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Narrativity and Its Effects on Reading Experiences, Empathy, and Intergroup Attitudes

Marieke Klöppel¹, Markus Appel², and Tobias Richter¹

¹ Department of Psychology IV, Julius-Maximilians-Universität Würzburg

² Psychology of Communication and New Media, Julius-Maximilians-Universität Würzburg

According to various theoretical approaches, stories provide the opportunity to enhance empathy and intergroup attitudes. In two preregistered online experiments with U.S.-based participants recruited via an online panel, we examined how narrativity affects the impact of a graphic narrative on reading processes, empathy, and intergroup attitudes. In Experiment 1 ($N = 781$), narrativity was manipulated by moving the climax from the end to the beginning, disrupting the narrative arc. Participants reading the high-narrativity version read faster, with smoother reading flow, and reported higher levels of transportation and cognitive empathy. However, no significant differences in affective empathy or intergroup attitudes were found. Empathy and transportation showed significant indirect effects of narrativity on intergroup attitudes, but the total effects were not significant. In Experiment 2 ($N = 813$), the sequence of events was manipulated to reduce plot causality. Participants in the high-narrativity version reported higher cognitive empathy. Empathy again showed a significant indirect effect of narrativity on intergroup attitudes, although the total effect was not significant. This study highlights how narrative structure influences empathy and intergroup attitudes, demonstrating the potential and the limits of narrative design to foster intergroup attitudes.

Keywords: empathy, graphic narrative, narrativity, intergroup attitudes

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Stories are a ubiquitous aspect of daily life. For centuries, scholars have postulated that stories influence how we perceive our social context and interact with others (Hakemulder, 2000). Stories

often depict the social world in detail and provide insights into people's goals and motives (e.g., Mar, 2018a, 2018b; Oatley, 2016). Stories invite the audience to engage with characters' perspectives and subjective experiences. Through this process, stories can foster perspective-taking and the capacity to understand how others think (Batson et al., 1997).

In this context, research has shown that stories can affect intergroup attitudes and empathy directly after exposure (e.g., Mar, 2018a; Murrar & Brauer, 2018). For example, stories portraying marginalized groups can challenge and alter prevailing stereotypes, fostering more inclusive attitudes. Such findings are particularly interesting because negative stereotypes are often resistant to change through interventions (Dobbin & Kalev, 2018), possibly because people tend to recognize the persuasive intent, leading to greater resistance to change (Petty & Cacioppo, 1986). Stories might offer the potential to subtly bypass this resistance, facilitating empathy with the characters and cause positive shifts in attitudes (Murrar & Brauer, 2019). According to the transportation-imagery model (Green & Brock, 2002), the immersive experience of being transported into a narrative reduces counterarguing and fosters emotional connections, especially when the story is coherent and flows smoothly (Wang & Calder, 2006).

One key question is which textual characteristic drive the social impact of stories. Could the causal structure or the presence of a well-developed climax play a more significant role in shaping the reader's response? Does the resulting ease with which a narrative is read and understood—its flow and coherence—enhance its

Hod Orkibi served as action editor.

Marieke Klöppel  <https://orcid.org/0009-0006-5504-2795>

Markus Appel  <https://orcid.org/0000-0003-4111-1308>

Tobias Richter  <https://orcid.org/0000-0002-0467-9044>

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Correspondence concerning this article should be addressed to Marieke Klöppel, Department of Psychology IV, University of Würzburg, Röntgenring 10, 97070 Würzburg, Germany. Email: marieke.kloepfel@uni-wuerzburg.de

influence on intergroup attitudes? Theoretical perspectives suggest that narratives with more cohesive plots might have a stronger impact on intergroup attitudes and empathy (Green & Appel, 2024; Mar, 2018a). In the present studies, we examined the extent to which the narrativity of a graphic narrative—its coherence, structure, and flow—affects intergroup attitudes and empathy. Experimental evidence indicates that narrative persuasion may arise from the causal organization of a story itself, such that information integrated into causally central plot elements is more easily processed, independent of readers' reported transportation (Dahlstrom, 2012). Further existing studies rarely disentangle narrative structure from psychological states such as transportation, leaving it unclear whether observed effects on empathy are driven by the story's inherent structure or by the reader's immersive experience. The present research addresses this gap by experimentally manipulating narrativity and examining its effects on empathy and attitudes toward the individuals portrayed and the group they represent. It should be noted, however, that changes in attitudes typically emerge from repeated or highly immersive narrative experiences (Green & Brock, 2000; Slater & Rouner, 2002). Accordingly, manipulating narrativity within brief narratives is not expected to produce long-term attitudinal change, but might provide a theoretically informative test of how narrative structure shapes persuasive processing under controlled conditions (Appel et al., 2019; O'Keefe, 2016).

We used a graphic narrative (i.e., a comic) as our stimulus material. The visual narrative structure of graphic narratives supports comprehension and engagement, especially for readers with lower literacy skills, by reducing cognitive load through multimodal presentation (Mayer, 2002). Moreover, graphic narratives may enhance emotional involvement and facilitate perspective-taking (Cohn, 2013b). The combination of visual and verbal elements allows for structured storytelling and can be systematically manipulated (e.g., by omitting key narrative segments or reordering panels, see Cohn, 2013a). Although graphic narratives are widely used in education and popular media (Freedman, 2011), their unique narrativity and their visual narrative structure, as well as their psychological effects, remain underexplored.

Specifically, we hypothesized that participants exposed to a graphic narrative with higher narrativity would report more positive story-related intergroup attitudes and higher empathy with the characters compared with those who read the same graphic narrative with lower narrativity. To test this, we conducted two experiments manipulating different aspects of narrativity. In Experiment 1, we focused on manipulating the time of the climax of the story, a key feature of narrative structure. In Experiment 2, we manipulated the causality of the plot, exploring how changes in the sequence of events might influence the story's impact on intergroup attitudes and empathy.

Narrative Effects on Social Perceptions

Stories can exert social influence by shaping how audiences interpret social issues, evaluate others, and respond to social differences. Narratives have the power to affect attitudes and beliefs by presenting alternative perspectives and challenging stereotypes (Green & Brock, 2002; Slater, 2002). Stories can influence social judgments by engaging audiences with characters' perspectives and subjective experiences. By inviting readers to consider how

others think and to make sense of their social world, narratives can foster empathy and perspective-taking (Batson et al., 1997; Oatley, 2016). In addition, individuals draw on internalized social knowledge and schemas (mental frameworks based on prior experiences) to interpret social cues and evaluate behavior, which in turn informs empathic responses and attitudes toward others (Fiske & Taylor, 2013).

Building on Allport's (1954) intergroup contact theory, researchers have found that exposure to information about other groups and parasocial contact with story characters can positively influence perceptions of the character's group and reduce prejudice (Harwood et al., 2013; Paluck et al., 2021). Fictional stories have been linked to reducing bias by providing concrete, relatable content about other social groups (Harwood et al., 2013; Paluck et al., 2021). Murrar and Brauer (2019) argued that narrative stimuli, compared with nonnarratives, reduce perceived persuasive intent, increase identification and transportation, and offer role models, which foster more positive intergroup attitudes. A similar view has been advanced in research on inspiring media by which emotionally impactful content is assumed to foster connectedness and reduce prejudice (Krämer et al., 2017; Oliver et al., 2021). Research has also shown that consumption of stories is positively (albeit weakly) correlated with empathy (for a meta-analysis, see Mumper & Gerrig, 2017). Furthermore, experimental studies have demonstrated a small positive effect of reading stories on empathy (for a meta-analysis, see Dodell-Feder & Tamir, 2018).

Narrativity As the Driving Feature of Story Processing

The influence of stories on empathy and attitudes has been examined in numerous studies, yet the methods used in these studies often conflated literary fiction and fiction narratives, with insufficient attention to the distinctions between fictionality, narrativity, and literariness (Koopman & Hakemulder, 2015). Narrativity, a dimension that encompasses multiple textual features that distinguish stories from other types of writing, such as informational texts, has been suggested as a crucial moderator for the effect of texts on readers' beliefs (Kinnebrock & Bilandzic, 2006). Stories are characterized by content dimensions and associated structural features that define them as story-like. They present coherent, causally linked sequences of events that unfold in a dynamic world shaped by nonroutine, goal-directed actions of characters that lead to conflict, change, and resolution (Onega & Landa, 2014; Ryan, 2007). This conflict may be resolved, as in stories with happy endings, or it can take a negative turn. But narratives typically involve at least one turning point (peripety or climax) associated with an emotional shift (Nabi & Green, 2015). The more these story characteristics are present in a text, the higher its level of narrativity (Appel et al., 2019; Fludernik, 2002). Narrativity in the sense explicated here facilitates the distinction between narratives and nonnarrative media without assuming that stories are necessarily fictional or literary texts or appear in a certain modality. A narrative can appear not only in text form but also in formats such as graphic narratives, videos, or other media that include narrative features, making them story-like.

The emphasis of the present work is on graphic narratives. According to Chute (2008), graphic narratives can be defined as a hybrid medium that combines verbal and visual narrative tracks to spatially convey temporality. This progression occurs across the

page through alternating sequences of panels (frames) and gutters (empty space), creating a rhythm of presence and absence. McCloud (1993) was the first to provide a framework for the understanding of the specific structure and language of graphic narratives. Building upon McCloud's work, Cohn proposed his Visual Narrative Grammar (Cohn, 2013a), in which visual narratives are composed of identifiable narrative components with distinct narrative roles: establisher (setting), initials (onset of action), peaks (climax), and releases (resolution). The arc of narrativity in graphic narratives is thus constructed through a systematic and hierarchical sequence of images, each fulfilling a specific structural function. The structural elements invite reader participation, allowing for an immersive interpretive experience (McCloud, 1993). McCloud described the unique aspect of graphic narratives as a "silent dance of the seen and unseen" (1993, p. 92) by which readers are drawn into the narrative and must fill in visual gaps, which fosters heightened emotional involvement. Research on the effects of graphic novels on attitudes toward stigmatized groups has shown that illustrations within a story increase narrative engagement and reduce counterarguing against a positive portrayal of stigmatized individuals with schizophrenia (Cohen et al., 2020). Further research in health care settings has demonstrated that nursing staff achieved greater improvements in cultural knowledge, skills, and attitudes after reading a comic book on cultural issues than with traditional printed materials (Lesińska-Sawicka, 2023).

Narrativity and Reading Processes

Narrativity might enhance the psychological effects of stories by facilitating a smoother reading flow. According to the event indexing model by Zwaan et al. (1995), readers attend to five dimensions during story processing: time, space, protagonist, causality, and intentionality. When a disruption occurs in one of these dimensions—such as temporal shift or a break in the causal sequence—readers slow down to register the new event and index it along the dimension (Zwaan et al., 1995). For example, if two sentences are closely linked causally, readers spend less time on the second sentence than if the first sentence does not clearly predict the impact of the second and is therefore only loosely connected to the second one (Keenan et al., 1984). In texts with higher narrativity and without disruptions, reading time is likely to be faster and less likely to fluctuate across segments, indicating a smoother reading flow.

The smooth construction of situational dimensions underlying narrative comprehension is likely to enhance transportation into the story world or deep immersion in the narrative (see Busselle & Bilandzic, 2008). Transportation refers to the experience of being absorbed in the story and feeling part of it while feeling disconnected from the immediate surroundings (Tal-Or & Cohen, 2016). When readers are transported into a story, their cognitive focus shifts to the narrative (Green & Brock, 2000). Not all narratives evoke high transportation, and transportation also depends on individual differences and contextual factors (Appel & Richter, 2010; Green & Brock, 2000). Research indicates that stories with disrupted temporal sequences elicit lower levels of transportation (e.g., Wang & Calder, 2006). When a suspenseful arc is developed in a story, transportation increases as well as central processing of the story leading to reduced attention (e.g., decreased peripheral processing) to secondary tasks (Bezdek et al., 2015). Prior findings

regarding the effects of suspense reduction on enjoyment, which may be related to increased transportation, are mixed. Specifically, it has been shown that an external spoiler paragraph can enhance enjoyment (Leavitt & Christenfeld, 2011). Conversely, when suspense is minimized by integrating spoiler information within the story itself, such as by placing the climax at the beginning, transportation decreased, resulting in higher attention to performance tasks (Cohen et al., 2023). Accordingly, if a high-narrativity story is characterized by an intact suspense arc and a temporally and causally coherent sequence of events, we assume that the higher narrativity of a story is associated with higher levels of transportation into the story.

Effects of Narrativity on Empathy

Empathy can be construed as a personality trait and as a reactive state in response to events that happen to other people in the real world or to characters in a story. In this study, we focus in particular on empathy toward the individuals portrayed in the story and the group they represent. Empathy consists of two main facets: affective and cognitive empathy. Affective empathy involves experiencing emotional responses to another's emotions or circumstances, essentially feeling what another person or character feels (Decety & Jackson, 2006; Zillmann, 2006). In contrast, cognitive empathy refers to perspective-taking, that is, recognizing, understanding, and mentally adopting another person's viewpoint. Adopting another's perspective by mentally placing oneself in the other's situation (Lazarus, 1991) involves sharing cognitive assessments of the environment and relational themes in that context.

Often, reading or listening to narratives influences recipients' emotions (e.g., Mar et al., 2011; Zupan & Babbage, 2017). Moreover, exposure to stories might improve empathy (Happé et al., 2017). Shared cognitive appraisals and relational themes serve as causal precursors to emotions (Smith & Lazarus, 1993), thereby fostering shared emotional responses and empathy with story characters.

Stories high in narrativity are especially effective in this regard because narrativity refers to a constellation of structural features that guide recipients' understanding of events, including causal sequencing, temporal organization, and goal-directed action (e.g., Rumelhart, 1975; Ryan, 2007). Narrative coherence represents one structural feature of high narrativity and has been empirically shown to influence social and empathic responses. For example, listeners exposed to coherent narratives (i.e., chronological order of events) compared with incoherent ones report greater willingness to interact with, more emotional support for, and higher empathic attitudes toward the narrator (Vanaken & Hermans, 2021), suggesting that coherent structuring of events and thematic integration enhances narrative impact on empathy.

In addition, coherent narratives often afford dynamic emotional experiences over the course of the story. Such emotional arcs often include emotional shifts from fear to relief or from good to bad. These emotional shifts are not equivalent to narrativity itself, but can amplify emotional engagement, making it more likely that readers will experience strong empathic responses (Appel et al., 2019).

Effects of Narrativity on Intergroup Attitudes

Narratives are effective at shaping beliefs and attitudes (Appel & Mara, 2013; Prentice et al., 1997), and under certain conditions,

their effects can even persist over time (Appel & Richter, 2007). Intergroup attitudes are specific dispositions and behavioral tendencies attributed to entire groups or individual members of an outgroup (Allport, 1954). Intergroup attitudes are closely tied to social identity processes and are highly resistant to change (Tajfel & Turner, 1979). Research on the impact of watching TV has shown a positive relationship between narrative messages promoting intergroup relations and positive attitudes toward outgroup members (Schiappa et al., 2006). In an experimental study, Murrar and Brauer (2018) found that exposure to narratives depicting intergroup relations and minority groups can improve intergroup attitudes. Similarly, narratives depicting homosexuals as an outgroup in a story about gay marriage was shown to be more persuasive than numerical data in fostering positive attitudes among individuals with negative preconceptions (Wojcieszak & Kim, 2016). Such findings do not necessarily imply large or enduring attitudinal change following brief exposure. Rather, short narrative interventions are more likely to produce subtle effects or component-level shifts that reflect the initial influence of narrative features on evaluative processing.

Stories with high narrativity may be particularly persuasive. For example, Nabi and Green (2015) suggested that emotional shifts within stories, as one feature of narrativity, enhance their persuasiveness. Thus, narratives with clear emotional arcs and schematic structure (e.g., Rumelhart, 1975), such as the typical progression from fear to relief in dramas and thrillers, can enhance the persuasive impact of stories, particularly in shaping intergroup attitudes. Overall, existing research indicates that brief narrative exposure rarely leads to lasting changes in attitudes; however, high narrativity may still enhance subtle, short-term effects on attitudes compared with exposure to the same low-narrativity story.

The Mediating Role of Transportation and Empathy on Intergroup Attitudes

An intact temporal and causal sequence of events appears to be crucial for the persuasive power of stories (Schreiner et al., 2018; Wang & Calder, 2006). Because transportation plays a crucial role for the psychological impact of stories (Gerrig, 2018), high narrativity might foster persuasion, affect attitudes, and empathy through increasing transportation. Empirical research has consistently shown that greater narrative transportation enhances the effects of stories, increasing the likelihood of narrative persuasion and personal change (Appel & Richter, 2010; Green & Appel, 2024; Green & Brock, 2000). Transportation into a story captures readers' cognitive resources, making it difficult to contradict the story's content (Slater & Rouner, 2002). When persuasive content is subtly embedded in the narrative without revealing the intent, individuals with conflicting attitudes might still experience persuasion regarding stereotypes, prejudices, and discriminatory behaviors (Ott et al., 2020). Green and Brock (2000) found that participants experiencing higher levels of transportation were more likely to adopt beliefs consistent with the narrative, rate the character more favorably, and notice fewer inconsistencies than those with lower transportation. As transportation increases, narrative events are encoded similarly to personal experiences (Green, 2004). Furthermore, high levels of transportation are related to enhanced retention of content (Fazio et al., 2015), greater empathy (Mar & Oatley, 2008), and contribute to a greater likelihood of

cognitive shifts (Banerjee & Greene, 2012). In conclusion, stories with higher narrativity tend to evoke greater transportation and lead to higher persuasiveness of stories.

Similarly, empathy with story characters can be argued to contribute to stereotype shifts through narratives (Slater & Rouner, 2002). Research indicates that perspective-taking of outgroup characters humanizes stigmatized groups (Ferchaud et al., 2020) and increases social acceptance and empathy with outgroup members in real life (Chung & Slater, 2013). Supporting the emotional shifts theory (Nabi & Green, 2015), stories featuring highly emotional events, such as the death of a protagonist, have been found to evoke stronger transportation and greater persuasive effects, particularly for readers with a high need for affect (Appel & Richter, 2010). In addition, Appel et al. (2019) found that a story's persuasive impact was mediated by the level of positive affect experienced by recipients during key moments, such as a happy scene in a film. In two experiments, Mazzocco et al. (2010) similarly demonstrated that attitude change was mediated by heightened empathy. In summary, increased empathy driven by higher narrativity could mediate the persuasive effect of story content on intergroup attitudes.

Study Overview and Predictions

The aim of this study was to explore the influence of narrativity on story processing, empathy, and attitudes toward an outgroup. Specifically, we sought to determine whether a high-narrativity story, characterized by a coherent emotional arc and a clear causal sequence, would enhance the reader's reading flow, transportation into the story, and empathy with the protagonists compared with a low-narrativity story. In addition, we examined whether higher narrativity would lead to stronger positive effects on story-related intergroup attitudes. Finally, we investigated the potential mediating roles of empathy and transportation in the relationship between narrativity and intergroup attitudes. We tested the following hypotheses:

1. We expected the exposure to the high-narrativity story to lead to a smoother reading flow (i.e., flow of comprehension; *Hypothesis 1 [H1]*), higher transportation (*Hypothesis 2 [H2]*), cognitive empathy, and affective empathy with the protagonists (*Hypotheses 3a and 3b [H3a and H3b]*) compared with the low-narrativity story.
2. We also expected the exposure to the high-narrativity story to have a stronger positive impact on story-related social attitudes and beliefs (i.e., intergroup attitudes) compared with the low-narrativity story (*Hypothesis 4 [H4]*).
3. We expected that empathy with the protagonists would mediate the effects of narrativity on social attitudes (i.e., intergroup attitudes; *Hypothesis 5 [H5]*). We also expected that transportation would mediate the effects of narrativity on social attitudes (i.e., intergroup attitudes; *Hypothesis 6 [H6]*).

To test our predictions, we conducted two preregistered experiments implementing two different manipulations of narrativity independently of each other. In Experiment 1, narrativity was reduced by moving the climax of a graphic story from the end to the beginning. In Experiment 2, narrativity was manipulated by

altering the order of events to reduce the causality of the plot. The data and analysis scripts underlying the analyses reported in this work are available on the open science framework (<https://osf.io/2zsdr>).

Experiment 1

In Experiment 1, we focused on manipulating the narrativity of the graphic narrative by undermining the emotional arc of the story and the narrative tension. For the low-narrativity condition, this manipulation was achieved by moving the climax of the story from the end to the beginning. The preregistration of Experiment 1 can be found at https://aspredicted.org/PKG_9GP.

Method

Participants

We determined the required sample size a priori. Given the minimalistic nature of the manipulation that left the story contents fully intact, we expected small effect sizes ($d = 0.2$) of narrativity on transportation, empathy, and story-related intergroup attitudes. To identify a difference between both narrativity conditions, a sample size of 858 participants was required (G*Power, Version 3.1.9.7; Faul et al., 2009; Cohen's $d = .2$, $\alpha = .05$, one-tailed, $1 - \beta = .90$). We increased this number to 1,073 participants, keeping in mind possible exclusions. We aimed for an English-speaking sample using the platform Prolific.

For Experiment 1, we recruited 1,073 participants with the United States as their country of residence on Prolific (sample stratified according to the U.S. census). Participants were compensated with £2.00. Of the initial sample, 292 participants had to be excluded based on the preregistered exclusion criteria, resulting in 781 valid responses. These exclusions were due to incomplete datasets ($n = 24$), technical issues ($n = 23$), at least one failed comprehension question ($n = 200$), a failed attention check (instructional response item, $n = 1$), log mean reading time that was ± 2 SD from the mean ($n = 39$), a low response time (less than 170 s, $n = 2$), and nonsensical or incorrect responses in an open answer summary task ($n = 3$). The participants in the final sample were between 18 and 87 years old ($M = 45.03$, $SD = 15.58$) and 52.5% identified as female, 45.1% as male, and 2.4% as other. The majority of the participants identified their ethnic background as white (64.3%, American Indian or Alaska Native: 0.6%, Black: 11.5%, Chinese: 1.4%, Native Hawaiian or other Pacific Islander: 0.5%, Hispanic or Latino: 10.5%, South Asian: 1.9%, mixed or others: 9.2%). Most participants indicated that their highest educational qualification was an undergraduate degree (41.1%, doctorate degree: 2.6%, graduate degree: 11.3%, high school diploma/A-levels: 26.9%, technical/community college: 17.0%, secondary education: 0.9%, no formal qualification: 0.3%). Post hoc tests showed no significant differences between conditions in sex, ethnicity, education, or age, suggesting that random assignment was successful (see online [Supplemental Materials](#) for full results of post hoc tests). The study adhered to the ethical guidelines of the German Psychological Society (Deutsche Gesellschaft für Psychologie, DGPs). According to these guidelines, formal ethics approval was not required because the study did not involve vulnerable populations or potentially

harmful procedures, participation was voluntary, informed consent was obtained, and all data were collected anonymously.

Stimuli

Graphic Narratives. We presented one of two graphic narrative versions. Either an original excerpt from a graphic narrative series called *Heartstopper* by Oseman (2019a) for the high-narrativity condition or a manipulated version of the same graphic narrative for the low-narrativity condition. Both graphic narrative versions had the same content. In the storyline, two adolescent male protagonists attend a party and play “truth or dare.” During the game, their romantic relationship is publicly revealed, with one of the characters coming out as bisexual. The reactions of the other characters are also depicted at the end of the excerpt. We introduced both graphic narratives with the same sentence “Playing Truth or Dare with their friends Nick and Charlie had a very important announcement to make.” In the high-narrativity version, we continued with a second introductory sentence “And this is the story that led to the event” and then proceeded with an unaltered original graphic narrative excerpt. In the manipulated version with the lower narrativity, the climax event was cut from the end of the graphic narrative excerpt and placed at the beginning after the introductory sentence, followed by the sentence “and this is the story that led to the event.” The graphic narrative then continued with the beginning of the original graphic narrative excerpt. The manipulation and order of events in both narrativity conditions for both experiments are shown in [Table 1](#).

Based on Cohn's (2013a) Visual Narrative Grammar, this manipulation disrupted the canonical narrative arc by revealing the panels of the climax (releases) before the initiating events (establishers). The high-narrativity version of the story was 14 pages long, the low-narrativity 15 pages. The story material is available from the authors upon request. To manipulate the low-narrativity condition, the images were rearranged without altering their total number, resulting in a more dispersed distribution across the pages. Given the visual nature of the stimuli, participants were required to take part using either a tablet or a desktop/laptop computer with a sufficiently large screen.

Measures

Reading Flow. Indicators for the reading flow were derived from baseline reading time, experimental reading time, and the intraindividual variability of reading time. We calculated the reading times for the baseline and experimental stimuli by averaging the reading time per element across the respective pages. Given that a graphic narrative consists of images and words, we defined elements as either an image or a visually framed speech bubble. The experimental reading time was computed per element ($M = 2.16$ s, $SD = 1.13$). We also computed the baseline reading time per element ($M = 2.56$ s, $SD = 1.77$) to control for individual differences in reading time. Slower reading was interpreted to indicate a reduced reading flow.

The intraindividual variability of reading time was assessed by calculating the standard deviation of each individual's reading time per page standardized by the number of elements on each page. Higher variability indicates greater fluctuations in reading times ($M = 2.60$, $SD = 2.52$), which could indicate disruptions in the reading flow. Reading times were logarithmically transformed.

Table 1*Order of Events of Graphic Narrative Across Groups for Experiments 1 and 2*

Experiment 1		Experiment 2	
High narrativity (original)	Low narrativity (climax position)	High narrativity (original)	Low narrativity (order of events)
“Playing Truth or Dare with their friends Nick and Charlie had a very important announcement to make. And this is the story that led to the event”	“Playing Truth or Dare with their friend Nick and Charlie had a very important announcement to make.”	Intro: Relationship of Charlie and Nick implied	Intro: Relationship of Charlie and Nick implied
E1—Truth-or-dare introduced	E8—Silence and relationship implied of Charlie and Nick	E1—Truth-or-dare introduced	E1—Truth-or-dare introduced
E2—First dare assigned and performed (Tara removed sock)	E9—Relationship revelation of Charlie and Nick/Outing of Nick as bisexual	E2—First dare assigned and performed (Tara removed sock)	E3—Second truth question answered (Tao kissed someone)
E3—Second truth question answered (Tao kissed someone)	“And this is the story that led to the event”	E3—Second truth question answered (Tao kissed someone)	E4—Third bottle spin: Focus on Charlie (Dare to kiss James)
E4—Third bottle spin: Focus on Charlie (dare to kiss James)	E1—Truth-or-dare introduced	E4—Third bottle spin: Focus on Charlie (dare to kiss James)	E5—Charlie refuses to perform dare and group tension rises
E5—Charlie refuses to perform dare and group tension rises	E2—First dare assigned and performed (Tara removed sock)	E5—Charlie refuses to perform dare and group tension rises	E2—First dare assigned and performed (Tara removed sock)
E6—Alternative truth question for Charlie	E3—Second truth question answered (Tao kissed someone)	E6—Alternative truth question for Charlie	E6—Alternative truth question for Charlie
E7—Group conflict escalation: Fairness of game in question and concerns about a forced outing of Nick	E4—Third bottle spin: Focus on Charlie (dare to kiss James)	E7—Group conflict escalation: Fairness of game in question and concerns about a forced outing of Nick	E7—Group conflict escalation: Fairness of game in question and concerns about a forced outing of Nick
E8—Silence and relationship implied of Charlie and Nick	E5—Charlie refuses to perform dare and group tension rises	E8—Silence and relationship implied of Charlie and Nick	E8—Silence and relationship implied of Charlie and Nick
E9—Relationship revelation of Charlie and Nick/Outing of Nick as Bisexual	E6—Alternative truth question for Charlie	E9—Relationship revelation of Charlie and Nick/Outing of Nick as Bisexual	E9—Relationship revelation of Charlie and Nick/Outing of Nick as Bisexual
E10—Positive reactions of friends and resolution of conflict	E7—Group conflict escalation: Fairness of game in question and concerns about a forced outing of Nick	E10—Positive reactions of friends and resolution of conflict	E10—Positive reactions of friends and resolution of conflict
	E10—Positive reactions of friends and resolution of conflict		

Note. Identical events (E1–E10) were presented in different temporal orders across experiments and conditions. Rows represent ordinal positions of events in each condition.

This procedure leads to a more symmetric distribution and alleviates the influence of outlier reading times (Ratcliff, 1993).

Transportation. The participants’ transportation into the graphic narrative was measured with the Transportation Scale–Short Form (TS-SF; Appel et al., 2015). The TS-SF consists of six items with a 7-point response scale (1 = *not at all* to 7 = *completely*; Cronbach’s $\alpha = .87$, $M = 4.54$, $SD = 1.46$). The TS-SF includes cognitive, emotional, and imaginative facets of transportation into stories.

Empathy. Empathy for the story characters was assessed with eight items from the state empathy during message processing scale (Shen, 2010). The items were adapted to fit the graphic narrative. Four items measured affective empathy, which refers to the activation and experience of affective reactions to the characters’ experiences and expressions of emotions (e.g., “I experienced the same emotions as the character when reading this comic”). The other four items assessed cognitive empathy, which involves recognizing, comprehending, and adopting the characters’ point of view (e.g., “The character’s reactions to the situation are understandable”). Participants responded on a 5-point scale (0 = *not at all* to 4 = *completely*; Cronbach’s $\alpha = .92$, $M = 2.58$, $SD = 0.91$; subscale cognitive empathy: Cronbach’s $\alpha = .90$, $M = 2.93$, $SD = 0.98$; subscale affective empathy: Cronbach’s $\alpha = .88$, $M = 2.24$, $SD = 1.01$).

Intergroup Attitudes. Participants’ story-related intergroup attitudes after reading the story were measured with a semantic differential measure adapted from Breen and Karpinski (2013). Participants were asked for their attitudes toward bisexual individuals (“Please indicate how you perceive individuals who identify as bisexuals.”) on five dimensions on a 7-point scale (1 = *awful, bad, foolish, ugly, unpleasant* to 7 = *nice, good, wise, beautiful, pleasant*; Cronbach’s $\alpha = .97$, $M = 5.11$, $SD = 1.49$).

Procedure and Design

Participants gave informed consent and answered questions on demographics (age, gender, ethnic group, educational background). As a baseline reading phase, participants then read a three-page graphic narrative excerpt in which all relevant characters meet in a hotel room and celebrate together (Oseman, 2019b), followed by a comprehension question. Importantly, the baseline graphic narrative excerpt was unrelated to the story told in the graphic narrative used as experimental material. Next, participants were randomly assigned to the experimental conditions to read either an original excerpt from a graphic narrative (high-narrativity condition) or a manipulated version of the same graphic narrative (low-narrativity condition). After reading, they completed the Transportation Scale–Short Form along with an attention check item, measures of cognitive and affective empathy, and two

comprehension questions. Finally, participants answered the five items on intergroup attitudes regarding bisexual individuals. For another attention check, participants provided a two-sentence summary of the graphic narrative excerpt in an open text box. The experiment was programmed using Inquisit Web Version 6.5.1 (Millisecond, 2021).

Results and Discussion

Linear models were conducted with narrativity (coded 0 = low narrativity; 1 = high narrativity) as the independent variable. The correlations between all variables for both experiments are shown in Table 2.

Our analysis showed a significant effect of narrativity on reading times (controlling for baseline reading times), $\beta = -.27$, $SE = 0.02$, $t(778) = -11.73$, $p < .001$, Cohen's $d = -.84$. Consistent with H1, participants who read the high-narrativity version of the graphic narrative read faster ($M = 7.43$, $SE = 0.02$) than participants who read the low-narrativity version ($M = 7.71$, $SE = 0.02$), which indicated a smoother reading flow. Likewise, our analysis showed a significant effect of narrativity on the intraindividual fluctuation in reading times, $\beta = -.69$, $SE = 0.04$, $t(779) = -16.37$, $p < .001$, Cohen's $d = -1.17$. Participants who read the high-narrativity version of the graphic narrative had a lower fluctuation of reading times per page standardized for the number of elements ($M = 7.26$, $SE = .03$) than participants who read the low-narrativity version ($M = 7.94$, $SE = 0.03$). The analysis also revealed a significant effect of narrativity on transportation, $\beta = .24$, $SE = 0.10$, $t(779) = -2.30$, $p = .011$, Cohen's $d = 0.16$. Consistent with H2, participants who read the high-narrativity version of the graphic narrative reported higher transportation ($M = 4.66$, $SD = 1.39$) than participants who read the low-narrativity version ($M = 4.42$, $SD = 1.52$). Consistent with H3a, the analysis revealed a significant effect of narrativity on cognitive empathy, $\beta = .13$, $SE = 0.07$, $t(779) = -1.88$, $p = .030$, Cohen's $d = 0.14$. Cognitive empathy was higher in the high-narrativity condition ($M = 2.99$, $SD = 0.95$) compared with the low-narrativity condition ($M = 2.86$, $SD = 1.00$).

However, we found no significant effect of narrativity on affective empathy, $\beta = .09$, $SE = 0.07$, $t(779) = 1.27$, $p = .103$, Cohen's $d = 0.09$ (high narrativity: $M = 2.29$, $SD = 0.98$, low

narrativity: $M = 2.19$, $SD = 1.04$). Furthermore, the effect of narrativity on intergroup attitudes was not significant, $\beta = .13$, $SE = 0.11$, $t(779) = 1.31$, $p = .095$, Cohen's $d = .09$ (high narrativity: $M = 5.18$, $SD = 1.51$, low narrativity: $M = 5.04$, $SD = 1.46$). Thus, H3b and H4 received no support. The results are visualized in Figure 1.

We also expected the effect of narrativity on intergroup attitudes to be mediated by empathy (H5) and transportation (H6). H5 and H6 were formulated as mediation hypotheses, which cannot be tested as such in the absence of a significant direct or total effect on intergroup attitudes. Nevertheless, we explored whether indirect effects are present, using regression-based path models with narrativity as the independent variable, intergroup attitudes as the dependent variable, and empathy (z -standardized) and transportation (z -standardized), respectively as intermediate variables. We follow current methodological recommendations indicating that indirect effects can be meaningfully estimated in the absence of a significant total effect (e.g., Hayes, 2009; MacKinnon et al., 2007), which of course constrains causal interpretation. Standard errors and confidence intervals (CIs) were estimated using bootstrapping with 10,000 samples. Results of the models are shown in Figure 2.

The model incorporating narrativity as predictor and empathy as an intermediate variable significantly explained variance in intergroup attitudes ($R^2 = .27$, $F(2, 778) = 147.2$, $p < .001$). The effect of empathy on intergroup attitudes was significant ($\beta = .52$, $SE = 0.03$, $t(778) = 17.09$, $p < .001$) as well as the indirect effect of narrativity on intergroup attitudes via empathy (*estimate* = 0.06, 95% CI [-0.01, 0.14], $p = .042$). In contrast, and as to be expected from the previous analyses, the model yielded neither a significant total effect of narrativity on intergroup attitudes (*estimate* = 0.09, 95% CI [-0.05, 0.23], $p = .094$), nor a significant direct effect of narrativity on intergroup attitudes (*estimate* = 0.03, 95% CI [-0.09, 0.15], $p = .312$).

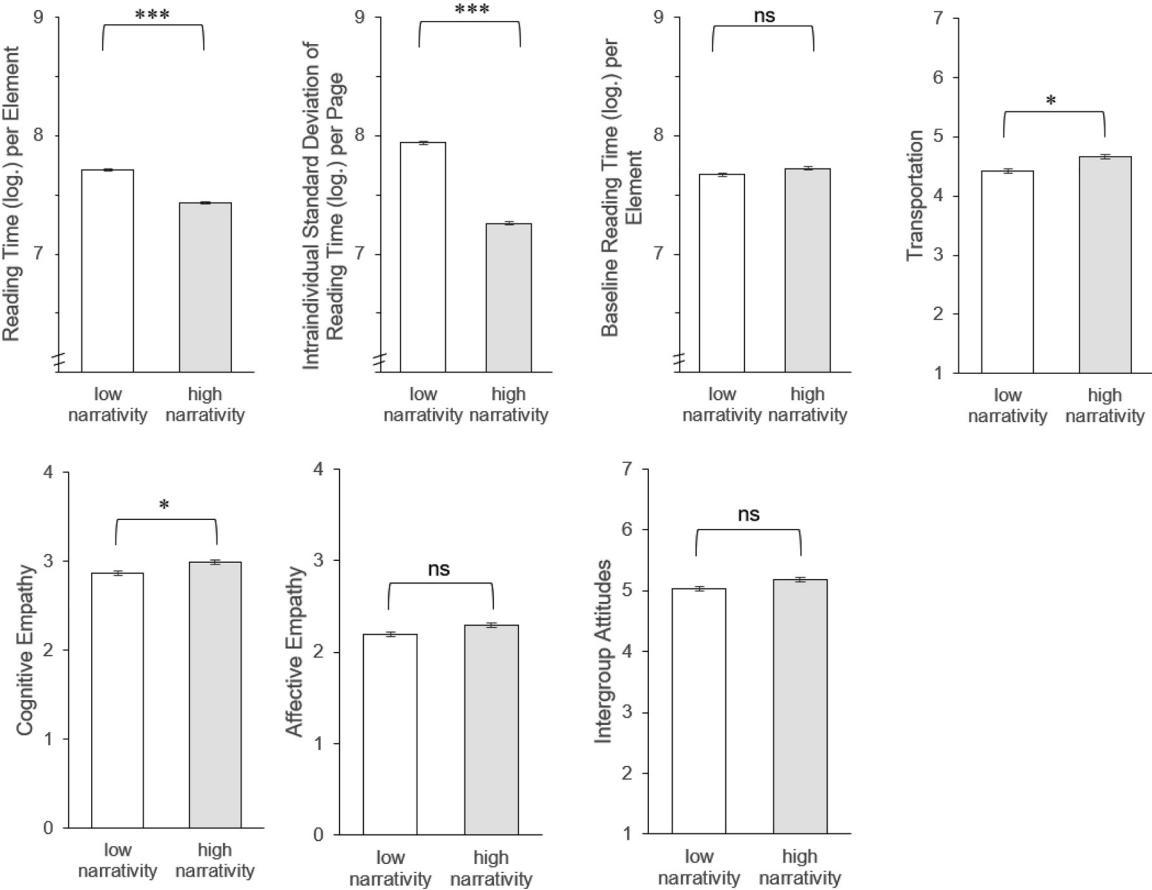
Similarly, the model incorporating narrativity as predictor and transportation as intermediate variable significantly explained variance in intergroup attitudes, $R^2 = .21$, $F(2, 778) = 100.9$, $p < .001$. The effect of transportation on intergroup attitudes remained significant, $\beta = .45$, $SE = 0.03$, $t(778) = 14.13$, $p < .001$, as well as the indirect effect of narrativity on intergroup attitudes via transportation (*estimate* = 0.07, 95% CI [-0.01, 0.12], $p = .011$). However, analyses again yielded neither a significant total effect of narrativity on

Table 2
Descriptive Statistics and Correlations of All Variables for Experiments 1 and 2

Variable	Experiment 1		Experiment 2		1	2	3	4	5	6	7	8	9
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>									
1. Narrativity					—	.00	-.04	.01	.03	.07	.09	.04	.05
2. Mean reading time (log.) per element	7.57	0.45	7.35	0.45	-.28	—	.87	.61	.10	.05	.03	.05	-.07
3. Intraindividual <i>SD</i> of reading time (log.) per page	7.60	0.68	7.03	0.64	-.51	.89	—	.44	.10	.06	.05	.07	-.05
4. Baseline mean reading time (log.) per element	7.69	0.53	7.70	0.60	.04	.61	.41	—	.06	.03	.03	.03	-.11
5. Transportation	4.54	1.46	4.67	1.40	.08	-.04	-.07	-.00	—	.80	.68	.80	.42
6. Total empathy	2.58	0.91	2.70	0.87	.06	-.07	-.09	-.03	.82	—	.91	.93	.46
7. Cognitive empathy	2.93	0.98	3.06	0.88	.07	-.08	-.11	-.02	.68	.92	—	.71	.45
8. Affective empathy	2.24	1.01	2.33	1.00	.05	-.05	-.06	-.03	.81	.92	.69	—	.46
9. Intergroup attitudes	5.11	1.49	5.23	1.42	.05	-.05	-.06	-.02	.45	.52	.48	.48	—

Note. The results for Experiment 1 ($N = 781$) are shown below the diagonal. The results for Experiment 2 ($N = 813$) are shown above the diagonal. Narrativity coded 0 = low narrativity, 1 = high narrativity. Transportation scores range from 1 to 7. Total empathy, cognitive empathy, and affective empathy scores range from 0 to 4. Intergroup attitudes scores range from 1 to 7.

Figure 1
Effects of Narrativity on Reading Times, Transportation, Cognitive Empathy, Affective Empathy, and Intergroup Attitudes (Experiment 1)



Note. $N = 781$, low narrativity $n = 394$, high narrativity $n = 387$. Error bars represent the standard error of the mean. Mean reading time per element (log.) is statistically controlled for baseline mean reading time (log.) per element. ns = not significant ($p \geq .05$).
* $p < .05$. *** $p < .001$.

intergroup attitudes, $estimate = 0.09$, 95% CI $[-0.05, 0.23]$, $p = .092$), nor a significant direct effect of narrativity on intergroup attitudes ($estimate = 0.02$, 95% CI $[-0.11, 0.14]$, $p = .120$).

Overall, Experiment 1 provided partial evidence for the hypotheses. Participants who read the high-narrativity version of the graphic narrative read faster and with less variation in reading times, which indicates a smoother reading flow. They also reported significantly higher levels of transportation and cognitive empathy compared with those who read the low-narrativity version. However, we found no significant differences between the groups in terms of affective empathy or intergroup attitudes. Moreover, these findings indicate that narrativity was indirectly related to intergroup attitudes via both empathy and transportation. However, given the absence of significant total and direct effects, the reported indirect effects are not interpreted as mediation in the sense of Baron and Kenny (1986), but as indirect effects within the specified path models. One possible explanation for not all hypotheses being supported, especially the lack of evidence for an effect of narrativity on intergroup attitudes, is that the minimalistic narrativity manipulation in Experiment 1 was simply not strong enough. Therefore, we conducted Experiment 2 to test the

same predictions with an alternative and possibly stronger manipulation of narrativity.

Experiment 2

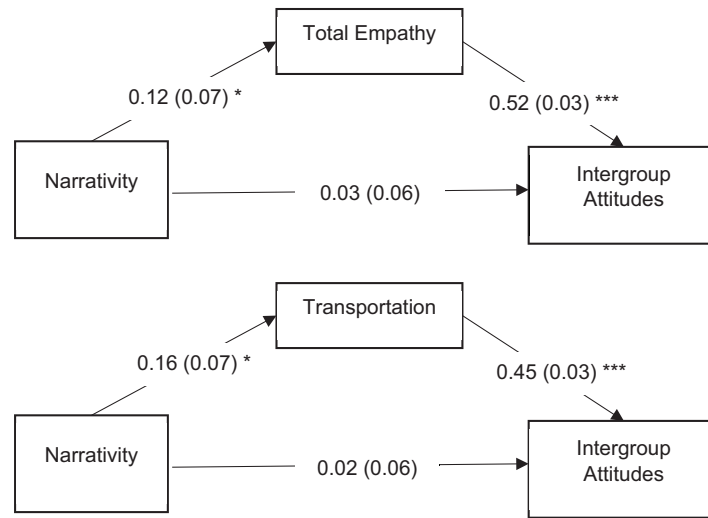
In Experiment 2, we employed a different method of manipulating narrativity to test its effects on the reading flow, transportation in the graphic narrative, empathy with the characters, and intergroup attitudes related to the content of the graphic narrative. Using the same graphic narrative sequence as in Experiment 1, we rearranged the order of events leading to the climax of the story for the low-narrativity condition. This procedure reduced the plot's causality by maintaining the overall story structure. The preregistration of Experiment 2 can be found at https://aspredicted.org/6JC_1N2.

Method

Participants

Experiment 2 was based on the same hypotheses and followed the same experimental design as Experiment 1. The same sample

Figure 2
Regression-Based Path Models of Narrativity on Intergroup Attitudes via
Total Empathy and Transportation (Experiment 1)



Note. $N = 781$. Standard errors are presented in parentheses.

* $p < .05$. *** $p < .001$.

size considerations as in Experiment 1 applied. Participants of Experiment 1 were not allowed to participate in Experiment 2.

We recruited 1,073 participants with the United States as their country of residence on Prolific (sample stratified according to the U.S. census). Participants were compensated with £2.00. From the initial sample, 260 were excluded based on the preregistered exclusion criteria, resulting in 813 valid participants. These exclusions were a consequence of incomplete datasets ($n = 20$), at least one failed comprehension question ($n = 201$), log mean reading time that was ± 2 SD from the mean ($n = 36$), or nonsensical or incorrect responses in an open answer summary task ($n = 3$). No participants were excluded based on a low response time (< 170 s) or a failed attention check (instructional response item). The participants in the final sample were between 18 and 85 years old ($M = 45.37$, $SD = 16.11$) and 50.7% identified as female, 46.5% as male, and 2.8% as other. The majority of the participants identified their ethnic background as white (65.6%, American Indian or Alaska Native: 1.1%, Black: 10.8%, Chinese: 1.7%, Native Hawaiian or other Pacific Islander: 0.4%, Hispanic or Latino: 10.0%, South Asian: 1.7%, mixed or others: 8.7%). Most participants indicated that their highest educational qualification was an undergraduate degree (37.1%, doctorate degree: 3.1%, graduate degree: 15.1%, high school diploma/A-levels: 25.0%, technical/community college: 17.7%, secondary education: 1.5%, no formal qualification: 0.5%). Although post hoc tests revealed a significant difference in the distribution of ethnicity across conditions, all other demographic variables were balanced, and controlling for ethnicity in the analyses did not affect the results (see online [Supplemental Materials](#) for full results of post hoc tests).

Stimuli

Graphic Narratives. In Experiment 2, we again presented one of two graphic narrative versions of the same excerpt of

Heartstopper series by Oseman (2019a). However, we employed a different manipulation of narrativity compared with Experiment 1. The content for both graphic narrative versions of narrativity and for both experiments remained the same. For the high-narrativity condition, we utilized the 14 pages of the original excerpt from the graphic narrative. The first page of the graphic narrative remained identical for both conditions. For the low-narrativity condition, we modified the stimulus material starting from page 2 onward. To reduce the narrativity of the graphic narrative excerpt, we altered the order of events leading up to the climax of the story. The manipulation and order of events in both narrativity conditions for both experiments are shown in [Table 1](#). Following the Visual Narrative Grammar (Cohn, 2013a), we subtly reordered panels within a conjunction sequence (i.e., a series of causally or temporally linked actions). This manipulation aimed to disrupt narrative coherence locally. The low-narrativity version of the graphic narrative was 15 pages long. The story material is available from the authors upon request. Given the visual nature of the stimuli, participants were required to take part using either a tablet or a desktop/laptop computer with a sufficiently large screen.

Main Measures, Procedure, and Design

The experimental design and the main measures were the same as in Experiment 1. We assessed the reading flow based on mean reading time per element ($M = 1.72$ s, $SD = 0.85$) and the mean baseline reading time per element ($M = 2.72$ s, $SD = 2.97$) to control for individual differences. We also assessed the intraindividual variability of reading times by calculating the standard deviation ($M = 1.44$, $SD = 1.64$). Mean reading times and the intraindividual variability of the reading time were logarithmically transformed. Participants' transportation into the graphic narrative was measured with the Transportation Scale–Short Form (TS-SF;

Appel et al., 2015; Cronbach's $\alpha = .85$, $M = 4.67$, $SD = 1.40$). Empathy for the story characters was assessed using the scale developed by Shen (2010). The reliability (Cronbach's α) was .92 for the total scale ($M = 2.70$, $SD = 0.87$), .89 for the subscale cognitive empathy ($M = 3.06$, $SD = 0.88$), and .88 for the subscale affective empathy ($M = 2.33$, $SD = 1.00$). Intergroup attitudes regarding bisexual individuals were measured using a semantic differential (Breen & Karpinski, 2013; Cronbach's $\alpha = .97$, $M = 5.23$, $SD = 1.42$).

Results and Discussion

We again conducted linear models with narrativity (coded 0 = low narrativity; 1 = high narrativity) as the independent variable to test the same hypotheses as in Experiment 1. The correlations between all variables are shown in Table 1.

We found a significant effect of narrativity on cognitive empathy scores. As predicted in H3a, cognitive empathy was higher in the high-narrativity condition ($M = 3.14$, $SD = 0.82$) compared with the low-narrativity condition ($M = 2.99$, $SD = 0.93$), $\beta = .15$, $SE = .06$, $t(811) = 2.50$, $p = .006$, Cohen's $d = 0.18$.

In contrast, we found no significant effect of narrativity on affective empathy, $\beta = .09$, $SE = 0.07$, $t(811) = 1.26$, $p = .104$, Cohen's $d = 0.09$ (high narrativity: $M = 2.38$, $SD = 0.98$; low narrativity: $M = 2.29$, $SD = 1.03$). Thus, H3b was not supported. Our analysis also showed no significant effect of narrativity on reading times (controlling for baseline reading times; high narrativity: $M = 7.35$, $SE = 0.02$; low narrativity: $M = 7.35$, $SE = 0.02$), $\beta = -.01$, $SE = 0.02$, $t(810) = -0.32$, $p = .375$, Cohen's $d = -0.02$. Likewise, our analysis showed no significant effect of narrativity on the intraindividual fluctuation in the reading flow (high narrativity: $M = 7.01$, $SE = 0.03$; low narrativity: $M = 7.05$, $SE = 0.03$), $\beta = -.05$, $SE = 0.04$, $t(811) = -1.02$, $p = .155$, Cohen's $d = -0.07$. Thus, H1 received no support. Moreover, no significant effects emerged on transportation between the high-narrativity ($M = 4.71$, $SD = 1.35$) and low-narrativity condition ($M = 4.63$, $SD = 1.44$), $\beta = .07$, $SE = 0.10$, $t(811) = 0.76$, $p = .224$, Cohen's $d = 0.05$. Thus, H2 received no support. Finally, we found no significant effect of narrativity on intergroup attitudes (high narrativity: $M = 5.31$, $SD = 1.37$; low narrativity: $M = 5.16$, $SD = 1.47$), $\beta = .15$, $SE = 0.10$, $t(811) = 1.53$, $p = .063$, Cohen's $d = 0.11$, implying that H4 was not supported either. The results are visualized in Figure 3.

We also expected the effect of narrativity on intergroup attitudes to be mediated by empathy (H5). Again, because H5 was formulated as a mediation hypothesis, the absence of a significant direct or total effect of narrativity on intergroup attitudes per se implies that this hypothesis was not supported. Nevertheless, in line with current methodological recommendations (e.g., Hayes, 2009; MacKinnon et al., 2007), we again estimated a regression-based path model to test the indirect effect, with narrativity as the independent variable, intergroup attitudes as the dependent variable, and empathy (z -standardized) as the intermediate variable. Note that the absence of a significant direct or total effect of narrativity on intergroup attitudes constrains causal interpretation. Standard errors and CIs were estimated using bootstrapping with 10,000 samples. Results of the models are shown in Figure 4.

The model with empathy as an intermediate variable explained a substantial portion of the variance in intergroup attitudes, $R^2 = .24$,

$F(2, 810) = 129.5$, $p < .001$. The indirect effect of narrativity on intergroup attitudes via empathy was significant ($estimate = 0.07$, 95% CI [0.001, 0.14], $p = .023$) but the direct effect was not ($estimate = 0.04$, 95% CI [-0.08, 0.16], $p = .250$). The total effect of narrativity on intergroup attitudes failed to reach significance ($estimate = 0.11$, 95% CI [-0.02, 0.24], $p = .058$). Accordingly, these findings indicate an indirect effect between narrativity and intergroup attitudes via empathy.

We expected the effect of narrativity on intergroup attitudes to be mediated by transportation (H6). This hypothesis received no support either as there were no significant direct effects of narrativity on transportation or intergroup attitudes. In this situation, it does not make sense to estimate and test indirect effects.

Overall, the results obtained in Experiment 2 showed some overlap with the results of Experiment 1. Our hypotheses were only partially supported. Although high narrativity increased cognitive empathy with story characters, it had no significant effect on the reading times or transportation, which is different from Experiment 1. We also found no significant effect of narrativity on affective empathy or intergroup attitudes. No evidence was found for the assumption for a mediating role of transportation for the effect of narrativity on intergroup attitudes. However, empathy showed evidence of an indirect effect with intergroup attitudes via narrativity, with the limitation that the total effect was not significant.

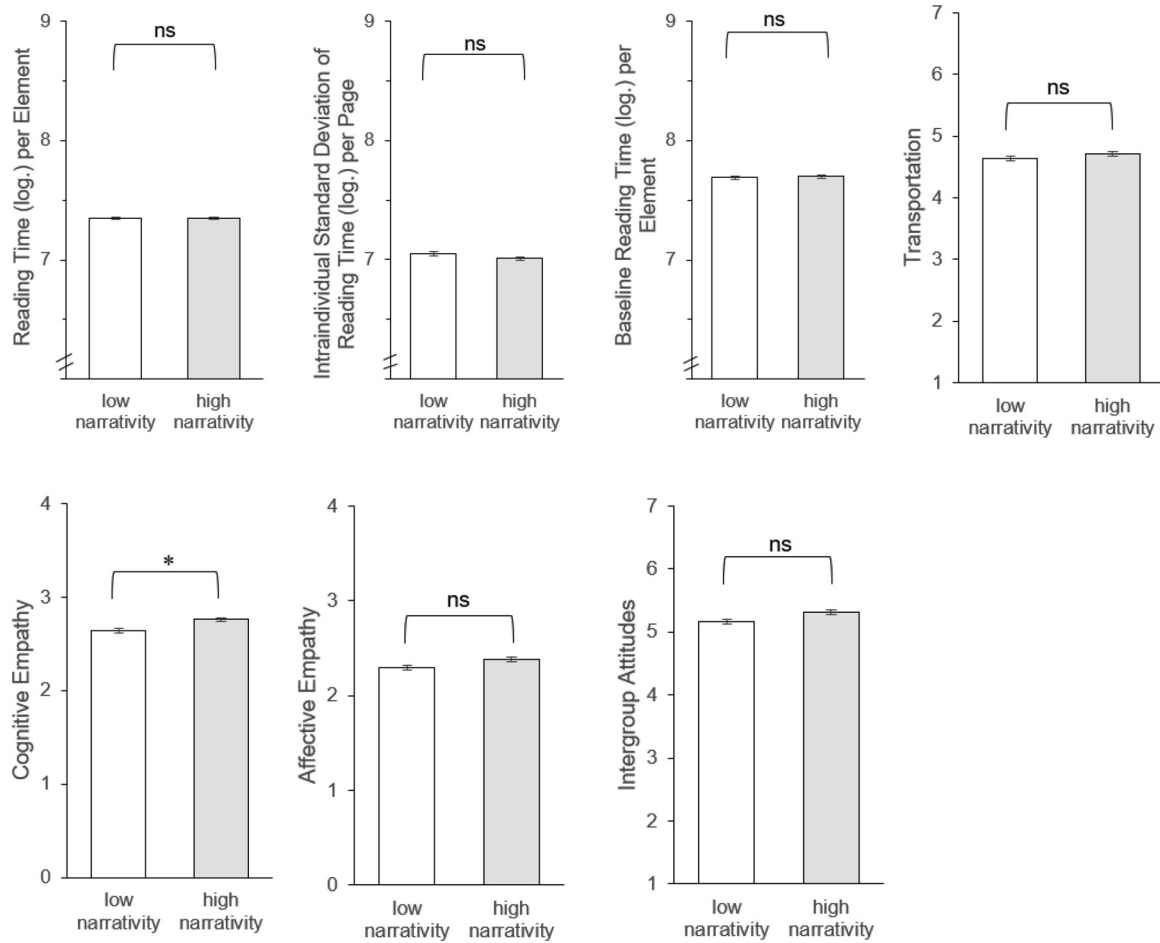
General Discussion

In the present study, we investigated the influence of narrativity on story processing, empathy, and attitudes toward an outgroup. We conducted two experiments with the same graphic narrative exploring two versions of manipulated narrativity. In Experiment 1, narrativity was reduced by moving the climax of the story from the end to the beginning. In Experiment 2, narrativity was manipulated in a different way by altering the order of events to reduce the causality of the plot. Specifically, we hypothesized that participants exposed to a graphic narrative with higher narrativity would report more positive story-related intergroup attitudes and higher cognitive and affective empathy with the story characters compared with those exposed to the lower narrativity version. We examined the role that reading processes such as transportation and empathy with story characters play for the effects of narrativity on intergroup attitudes. Beyond testing our hypotheses, this study contributes to the theoretical discussion and limits on the effects of narrative structure on persuasion.

In line with the hypotheses in both experiments, the higher narrativity version of the graphic narrative led to higher cognitive empathy, that is increased perspective-taking. Our findings suggest that even a short exposure to a graphic narrative with high narrativity can increase cognitive empathy with outgroup members—in this case, a bisexual person—compared with an interrupted narrative with lower narrativity. A coherent causal sequence of events facilitates the construction of a situation model of the narrative, enabling readers to better understand characters' actions and perspectives (Zwaan & Radvansky, 1998), as reflected in the observed cognitive empathy toward story characters. Consistently, we found an indirect effect of narrativity via overall empathy on intergroup attitudes, although the total effect of narrativity on intergroup attitudes was not significant. This finding aligns with prior research indicating the mediating role of emotional responses and empathy

Figure 3

Effects of Narrativity on Reading Times, Transportation, Cognitive Empathy, Affective Empathy, and Intergroup Attitudes (Experiment 2)



Note. $N = 813$, low narrativity $n = 419$, high narrativity $n = 394$. Error bars represent the standard error of the mean. Mean reading time (log.) per element is statistically controlled for baseline mean reading time (log.) per element. ns = not significant ($p \geq .05$).

* $p < .05$. *** $p < .001$.

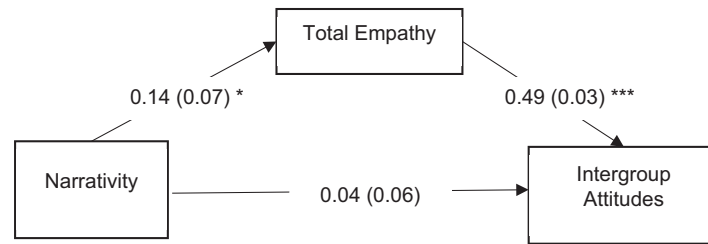
on the story's persuasive impact on attitudes (Appel et al., 2019; Mazzocco et al., 2010) and suggests that there may be other mechanisms through which the positive effect of narrativity on intergroup attitudes might be affected.

In addition, no significant effects of narrativity on affective empathy were observed in both experiments. The absence of significant effects of narrativity on affective empathy could be attributed to the story's focus on the coming out of a bisexual protagonist and their friends' highly cognitively empathetic reactions (e.g., perspective-taking). Observing these reactions might have enabled perspective-taking, aligning with Bandura's social learning theory (Bandura, 1977). In contrast, affective empathy—feeling the emotions of others—might have been less likely to be elicited because of the story's limited emphasis on the characters' emotional experiences, as indicated by the overall low level of affective empathy in both experiments. Furthermore, recognizing and reporting the cognitive component of empathy might be easier for readers than identifying affective empathy, assuming that cognitive awareness

is a prerequisite for emotional reactions (e.g., Smith & Lazarus, 1993). Although emotional arcs in high-narrativity conditions may have increased emotional engagement and narrative involvement, they may have remained insufficient to consistently elicit affective empathy. From a theoretical perspective, emotional shifts at the level of plot progression can guide attention and emotional tension, yet might not translate into affective empathy when narratives provide limited focalization on characters' subjective emotional experiences (Decety & Cowell, 2014). In line with models conceptualizing empathy as a flexible and context-dependent process (Zaki, 2014), coherent narrative structure and emotional arcs may therefore be particularly effective in fostering cognitive empathy (perspective-taking), whereas affective empathy may depend more strongly on explicit emotional cues and access to characters' subjective emotional experience.

Contrary to our hypothesis, we found no main effect of narrativity on story-related intergroup attitudes in either of the two experiments. The hypothesis was informed by previous research showing

Figure 4
Regression-Based Path Models of Narrativity on Intergroup Attitudes via Total Empathy (Experiment 2)



Note. $N = 813$. Standard errors are presented in parentheses.

* $p < .05$. *** $p < .001$.

that exposure to stories and narrative messages can positively influence social attitudes, such as intergroup attitudes (e.g., Murrar & Brauer, 2018; Schiappa et al., 2006) and narratives may be more effective in driving attitudinal change compared with expository texts (Hakemulder, 2000). Social attitudes are closely tied to social identity processes (Tajfel & Turner, 1979), and attitudes toward sexual minorities are known to be relatively stable at the individual level (Ekstam, 2023). Against this background, a single narrative exposure may be insufficient to induce significant differences between experimental conditions in attitudes toward bisexual individuals. Consistent with this interpretation, Mar (2018a) argues that the social content of narratives might be learned during reading with frequent exposure to narratives over a long time and is primarily learned by application in real-world contexts following the reading experience. The between-subjects design of this study, which involved measuring attitudes immediately after reading only one graphic narrative, excluded such an application and was therefore unsuitable for measuring potential attitudinal change in either the short term or the long term.

We also hypothesized that narrativity influences reading processes. Specifically, we predicted that the high-narrativity version would be read faster and with a smoother reading flow than the low-narrativity version of the graphic narrative. This hypothesis was supported in Experiment 1 in which participants in the high-narrativity condition read significantly faster and reported higher transportation into the narrative than participants in the low-narrativity condition. It should be noted that reading flow was operationalized as reading time per element, which should largely mitigate potential effects of differences in overall page length. Nevertheless, in Experiment 1 the low-narrativity version contained one additional page, which constituted a minor structural difference that may have influenced reading flow.

In contrast, in Experiment 2, we found no significant differences in reading flow, total reading time, or transportation between the high- and low-narrativity conditions. The key to understanding this pattern might be the positive correlation observed in Experiment 2 between reading time, fluctuations in reading times, and transportation within the low-narrativity condition. (Descriptives and intercorrelations of all variables are presented separately for each experiment and each narrativity condition in the online [Supplemental Materials](#).) Possibly, the extensive interference with the causal structure of the story in the low-narrativity condition in Experiment 2 impaired reading flow to such an extent that faster

reading times and reduced variability in reading times reflect indifferent skimming rather than smoother reading. Relatedly, the absence of an effect of narrativity on transportation in Experiment 2 also precluded transportation from mediating the effect of narrativity on intergroup attitudes.

Building on these findings of narrativity effects on reading processes, the focus of this study on manipulating narrativity of graphic narratives is important to highlight. The format of graphic narratives uniquely combines visual and textual content (Chute, 2008). The inherent visual interruptions and the fragmented narrative structure potentially influence reading processes in ways that differ from traditional text-based stories. Because information is processed visually and verbally in parallel (dual coding), mental representations are constructed more easily and quickly; this can reduce cognitive load and lead to more fluent reading (Clark & Paivio, 1991). Against this background, the manipulation of event coherence, particularly in Experiment 2 in which events were merely rearranged for the low-narrativity condition, might have left narrativity relatively intact. This reasoning could also explain the results in Experiment 2 in which no significant differences in transportation or reading times were observed between conditions. Finally, a possible moderator effect of transportation not included in our hypotheses might have masked possible effects of narrativity. When readers are deeply transported into a story, they may become less sensitive to inconsistencies or errors in the narrative (Green & Brock, 2000). The moderation analyses for both experiments are presented in the online [Supplemental Materials](#).

Limitations and Implications for Future Research

The study relied on a single exposure to a short LGB-themed graphic narrative. Although this design allowed for a controlled examination of narrativity effects, detection of changes in intergroup attitudes may have been limited. This limitation is relevant given that attitudes toward sexual minorities tend to be well-established and resistant to short-term change (Eagly & Chaiken, 1993), as they are embedded in stable social norms and institutional structures (Herek, 2000). Future studies are encouraged to incorporate longitudinal designs with multiple narratives on the same theme, allowing for repeated exposure and thereby increasing the likelihood of attitudinal change. Moreover, due to our study design with a postexposure measurement without a control group, we cannot determine whether the attitudes were already

quite high in both experimental groups prior to exposure, which may have resulted in ceiling effects that further constrained the potential for observable attitude differences between conditions.

Another potential issue might have been the low sensitivity of the semantic differential scale, which could have failed to detect subtle differences between the experimental groups in story-related intergroup attitudes. Previous work suggests that narrative interventions may produce nuanced differences that are better captured by multidimensional, implicit, or behavioral measures rather than by global evaluative scales (Green, 2004). Future studies may therefore benefit from combining explicit self-report measures with more sensitive or complementary assessment approaches to capture subtle shifts in intergroup perceptions that may not be reflected in global evaluations.

The specific social content of the experimental story—centered on themes of adolescence, identity, and the social interactions with bisexual individuals—could have further limited its broader impact. Narrative effects on intergroup attitudes depend on perceived relevance and identification with the characters and themes (Green & Brock, 2000; Slater & Rouner, 2002). Consequently, the story and its focus on the outing of a bisexual boy might have been more relevant to younger adults, who are also the demographic group more likely to engage with graphic narratives as a medium and more familiar with coming-out experiences, thereby limiting generalizability to the general U.S. population represented by the census based samples in our experiments.

We also acknowledge a potential confound between the narrativity manipulation and the timing of the character's identity reveal, particularly in Experiment 1. Narrative persuasion research indicates that the placement of key information in central story elements facilitates processing (Dahlstrom, 2012). More specifically, prior research suggests that delaying the disclosure of a stigmatized identity can increase identification with the character before stereotype-relevant information becomes salient (Kaufman & Libby, 2012). Consequently, some effects attributed to narrativity may partly reflect differences in processing and identification arising from the protagonist's identity reveal timing, a distinction that should be addressed in future research by orthogonally manipulating narrativity and identity disclosure timing.

Our findings suggest that narrativity's impact on empathy toward an outgroup (specifically perspective-taking) might depend on threshold levels of narrative coherence and emotional engagement. Subtle manipulations of narrativity might not produce significant differences when baseline narrativity remains high, as may be the case for graphic narratives. This limitation is particularly relevant for Experiment 2, where narrativity was manipulated primarily through rearrangements of event sequences. We did not include separate manipulation checks or pilot ratings of perceived narrativity. One reason for this is that narrativity is not easily or reliably captured by self-report measures when readers are exposed to only one version of a narrative and without extensive prompted comparisons. Accordingly, the manipulation was theoretically derived from Cohn's Visual Narrative Grammar (Cohn, 2013a), which specifies how changes in panel structure and sequencing affect narrative coherence and narrativity. Future research should therefore employ stronger and more differentiated narrativity manipulations. Exploring additional dimensions of narrativity, such as narrative perspective or emotional intensity, could provide a more nuanced understanding of the effects of narrativity on empathy and attitudes.

We interpreted slower reading, particularly the lower intraindividual fluctuations in reading time, as an indicator of reduced reading flow (e.g., Mitchell, 1984). However, reading time should be considered an indirect proxy for reading flow and may reflect multiple cognitive processes beyond narrative coherence alone. For instance, longer reading time may also reflect aesthetic engagement with visual details or personal reflection triggered by images in graphic narratives. Although our interpretation follows established reading time paradigms, future research on graphic narratives could more clearly disentangle these different reading processes compared with text-based narratives. Furthermore, investigating different formats and media types besides graphic narratives (e.g., written stories) would be informative for understanding the scope and limits of narrativity effects in narrative persuasion research.

Conclusion

This study provides insights into one particular kind of story feature that might be crucial for narratives to affect social perception. Narrativity significantly influences cognitive empathy, a key process in daily social interactions and perspective-taking, whereas no comparable effects were observed for affective empathy. Structural features that are essential for the "story-likeness" of narratives, namely the presence of an emotional arc and a stringent causal sequence of events, are essential for readers' cognitive empathy with the story characters, supporting perspective-taking and understanding of characters' experiences. By disrupting narrative flow, cognitive empathy toward the characters decreased. The findings have practical implications whenever narratives are used to convey complex ideas or promote intergroup attitudes. For example, graphic narratives could be optimized for educational use by enhancing their narrative coherence or emotional arc to maximize cognitive empathy with outgroups. Similarly, interventions aimed at challenging prejudices could benefit from employing high-narrativity storytelling techniques.

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