinal expressions between all three regions. Berlin has the highest number of negative attitudinal expressions, followed by ST and finally NRW. All three regions increase in positive and negative attitudinal expressions over time.