Current Psychology (2024) 43:36246–36258
https://doi.org/10.1007/s12144-024-07005-1

Who thinks the media is hostile?! An examination of individual differences predicting the hostile media effect concerning news media coverage of individuals with a migratory background in Germany

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Accepted: 11 November 2024 / Published online: 2 December 2024

Abstract
The present study explores individual differences related to the perception of the media coverage of immigrants as biased. Building on previous research, relations with the extremity in preexisting attitudes toward immigrants and in affective ratings of non-immigrants versus immigrants are examined. Additionally, the present study extends previous work by investigating dogmatism and intellectual humility, including their potential moderating roles on the relations of extremity in attitudes and affective ratings with perceived media bias. A sample of $N = 212$ (59% men) individuals from the general German population completed self-reports on their preexisting attitudes and affective ratings, as well as dogmatism and intellectual humility online. Moreover, participants rated their perception of news media coverage of immigrants as biased against their views. Results indicate that particularly more extreme negative attitudes toward immigrants and affective ratings favoring non-immigrants relative to immigrants are positively associated with perceiving the media coverage of immigrants as biased. No robust relations of dogmatism, intellectual humility, or their interactions with the extremity scores with perceived media bias were found. These findings underline the importance of negative extremity in (out) group-related attitudes and affect in perceiving the media coverage as biased. New approaches investigating media perceptions from a group-related perspective are discussed.

Keywords Hostile media effect · Dogmatism · Intellectual Humility · Affect · Attitude extremity

The perception of the media and news media coverage as biased or even hostile toward one's own views represents an important phenomenon in current society. This is because it is hypothesized to be related to lower trust in the media and detrimental consequences on, for instance, trust in the government and democracy (Perloff, 2015; Tsfati & Cohen, 2005). Such effects seem especially likely when politically relevant and controversially debated topics are at stake, like those surrounding individuals with a migratory background (or: immigrants). Some factors that may underly and contribute to the perception of the media as biased against one's views have been extensively researched. However, research on individual differences in personal characteristics and their relations to differences in perceived media bias is not yet well-developed. Based on these observations, the aim of the present study was three-fold. First, building on a multitude of previous research, relations of the extremity in individuals' preexisting attitudes toward immigrants and extremity in affective ratings concerning non-immigrants relative to immigrants were related to the perception of bias in media coverage of immigrants. Second, extending previous work, the associations of dogmatism and intellectual humility with the perception of bias in media coverage of immigrants were examined. Third, the moderating effects of dogmatism and intellectual humility on the relations of extremity in attitudes and affective ratings with perceptions of bias in media coverage of immigrants were investigated.

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The hostile media effect

The Hostile Media Effect (HME), also referred to as the Hostile Media Phenomenon/Perception/Bias, is broadly defined as the perception that the media (coverage) is biased against one's views and in favor of opposing views. Although the HME was initially discussed specifically in the context of neutral and balanced media (coverage), there is now also the so-called relative HME (Gunther et al., 2001, 2009). The relative HME posits that, despite the general recognition that the media (coverage) tends to favor one side, individuals perceive the media coverage as relatively more biased against their own views than against opposing views and individuals with opposing views. Accordingly, media (coverage) perceived as biased against one's own views is perceived as relatively more biased, whereas coverage perceived as biased in favor of one's views is perceived as relatively less biased (Perloff, 2015; Tsfati & Cohen, 2005, 2012; Vallone et al., 1985). The (relative) HME has been observed across a multitude of modalities, research designs, and topics (Perloff, 2015), including topics surrounding refugees and immigrants (Arlt & Wolling, 2016; Feldman, 2011).

Frequently investigated correlates of the hostile media effect: involvement and social identification

To explain the HME, research on the effects of factors related to the media (coverage) has primarily focused on source characteristics and perceived reach. At the individual person level, studies have explored factors such as individuals' involvement in the topic covered in the media that is perceived as biased, social identification with groups involved in the topic, and information processing mechanisms (Perloff, 2015). Among others based on the Cognitive-Affective Process Model of Hostile Media Perceptions by Matthes and Beyer (2017), especially involvement but also social identification are important to the present work.

Regarding the role of involvement in the HME, early work states that the HME is particularly applicable to partisans and highly involved individuals (Gunther et al., 2001; Perloff, 2015; Vallone et al., 1985). This proposition is supported by a meta-analysis showing that the HME effect sizes are larger when individuals exhibit a higher level of involvement with the topic of relevance (Hansen & Kim, 2011). Unfortunately, neither the definition nor the coding of involvement in this meta-analysis is entirely clear. Similarly, across the HME literature, involvement has been defined and operationalized in various ways. One possibility to structure the literature on involvement is to make a distinction between cognitive and affective involvement. Cognitive involvement can be defined as the intensity of cognitive effort and mental engagement with a topic, i.e., how much cognitive resources are devoted to that topic. As such, cognitive involvement has been assessed by various means, including attitudes and their extremity, strength or certainty, as well as the commitment and importance attributed to the topic (Gunther et al., 2009; Matthes, 2013; Tsfati & Cohen, 2012). Affective involvement can be understood as the intensity of emotions experienced about the topic. The work by Matthes (2013), for instance, indicates that both cognitive and affective involvement are important predictors of the HME.

In line with this finding, the Cognitive-Affective Process Model of Hostile Media Perceptions (Matthes & Beyer, 2017) proposes a cognitive, an affective, and a cognitive-affective route to the HME. The cognitive route describes that individuals who exhibit higher cognitive involvement categorize more items as hostile to their own views, leading to the HME (Matthes & Beyer, 2017). Thus, while various mechanisms have been discussed as mediators linking cognitive involvement and the HME – (i) selective recall, (ii) selective categorization, (iii) different standards, and (iv) prior beliefs about media bias (Perloff, 2015) – this model focuses specifically on selective categorization based on empirical research highlighting the importance of this mechanism (Schmitt et al., 2004). Regarding the affective route, based on affective priming theory, the model additionally proposes that particularly negative affective involvement activates negative affective categories that become quickly available to individuals when judging related news, leading them to evaluate the news negatively and to the HME accordingly (Matthes & Beyer, 2017). Finally, cognitive and affective involvement are likely to be interrelated. In this regard, the Cognitive-Affective Process Model of Hostile Media Perceptions proposes a cognitive-affective route to the HME, where cognitive involvement affects affective involvement, which in turn impacts the HME, following an appraisal approach (Matthes & Beyer, 2017).

Next to involvement, the social identification approach to the HME is relevant to the present study. It has been posited that media coverage of a topic pertaining to one's in- or outgroup results in heightened group salience. The increased group salience, in turn, leads to self-categorization and differentiation between in- and outgroup members, as well as the perception of the ingroup as superior to the outgroup (Perloff, 2015). This idea is in line with social identity theory (Tajfel & Turner, 2004). In this process, a HME, and a derogation of media coverage accordingly, could be a means of keeping up or increasing the legitimacy of the ingroup compared to that of the outgroup, regardless of the actual slant of the media coverage.

While the Cognitive-Affective Process Model of Hostile Media Perceptions focuses on involvement, it can be assumed that both involvement and social identification are intertwined, especially when it comes to group-related issues covered in the media. Higher social identification with a group may be related to group-related affect, including negative affect toward the outgroup. This could not only lead to a higher negative affect toward the general issue at hand but could also be directly understood as higher affective involvement in a group-related issue. Negative affect, in turn, is related to a higher HME according to the Cognitive-Affective Process Model of Hostile Media Perceptions. Thus, although the Cognitive-Affective Process Model of Hostile Media Perceptions deals with affect toward a topic, the assumptions about the affective and the cognitive-affective route from the model may be transferable to group-related affect, making both group-related cognitive and affective involvement interesting variables to be examined in relation to the HME.

Additional variables potentially related to the hostile media effect: dogmatism and intellectual humility

Next to involvement and social identity approaches, other psychological variables that may underlie the HME have been less studied. Thus, the present work aimed to more thoroughly examine the potential basis of the HME by focusing on individual differences and thereby extend previous work.

According to Oeberst and Imhoff (2023), the foundation of the HME is the fundamental belief that one makes accurate assessments of the world. Considering this, any individual differences variable being positively (negatively) related to such beliefs should be positively (negatively) related to the HME. Accordingly, two psychological variables that appear to be of particular relevance to the HME are dogmatism and intellectual humility. The term dogmatism, which was first introduced by Rokeach (1954), is defined as "relatively unchangeable, unjustified certainty" (Altemeyer, 2002, p. 713). Consequently, individuals exhibiting high levels of dogmatism should be more prone to be certain about making accurate assessments of the world, and the HME accordingly. Supporting this notion are findings showing that information consistent with one's views is rated as more positive in individuals with high versus low dogmatism (Kleck & Wheaton, 1967). In contrast, intellectual humility describes an individual's tendency to acknowledge, i.e., be aware and admit, the limitations of their own knowledge, the potential inaccuracy of their beliefs, and the intellectual capabilities of others, and being open to the input, ideas, and corrections by others. Intellectual humility can be assessed both in general and related to a specific topic (Porter et al., 2022a, b). In both cases, intellectual humility seems to describe an opposing tendency to the one underlying the HME. Thus, it can be hypothesized that individuals scoring high in general intellectual humility should be less prone to assume they make accurate assessments of the world and the HME accordingly. Supporting this assumption are findings showing that intellectual humility, both specific and general, is negatively related to political hostility toward individuals with opposing views (Smith, 2023), and that general intellectual humility is positively related to openness to disagreement and opposing perspectives (Porter & Schumann, 2018). The notion that "[r]esearch on intellectual humility offers an intriguing avenue to safeguard against human errors and biases." further underlines its importance for the HME (Porter et al., 2022b, p. 524).

The present study

The present study focuses on the HME concerning topics surrounding immigrants in Germany. This is because the topics around individuals with a migratory background or immigrants are politically relevant and receive widespread media coverage in Germany (Bundeszentrale für politische Bildung, 2021; Der Spiegel, 2023; Schayani, 2023; tagesschau.de, 2023). Additionally, several specific recent events have garnered widespread media coverage. These events include a right-wing extremist meeting on "re-migration" in late 2023 (tagesschau.de, 2024a), where the topic of immigrants leaving Germany, if necessary under duress, was discussed. In addition, a viral video of individuals expressing anti-immigrant sentiment in a club on the German island of Sylt (tagesschau.de, 2024b) received widespread attention in Germany. The reactions to these events were largely negative, reflecting outrage over the events. This dichotomy of anti- versus pro-immigrant sentiment is also consistent with findings showing that attitudes toward immigrants show considerable variance in Germany, including extreme views (European Social Survey European Research Infrastructure (ESS ERIC), 2023; Schröter, 2023; Zick & Krott, 2021), and that immigration-related policies are seen as a driver of polarization in Germany (Roose, 2021). These observations make the topics surrounding immigrants interesting to be studied in the context of the HME in Germany.

Based on previous literature on the role of involvement in the HME, it can be assumed that more extreme positive and negative attitudes toward immigrants both are related to a higher HME: More extreme negative (positive) attitudes toward immigrants are likely to be related to a higher

HME in terms of feeling that the media is more positively (negatively) biased toward immigrants. Particularly the assumption related to negative attitudes is supported by the the Cognitive-Affective Process Model of Hostile Media Perceptions and previous work showing that anti-immigrant sentiment and the perception of immigrants as a threat are positively related to the perception that immigrants are treated favorably in the news media (McKeever et al., 2012; Watson & Riffe, 2013). Moreover, Arlt and Wolling (2016) report positive relations between perceiving refugees as a threat and the HME in terms of perceiving the respective news coverage as too positive.

Next to extremity in attitudes, another variable that may be relevant to the HME is individuals' extremity in the differences of their affective ratings of non-immigrants versus immigrants; or in other words: extremity in difference between one's (positive) feelings for one's ingroup relative to one's (negative) feelings toward the outgroup [the present work uses a sample of non-immigrant individuals]. Such affective ratings of the in- versus outgroup in the context of social and political groups, particularly political parties, are also known as affective polarization (Iyengar & Westwood, 2015; Jost et al., 2022), and have previously been applied to the groups of non-immigrants versus immigrants (Wojcieszak & Garrett, 2018). Supporting the general notion of a relation between such differences in affective ratings and the HME, both have been positively associated in previous work. For instance, Tong et al. (2021) found that affective polarization related to voters of different parties was positively related to perceptions of greater ideological bias in news against one's own ideological leanings in samples from Brazil, Mexico, and the United States. Moreover, affective polarization, and therefore also individuals' affective ratings of non-immigrants and immigrants, can be based on social identity theories (Bliuc et al., 2021; Iyengar et al., 2012). Accordingly, higher extremity in differences in the affective ratings of the in- versus outgroup could be seen either as high (affective) involvement or as a consequence of group identification processes and thus be related to a higher HME: More extreme differences in affective ratings favoring non-immigrants relative to immigrants (favoring immigrants relative to non-immigrants) are likely to be related to a higher HME in terms of feeling that the media is more positively (negatively) biased toward immigrants. Taken together, the first two hypotheses of the present study are:

H1 Extremity in attitudes toward immigrants is positively related to the HME concerning reports on immigrants.

H2 Extremity in the affective ratings concerning non-immigrants relative to immigrants is positively related to the HME concerning reports on immigrants.[1]

Moreover, based on the aforementioned literature on dogmatism and intellectual humility, the following hypotheses are proposed:

H3 Dogmatism is positively related to the HME (concerning reports on immigrants).

H4 General intellectual humility is negatively related to the HME (concerning reports on immigrants).

Finally, it is reasonable to assume that dogmatism and intellectual humility moderate the proposed associations of extremity in attitudes and extremity in the difference in affective ratings of the in- versus outgroup with the HME. Even if one may be more extreme in one's attitudes or affective ratings, it is likely that one will not perceive the HME as strongly if one is generally not certain about one's views (low dogmatism) or if one is generally open to the possibility that one's knowledge and views may be incomplete and incorrect (high intellectual humility). Thus, the final two hypotheses of the present work are:

H5 The positive relations of both extremity in attitudes toward immigrants and extremity in affective ratings concerning non-immigrants relative to immigrants with the HME concerning reports on immigrants are attenuated by lower dogmatism.

H6 The positive relations of both extremity in attitudes toward immigrants and extremity in affective ratings concerning non-immigrants relative to immigrants with the HME concerning reports on immigrants are attenuated by higher intellectual humility.

[1] According to the Cognitive-Affective Process Model of Hostile Media Perceptions, especially negative affect (toward immigrants) – but not positive affect – increases the HME. However, this was not a preregistered hypothesis and is therefore not mentioned here.

Materials and methods

Openness and transparency

The present study, including hypotheses, recruitment strategy, power analysis, data cleaning, and analysis approach was preregistered at the Open Science Framework (OSF: https://osf.io/d6r7a). Data and code are available from the OSF as well (https://osf.io/94bkz/). Because the measures used have been published elsewhere (see references), the wording of the German items is not published here or on the OSF but is available from the author.

Procedure

The study was programmed on the Qualtrics platform (https://www.qualtrics.com). Individuals from the general German population from the age of 18 were recruited by Bilendi GmbH (https://www.bilendi.de/) to achieve diversity in age, gender, educational background, and federal states from which the participants came. Data collection took place in May 2024.

All participants were informed about the study and provided their electronic informed consent before participation. After participation, they received information on the complexity of topics surrounding immigrants and immigration to Germany, and they were presented with links to websites to get further information on the topics. They received an incentive according to the regulations of Bilendi GmbH. The study was approved by the local ethics committee of the University of Stuttgart, and the study was performed in line with the principles of the latest revision of the Declaration of Helsinki.

Sample

After data cleaning (see Supplementary Information (SI)), the final sample size was $N = 212$ ($n = 126$ men, $n = 86$ women) individuals without a migratory background. This sample size slightly exceeds the necessary preregistered samples size of $N = 208$, which was derived from power analysis. The mean age was $M = 50.53$, $SD = 15.58$ years, ranging from 18 to 75 years. Most participants reported a secondary school leaving certificate ($n = 71$) or a university – including a university of applied sciences – degree ($n = 68$) as their highest educational degree.

Measures

Interest in the topic of immigration

Next to age and gender, interest in the topic of immigration was assessed as a control variable. For this, the three items on interest in politics used in Study 3 by Bromme et al. (2022) were applied to the topic of immigration and used in the present study. The items were answered on a 5-point Likert scale ranging from 1 = "do not agree at all" to 5 = "completely agree". Cronbach's α was 0.92.

Attitudes toward immigrants

Three items from the European Social Survey (2020) were used to measure participants' attitudes toward immigrants: Participants were asked to rate the extent to which they believe that immigrants coming to Germany are good or bad for the economy, cultural life, and Germany as a place to live on an 11-point scale ranging from 0 to 10, with higher scores indicating more positive ratings of immigrants coming to Germany. One additional item on whether the number of immigrants to Germany should be reduced or increased was rated on an 11-point scale ranging from 0 = "reduced a lot" to 10 = "increased a lot" (adapted from Eger et al. (2022)). Note that prior to presenting these items and items of other scales, "immigrants" were described as people who come from another country and settle in Germany in the present study. The scores of all four items were combined into one mean score with a Cronbach's α of 0.93. Additionally, an extremity score was built by taking the absolute difference of the participants' mean scores from the midpoint of the scale (5).

Affective ratings of non-immigrants versus immigrants

The feeling thermometer (American National Election Studies, 2021), which is often used to assess affective polarization, was applied to immigrants and non-immigrants. Specifically, participants were asked to rate both groups on a scale from 0 to 100, with higher scores indicating more positive affect. To compute a difference in affective ratings score, feelings toward immigrants were subtracted from feelings toward non-immigrants. Hence, this difference in affective ratings score can range from −100 to +100. In the preregistration, the subtraction in the opposite direction is described. However, this was changed during manuscript writing because the study required participants to not have a migratory background (see data cleaning described in the SI). Therefore, the order was changed so that higher scores indicated more positive affective ratings in favor of the participants' in- versus the outgroup. Additionally, an extremity score was created by calculating the absolute difference in the difference scores from the midpoint of the scale (0).

Dogmatism

The updated 11-item dogmatism scale by Shearman and Levine (2006) was used. The items were translated into German by two independent bilingual speakers using a rigorous forward-backward translation procedure. Items were answered on a 5-point Likert scale ranging from 1 = "completely disagree" to 5 = "completely agree".

A confirmatory factor analysis (CFA) using the maximum likelihood (ML) estimator was conducted to test the one-factor solution. The CFA yielded a Comparative Fit Index (CFI) of 0.736 and a Root Mean Square Error of Approximation (RMSEA) of 0.149. Several items loaded lower than |0.30| on the factor (items 01, 06, 10, 11; based on standardized loadings), potentially explaining the low fit indices (Hu & Bentler, 1999). Excluding these items led to a CFI of 0.985 and an RMSEA of 0.053. Cronbach's alpha across the eleven items – after re-coding reverse formulated items – was 0.80. Cronbach's alpha across the seven items (excluding items 01, 06, 10, 11) was 0.81. Despite higher fit indices for the seven-item scale, in line with the literature and the preregistration, the 11-item version was used in the present work. This decision is also based on Shearman and Levine (2006) similarly reporting alpha reliabilities of 0.79/0.77 for the 11-item version. Furthermore, Cronbach's alpha was similar for the complete 11-item versus the reduced 7-item scale, additionally supporting the decision.

General intellectual humility

Consistent with dogmatism being assessed as a broad, topic-unspecific concept, general rather than specific intellectual humility was assessed. For this purpose, the nine items by Porter and Schumann (2018) were presented to the participants, who were asked to answer the items on a 7-point Likert scale ranging from 1 = "strongly disagree" to 7 = "strongly agree". The items were translated into German by a rigorous forward-backward translation procedure by two independent bilingual speakers.

The CFI derived from a CFA testing the one-factor solution using the ML estimator was 0.469, and the RMSEA was 0.211. The low scores in fit indices (Hu & Bentler, 1999) in the present work were probably due to low loadings of the negatively scored items (items 06, 08, 09) between |0.001| and |0.069| based on standardized loadings. In addition, the existence of a method effect for the negatively worded items, as found in the original work, may explain these fit indices. In line with the authors of the original scale and the preregistration, still all nine items were used to build the total score. A mean score across the nine items – after re-coding reverse formulated items – was computed. Cronbach's α was 0.62 (0.74 if negatively scored items were excluded). In the original study, the average internal consistency was 0.74 (ranging from 0.67 to 0.79 in different studies).

Hostile media effect

The five items used in Study 1 by Matthes (2013) were translated by two bilingual speakers using a rigorous forward-backward translation procedure and applied to perceived bias in media coverage of topics surrounding immigrants in Germany ("Related to topics surrounding immigrants… "). As such, the items do not specify in which absolute direction (negatively-positively toward immigrants) the bias is perceived but whether it is perceived to be biased against one's own views. Each item was answered on a 5-point Likert scale from 1 = "do not agree at all" to 5 = "fully agree".

The CFA using the ML estimator and testing a one-factor solution revealed satisfactory fit indices with a CFI of 0.997 and an RMSEA of 0.029 (Hu & Bentler, 1999). A mean score was computed after re-coding a negatively formulated item. Cronbach's α was 0.81.

Statistical analyses

The statistical software R version 4.4.0 and R Studio version 2024.04.1 + 748 were used (R Core Team, 2024; RStudio Team, 2020). First, descriptive statistics were computed, and zero-order correlation analyses were performed (preregistered as exploratory analyses; see SI). Afterward, a linear regression model was calculated to predict the HME scores by age, gender, interest in the topic of immigration, extremity in attitudes toward immigrants, extremity in the difference in affective ratings score, dogmatism, general intellectual humility, and the interaction terms of both extremity in attitudes toward immigrants and extremity in the difference in affective ratings score with each dogmatism and intellectual humility.

Results

Descriptive statistics

Table 1 presents descriptive statistics for the variables of interest. Both individuals with negative (mean attitude score < 5) and positive (mean attitude score > 5) attitudes toward immigrants descriptively perceived the media as biased against their own views. However, the HME score was higher among those with negative attitudes (negative: $n = 122$, $M_{HME} = 3.57$, $SD_{HME} = 0.80$; positive: $n = 82$, M_{HME}

Table 1 Descriptive statistics of variables of interest in the total sample ($N = 212$)

	M	*SD*	Median
Interest	3.22	1.13	3.33
Attitudes	4.18	2.73	4.25
Extremity in Attitudes	2.34	1.62	2.00
Difference in Affective Ratings	20.44	29.52	10.50
Extremity in Difference in Affective Ratings	24.92	25.82	20.00
Dogmatism	2.15	0.54	2.09
General Intellectual Humility	5.13	0.70	5.11
Hostile Media Effect	3.21	0.88	3.20

= 2.73, SD_{HME} = 0.77; $t(202) = 7.42$, $p < 0.001$, $d = 1.06$; neutral: $n = 8$, M_{HME} = 2.65, SD_{HME} = 0.41). Note that this comparison was not preregistered.

Linear regression model

As presented in Table 2, both the extremity in attitudes toward immigrants score and the extremity in the difference in affective ratings score were significantly positively related to the HME score. No other associations were significant.

Table 2 Regression model to predict the hostile media effect scores in the total sample ($N = 212$)

	B/β	*SE*	*t*	*p*
Intercept	−0.04	0.07	−0.57	0.572
Age	0.02	0.06	0.27	0.788
Gender	0.16	0.12	1.40	0.163
Interest	−0.06	0.06	−0.98	0.326
Extremity in Attitudes	0.33	0.06	5.29	< 0.001
Extremity in Difference in Affective Ratings	0.33	0.07	5.09	< 0.001
Dogmatism	0.11	0.07	1.62	0.106
General Intellectual Humility	−0.01	0.07	−0.09	0.926
Dogmatism × Extremity in Attitudes	0.07	0.07	0.98	0.328
Dogmatism × Extremity in Difference in Affective Ratings	−0.11	0.07	−1.55	0.123
General Intellectual Humility × Extremity in Attitudes	0.03	0.07	0.42	0.676
General Intellectual Humility × Extremity in Difference in Affective Ratings	0.02	0.06	0.29	0.771

All metric variables were standardized. Gender: 0 = men, 1 = women. Given the standardization of all metric variables, the *B* coefficient equals the β coefficient for these variables and their interactions. If gender is additionally standardized, the respective coefficient changes to 0.08, and the coefficient of the intercept changes to 0.02. When using the shortened dogmatism scale score and the shorten intellectual humility scale score, the interactions of dogmatism with extremity in attitudes ($\beta = 0.15$, $p = 0.050$ (more precisely: 0.0498)) and extremity in the difference in affective ratings ($\beta = -0.17$, $p = 0.013$) become additionally significant. These results indicate less strong positive slopes for the relation between extremity in attitudes and the HME with lower dogmatism (in line with H5) and stronger positive slopes for the relations between extremity in the difference in affective ratings and the HME with lower dogmatism (seemingly contradicting H5). Since this was not a preregistered analysis, this is not further explored here

As mentioned in the preregistration, for exploratory reasons, an additional model using the raw scores rather than the extremity scores of attitudes toward immigrants and the difference in affective ratings score was computed. The results of this model are presented in the SI. The results of this additional model show that more *negative* attitudes toward immigrants and more *positive* feelings toward non-immigrants relative to immigrants were associated with a higher HME. These findings led to exploratory (post-hoc, not preregistered) investigations of the associations between the two extremity scores and the HME split for individuals with (i) negative versus neutral and positive attitudes toward immigrants (mean score of < 5 versus ≥5) and (ii) more positive feelings toward non-immigrants (difference in affective ratings score > 0) versus equal and more positive feelings toward immigrants (difference in affective ratings score ≤ 0). As can be seen in Fig. 1, the positive relations of extremity in attitudes and the difference in affective ratings scores with the HME (see Table 2) hold (i) only for individuals with negative attitudes toward immigrants (negative attitudes: $n = 122$, $r = 0.64$, $p < 0.001$; neutral/positive attitudes: $n = 90$, $r = -0.05$, $p = 0.613$; Fisher's $z = 5.73$, $p < 0.001$, $d = 0.81$) and (ii) individuals with more positive feelings toward non-immigrants relative to immigrants (more positive toward non-immigrants: $n = 131$, $r = 0.56$, $p < 0.001$; neutral/more positive toward immigrants: $n = 81$, $r = 0.13$, $p = 0.253$; Fisher's $z = 3.50$, $p < 0.001$, $d = 0.50$). These findings suggest that more extreme negative attitudes – but not more extreme positive attitudes – and more extreme differences in the affective ratings in favor of non-immigrants – but not in favor of immigrants – are related to the HME.

Discussion

The present study sought to examine the individual-level predictors of the HME concerning media coverage of immigrants. Building on previous research, the associations of the HME with extremity in in-/outgroup related preexisting attitudes and affect were investigated. Extending previous work, the roles of dogmatism and general intellectual humility were also investigated, as well as the moderating effects of these concepts on the associations of extremity in group-related attitudes and affect with the HME.

Hypotheses H1 and H2 posited positive associations of extremity in attitudes toward immigrants – the outgroup and the featured group in the news the HME was assessed about – as well as extremity in the difference in affective ratings of non-immigrants relative to immigrants – in- versus outgroup – with the HME. Both hypotheses were

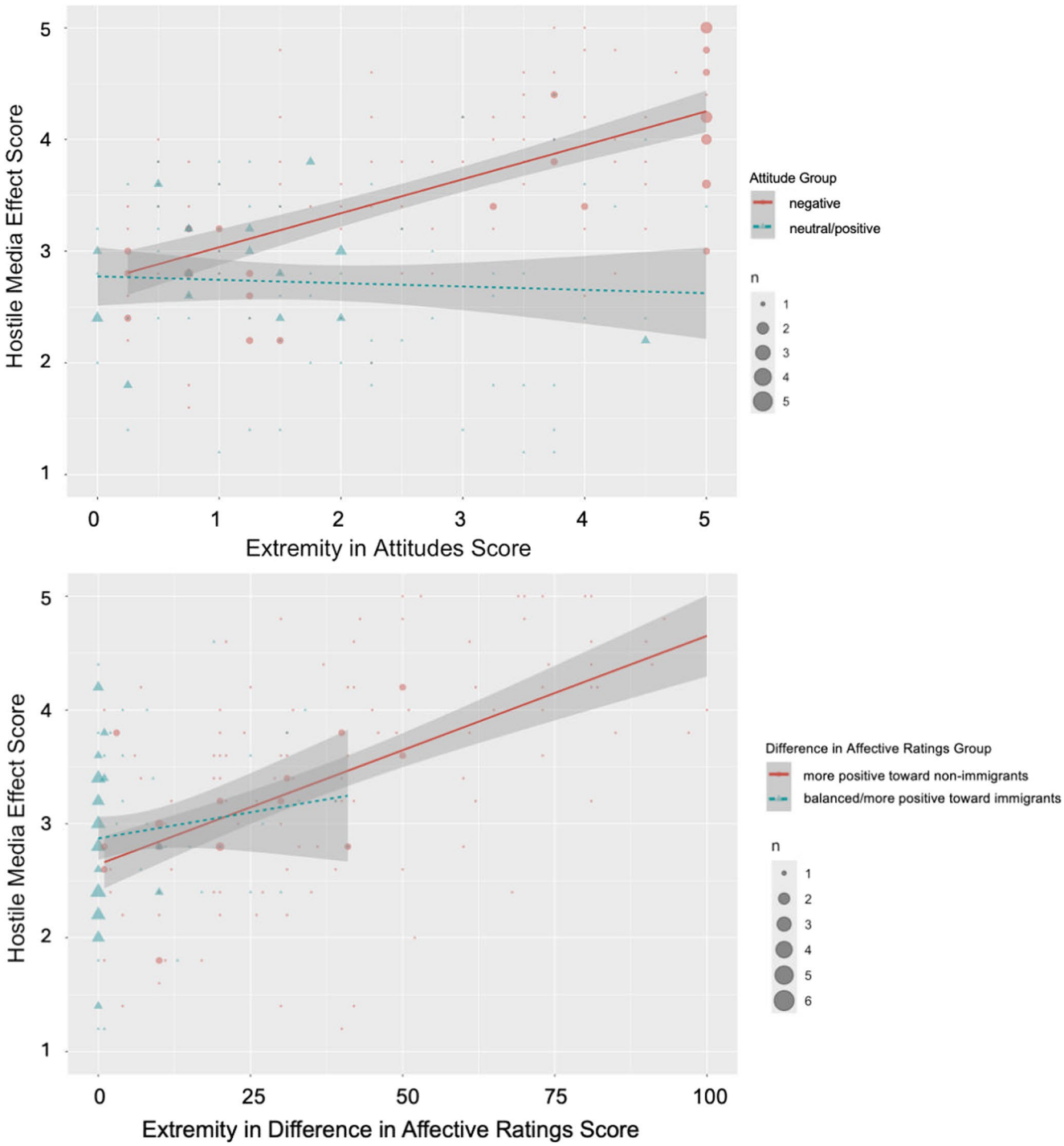

Fig. 1 Scatterplots on relations between extremity in attitudes and extremity in difference in affective ratings scores split by negative versus neutral and positive attitudes and positive versus balanced and negative difference in affective ratings scores, respectively. *Note:* Scatterplots created in R depicting relations between extremity in attitudes toward immigrants and Hostile Media Effect scores split by negative (red, solid line and points) versus neutral and positive attitudes (turquoise, dashed line and triangles) in the upper half; and relations between extremity in difference in affective ratings scores and Hostile Media Effect scores split by positive (more positive toward non-immigrants; red, solid line and points) versus balanced and negative difference in affective ratings scores (more positive toward immigrants; turquoise, dashed line and triangles) in the lower half

confirmed both through correlations (see SI) and regression analyses. Further exploratory analysis (see SI), however, revealed that attitudes toward immigrants were negatively related to the HME. This finding indicates that individuals with more negative attitudes toward immigrants perceive the media coverage of immigrants as more biased against their views and, thus, potentially more favorable toward immigrants. This finding is consistent with the results of studies demonstrating positive associations between higher perceptions of immigrants as a threat or anti-immigrant/-refugee attitudes and perceiving the news media coverage as favorable toward immigrants/refugees and the HME accordingly (Arlt & Wolling, 2016; McKeever et al., 2012; Watson & Riffe, 2013). The present result more broadly also aligns with the findings of a study reporting positive relations between conservative ideology and perceived media bias (Huge & Glynn, 2010). Considering this finding of the present work, non-preregistered post-hoc analyses were conducted. These analyses revealed that the relation between extremity in attitudes toward immigrants and the HME was exclusive to those with negative attitudes toward immigrants. Concerning extremity in the difference in affective ratings of non-immigrants versus immigrants, analogous findings were observed: The more extreme the difference in affective ratings, i.e., the greater the absolute difference between feelings for non-immigrants versus immigrants, the higher the HME, supporting H2. However, as with the findings regarding attitudes, the exploratory analysis (see SI) demonstrated positive relations between the differences in affective ratings and the HME. This finding suggests that more positive feelings toward non-immigrants relative to immigrants are related to the HME. Moreover, post-hoc and non-preregistered analyses revealed that the positive relations of extremity in the difference in affective ratings with the HME were significant only among individuals who exhibited more positive feelings toward non-immigrants relative to immigrants. The latter finding must, however, be considered against the limited range of scores in favor of immigrants, which only ranged to −41 but did not extend to the maximum negative score of −100.

Overall, the results suggest that the HME is related to the extremity of attitudes toward immigrants and extremity in feelings toward non-immigrants versus immigrants only among individuals with negative attitudes toward immigrants and more positive feelings toward non-immigrants relative to immigrants; not among individuals with neutral and positive attitudes and feelings toward immigrants. As such, H1 and H2 are partly confirmed.

It seems highly interesting to interpret these findings in a group context: It appears that extremity in attitudes toward the outgroup and in the difference in affective ratings of the in- versus outgroup are only related to the HME among those with negative attitudes toward the outgroup (immigrants) and more positive feelings toward the ingroup (non-immigrants) relative to the outgroup (immigrants). Regarding the latter relation, post-hoc and non-preregistered analyses conducted during interpreting the findings additionally revealed that these effects were driven by relations with the ratings of the outgroup ($r = -0.54$, $p < 0.001$ between the affective ratings of immigrants and the HME in individuals with more positive feelings toward non-immigrants relative to immigrants) but not by relations with ratings of the ingroup ($r = 0.13$, $p = 0.138$ between the affective ratings of non-immigrants and the HME in individuals with more positive feelings toward non-immigrants relative to immigrants).

In the context of the present study, this indicates that individuals of one group (non-immigrants) who hold more negative stances (attitudes/feelings) toward the outgroup demonstrate a stronger HME concerning media coverage of the outgroup. Conversely, among individuals of the group (non-immigrants) holding positive stances toward the outgroup, these stances seem unrelated to the HME. Thus, the importance of extremity in attitudes and the difference in affective ratings of the in- versus outgroup as indicators of (cognitive/affective) involvement or group identification processes on the HME concerning media coverage of the outgroup seem to be dependent on whether individuals hold negative or positive stances on the outgroup. More specifically, it seems like while negative attitudes/feelings strengthen the HME or the HME strengthens negative attitudes/feelings, positive attitudes/feelings are not as strongly related to an HME. Particularly related to affect, this finding is in line with the affective route of the Cognitive-Affective Process Model of Hostile Media Perceptions, where especially negative affective involvement is related to a higher HME. The negative relation between positive affect and an HME as proposed in the model, however, was not found in the present work (Matthes & Beyer, 2017).

Interpreting the findings from the angle of social identities, non-immigrant individuals with negative stances on immigrants may perceive immigrants as a threat to their ingroup's social status or resources. In line with Realistic Group Conflict Theory, an actual or perceived threat can be related to variables like higher hostility, less empathy, and higher counter-empathy toward the outgroup (Chang et al., 2016). In addition, higher perceived threat through immigrants has been related to an HME before (Arlt & Wolling, 2016; McKeever et al., 2012; Watson & Riffe, 2013). Thus, perceived threat may explain the relations found in the present work, especially regarding extreme negative stances.

Given that the groups examined in the present work have a clear majority versus minority group aspect to them, it would be highly interesting to examine whether analogous relations to the ones found in the present work were to be

found for (i) the HME concerning media coverage of the majority group (non-immigrants), and in (ii) individuals from the minority group (immigrants). As such, it would be interesting to examine, for instance, if more extreme negative attitudes and feelings toward one's outgroup are related to the HME concerning media coverage of the outgroup also in minority groups or in the absence of clear minority/majority groups. Although seemingly highly relevant, there appears to be little empirical work on group-related concepts like group status in the context of the HME at this time; but see Hartmann and Tanis (2013) or Kim (2023). For reasons outlined in the limitations section, such examinations were not conducted in the present work either. Nevertheless, similar to the inclusion of group status, the inclusion of more contextual variables, such as politics, legal regulations, and social realities in a given country, and how they shape groups and related perceptions and phenomena, such as the HME, seems relevant (Cikara et al., 2022).

Moreover, an alternative explanation for the findings needs to be considered: The HME may be associated with more extreme negative, but not positive, stances on immigrants because most news media actually report rather positively on immigrants. An objective examination of the actual coverage is challenging. Nevertheless, in this case, individuals with negative stances on immigrants would be accurate in their perceptions. However, if individuals were accurate in their perceptions, then individuals with positive stances should also be accurate in their perceptions. Therefore, there should also be a relation found among individuals with positive stances: If the news coverage was mildly positive, the HME score (as assessed in the present paper) should be positively related to extremity in stances on immigrants among individuals with positive stances. If the news coverage was extremely positive, the HME score should be negatively related to extremity in stances on immigrants in individuals with positive stances. However, this does not seem to be the case; definitely not for attitudes, and seemingly also not for affective ratings (see Fig. 1; Supplementary Fig. 1).

H3 on a positive relation between dogmatism and the HME was only supported in zero-order correlations (see SI), but not in the regression model including further predictor variables. This finding indicates that other variables investigated in the present study may be more important in the prediction of the HME than dogmatism. H4, which proposed a negative relation between intellectual humility and the HME, could not be confirmed in the present study. It was assumed that there would be a positive relation of dogmatism and a negative relation of intellectual humility with the assumption that one is making correct assessments of the world. This assumption, as posited by Oeberst and Imhoff (2023), should, in turn, be positively related to the HME. Future studies should therefore test whether dogmatism and especially intellectual humility are indeed related to the aforementioned assumption, and whether this assumption is indeed related to the HME, to elucidate the present non-significant findings. Additionally, potential moderators on these relations could be examined to try to explain the current non-significant findings.

Related to H5 and H6, which were about interaction effects, no significant findings were found in the original analyses. However, when using the shortened dogmatism and intellectual humility scales, the interactions with dogmatism became significant: The slopes of the relation between extremity in attitudes and the HME were less strongly positive with lower dogmatism, which is in line with H5. In addition, higher positive slopes for the relation between extremity in the difference in affective ratings scores and the HME with lower dogmatism were found, which seems to contradict H5. These findings should not be over-interpreted. However, they may pave the way for future investigations on dogmatism and its role in the HME using other scales.

Finally, the present findings should be interpreted against the following limitations. First, the present study's cross-sectional self-report survey design disallows for causal conclusions and results may be affected by response biases. Concerning causality, extremity in attitudes and affect are probably bidirectionally related to the HME, where higher preexisting extremity leads to a more biased perception of media coverage and vice versa. Particularly in today's high-choice media environment, an HME might lead to the consumption of alternative and hyperpartisan media aligning with one's views, which may increase extremity indirectly. However, evidence for such effects remains limited (Guess et al., 2021; Wojcieszak et al., 2023). Second, the self-report measure to assess the HME did refer to the media and media coverage in general, which allows for variability in the sources participants referred to when answering the items. A manual inspection of an item in open response format asking participants which source they thought of indicates that many participants thought about mainstream public-service news sources when responding to the HME items. Moreover, the HME measure can be criticized for assessing a general perceived bias without specifically asking for the direction. Future studies may want to directly ask how favorable/positive versus unfavorable/negative the news media coverage on a topic or group is perceived and compare it to individuals' own stances. Similarly, the scale used to assess intellectual humility may be criticized for its rather low internal consistency, and the dogmatism scale may be criticized for low loadings of some items. These findings are, however, in line with previous work. Nevertheless, future studies could replicate the present one

applying other measures. Furthermore, the findings' generalizability to different media systems, topics, and samples from other countries requires further research. In fact, given the sample size of $N = 212$ (based on power analysis; see preregistration), also the representativeness for the German context is limited despite having used a large panel provider to sample a diverse set of individuals from the general adult German population. In this regard, it is additionally important to note that the present study only reflects the relations in the group of non-immigrants and their judgment of the HME concerning media coverage of immigrants. It would be interesting to also examine the HME concerning media coverage of non-immigrants in both the group of non-immigrants and the group of immigrants in Germany. However, clearly defining which news stories are related to "non-immigrants" is challenging. This is why the present study focused on the relations in non-immigrants and on media coverage of immigrant-related topics. Lastly, dogmatism and intellectual humility were assessed as general tendencies rather than specific to immigrants. This was done to capture broad individual tendencies without conflating these potential moderators with measures of involvement like attitude strength and certainty. Nevertheless, specific intellectual humility on topics surrounding immigrants might be more strongly related to the HME concerning the media coverage of the same topics.

In conclusion, the present study indicates that both extremity in attitudes and extremity in affective ratings of the in- (non-immigrants) versus outgroup (immigrants) are positively related to the HME in the context of topics surrounding immigrants. These relations, however, seem to be exclusive to those individuals from the majority in-group with negative attitudes and feelings toward the out-/minority group, i.e. non-immigrants with negative stances on immigrants. Neither dogmatism nor general intellectual humility appear to be consistently related to the HME. Finally, the relations of extremity in attitudes and extremity in affective ratings of the in- (non-immigrants) versus outgroup (immigrants) with the HME do not seem to be stringently moderated by either dogmatism or intellectual humility.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s12144-024-07005-1.

Acknowledgements I acknowledge the support of the Ministerium für Wissenschaft, Forschung und Kunst Baden-Württemberg (MWK, Ministry of Science, Research and the Arts Baden-Württemberg under Az. 33-7533-9-19/54/5) in "Künstliche Intelligenz & Gesellschaft: Reflecting Intelligent Systems for Diversity, Demography and Democracy (IRIS3D)" and the support by the "Interchange Forum for Reflecting on Intelligent Systems" (IRIS) at the University of Stuttgart. Further, I acknowledge the support by the Stuttgart Center for Simulation Science (SimTech).

Author contributions Cornelia Sindermann: Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Project administration, Supervision, Validation, Visualization, Writing—original draft, Writing—Review & Editing, Project Administration.

Funding Open Access funding enabled and organized by Projekt DEAL. No funding was received for conducting this study.

Data availability To follow the highest open science standards, the present work was preregistered (https://osf.io/d6r7a), and data and analysis codes are available at the Open Science Framework website (https://osf.io/94bkz/). Because the measures used have been published elsewhere (see references in manuscript), the wording of the items is not published on the OSF.

Declarations

Ethics approval, consent The study was approved by the local ethics committee of the University of Stuttgart (24-012), and the study was performed in line with the principles of the latest revision of the Declaration of Helsinki. All participants were informed about the study and provided their electronic informed consent before participation.

Assistance During the preparation of this work the author used chatgpt (https://chat.openai.com/) in order to rephrase some sentences. Moreover, the author used Grammarly (https://www.grammarly.com/) as well as DeepL Write (https://www.deepl.com/write) to ensure grammatical correctness of the text. After using these tools, the author reviewed and edited the content as needed and takes full responsibility for the content of the publication.

Conflicting interests The author has no competing interests to declare that are relevant to the content of this article.

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