Lea Frentzel-Beyme*
Nicole C. Krämer
Social Psychology
Media and Communication
University of Duisburg-Essen

Back to the Past—An Experimental Investigation of the Effects of Immersive Historical Environments on Empathy and Morality

Abstract

Immersive environments are known for fostering empathy via their technological properties that offer users the opportunity to get immersed in a virtual environment and take other perspectives. As empathy and perspective-taking are considered to be the basis of moral development, the present study examines the potential of historical immersive media applications for the individual's moral development according to Kohlberg's stage model (1958). An integrative approach was used to examine the role of technological immersion as well as the recipients' immersion (presence, transportation) in eliciting empathy and promoting moral development and behavior. Therefore, an online experiment with one factorial between-subject design was conducted in which participants ($N = 289$) were exposed to historical media that differed only in their extent of technological immersion; participants either read a text, or watched a video, or a 360° video. In line with previous research, results showed that technological immersion positively affects presence, while transportation was not influenced by technological aspects. Furthermore, results revealed positive effects of transportation and presence on empathy which, in turn, was positively related to moral orientation and behavior. The study indicates that immersive historical environments can promote empathy and morality due to their immersive characteristics.

1 Introduction

Increasingly, memorial places and museums make use of immersive historical environments, like virtual reality (VR), to make the past more tangible and vivid. Immersive historical environments are seen as a contemporary approach to illustrating the past, offering recipients previously impossible experiences (Beale & Reilly, 2017; Bell & Folger, 1995; Schofield et al., 2018). For instance, the memorial site Berlin Hohenschönhausen (Germany) offers visitors, through its 360° experience, the possibility to get an impression of what it was like to be a prisoner in the state security service (Stasi) prison of the German Democratic Republic (GDR) in the 1980s. It is important to emphasize

*Correspondence to lea.frentzel-beyme@uni-due.de.

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that these applications cannot fully reflect the past or even create real experiences (Knoch, 2021; Nakamura, 2020). They are still a selected and effortfully produced representation of the past.

Historical immersive environments support the recipients' immersion into the historical content by creating an illusion of reality with the aid of technological characteristics (e.g., panoramic view; Fonseca & Kraus, 2016; Hofer, 2013; Slater & Wilbur, 1997). The richness of input and output channels (e.g., visual, sound, haptic) and interaction opportunities describe the degree of *technological immersion* of technologies (Herrera, Bailenson, Weisz, Ogle, & Zaki, 2018; Slater, 2003, 2018; Slater & Willbur, 1997). In this sense, 360° videos, which offer a panoramic view, are considered to be immersive but differ in their richness of technological immersion from other technologies that offer more input and output channels or interaction opportunities (e.g., Head-Mounted Display, HMD).

Immersive technologies promote the recipients' immersion in the virtual environment accompanied by a shift of attention to the mediated environment (Agrawal, Simon, Bech, Bæntsen, & Forchhammer, 2020). This phenomenon can be described by the term *presence*: "the sense of being there" (Slater & Willbur, 1997, p. 604). When dealing with narrative media a similar construct, *transportation*, describes the recipients' immersion into narration accompanied by the attentional focus on the narration (Green & Brock, 2000). As historical immersive environments are often characterized by their immersive and narrative characteristics (e.g., being a prisoner in the GDR) the current investigation focuses on the recipients' immersion in terms of presence and transportation.

Previous research indicated that immersion in immersive environments (VR) offers recipients the opportunity to understand other perspectives more deeply (De la Peña et al., 2010) and promotes empathy (Bal & Veltkamp, 2013; Shin, 2018). Especially, immersive environments that enable users to take another perspective are considered to help to empathize with others (e.g., how it feels to be homeless; Herrera et al., 2018). Therefore, VR is discussed as the "ultimate empathy machine" (Barreda-Ángeles, Aleix-Guillaume, & Pereda-Baños, 2020, p. 683; for a critical discussion see Nakamura, 2020).

Taking other perspectives is, according to Kohlberg's moral stage model (1958), assumed to be essential for the individuals' moral development. Learning from the past and teaching individuals moral values is mentioned as an important aim of the historical and democratic education to ensure peaceful coexistence within the society (Brauer & Lücke, 2013; Haidt & Joseph, 2007; Kohlberg, 1971; Pizarro & Solovey, 2002). Therefore, getting the opportunity of taking another perspective in the past might be a useful way to support the individuals' moral orientation, as empathizing with others as an emotional component of perspective-taking is related to higher stages of moral orientation (Eisenberg, Cumberland, Guthrie, Murphy, & Shepard, 2005; Kohlberg, 1958).

In the light of this, the present study aims to investigate based on the immersive historical 360° experience of the German Stasi prison Berlin Hohenschönhausen whether historical immersive environments support the moral development according to Kohlberg's (1958) stage model. We assume that immersive historical environments will be more effective in fostering empathy in recipients than traditional historical media (text, video). Therefore, the study will examine the role of technological immersion in this context, as well as the role of the recipients' immersion (presence, transportation) in eliciting empathy and promoting moral development and moral behavior.

2 Theoretical Framework

2.1 Immersive Historical Environments

In recent years, immersive environments are becoming more and more present, even in history education (Zhang, 2019). History museums use immersive environments to illustrate past events and offer visitors experiences they were not able to get otherwise (Beale & Reilly, 2017). For instance, the Anne Frank House (Netherlands) offers a VR application in which individuals can inspect the family's hiding place

in the Second World War by using an HMD. But also, 360° videos are used to illustrate the past, more deeply involve recipients, and make history more interesting (Dondi, Lombardi, Rocca, Malagodi, & Licchelli, 2018). For instance, *History 360°*[1] produced by German Public Broadcasters aims to bring historical contexts, developments, and events to life through 360° video productions.

According to frequent definitions, any "high-end user interface that involves real-time simulation and interaction through multiple sensorial channels" (Burdea & Coiffet, 2003, p. 3) or computer-generated realistic world (Pan & Hamilton, 2018; Zheng, Chan, & Gibson, 1998) is considered as a type of VR. In this sense, historical 360° videos (e.g., *History 360°*) up to HMD applications (e.g., Anne Frank House) are VR applications (Fonseca & Kraus, 2016; Slater, 2018). VR is known for its immersive characteristics that offer users the opportunity to immerse in a computer-generated environment (Bell & Folger, 1995). Nevertheless, the term immersion is frequently used in different ways throughout literature. On the one hand, it describes a psychological state characterized by perceiving oneself to be part of, located in, and interacting with a virtual environment (Agrawal et al., 2020). On the other hand, it is seen as an objective characteristic of a technology (Slater & Wilbur, 1997).

2.2 Immersion as Technological Property

Whether technology can be described as immersive can be assessed based on specific characteristics. These are the extent of sensory input a device offers (e.g., sound or haptic), *surroundingness* (panoramic displays, e.g., 360° view), the richness of image features (*vividness*, e.g., dynamic illustration of shadows), or the matching of perceptual means with the virtual interface (*proprioceptive matching*; e.g., walking; Slater & Wilbur, 1997). Based on the surroundingness (panoramic view) and the proprioceptive matching (naturally looking around by moving the head or using the keyboard or mouse) historical 360° videos can be classified as immersive. In line with this, technology is not classified binarily into immersive or non-immersive applications but rather described based on the extent of immersion (Slater & Wilbur, 1997). Following this, technologies that are characterized by a diversity of input and output channels (e.g., visual, sound, haptic) and interaction opportunities like HMD are considered to be highly immersive whereby 360° videos are less immersive but more immersive than standard videos (Bell & Folger, 1995; Slater, 2003, 2018). In the following, we will describe this type of immersion classified by objective technological characteristics *technological immersion*.

2.3 Human Reactions to Immersive Media: Presence and Transportation

When immersion refers to human reactions to media, it can be described by the term presence (Agrawal et al., 2020; Fonseca & Kraus, 2016; Slater, 2003). Same as immersion, presence is a vague term and can, on the one hand, refer to the subjective impression that a mediated experience is not mediated (Lombard & Ditton, 1997), summarized as the "*sense of being there*" (Slater & Willbur, 1997, p. 604). On the other hand, it can describe technological characteristics (Steuer 1992). In the following, we will use the term *presence* to explain the subjective experience of recipients to be part of and located in a mediated environment. It is assumed that individuals who experience presence perceive the virtual environment as more engaging and real than the actual physical environment (Slater & Wilbur, 1997). Recipients become fully immersed in the mediated environment, shifting their attentional focus on the virtual environment and turning out everything that is happening around them (Agrawal et al., 2020). As consequence, the mediated environment is perceived as a place visited.

Previous research showed that presence depends, among other things, on the extent of technological immersion (Breves, 2020; Fonseca & Kraus, 2016; Lee, Kim, & Kim, 2017; Troeger & Tümler, 2020). For instance, Troeger and Tümler (2020) showed a greater extent of presence for VR games compared to desktop

[1] https://history360.zdf.de/

games and Lee et al. (2017) demonstrated in an experiment that presence increases if users can naturally move in a virtual environment with the aid of a walking simulator (proprioceptive matching). However, individual characteristics also affect the experience of presence (e.g., interest, motivation, personality; Hofer, 2013)

Furthermore, when dealing with immersive media, like video games or movies, there is mostly some kind of narration (Balakrishnan & Sundar, 2011). Some virtual media products tell a story (e.g., how trees are cut down; Ahn, Bailenson, & Park, 2014) and put the user into a specific role (e.g., homeless person; Herrera et al., 2018). This even occurs in historical immersive media applications which often include narration (e.g., being a prisoner in the GDR; Bunnenberg, 2020). Therefore, it is important to investigate the effects of narration when focusing on historical immersive environments. A term that describes to what extent a reader or viewer gets lost in the narrative plot is called *transportation* (Green & Brock, 2000, 2002) and is partly also described as cognitive and emotional immersion in a fictional world (Hofer, 2013).

In summary, both presence and transportation describe a subjective experience of users of being immersed in media. Literature highlights that presence and transportation should be treated separately as presence mainly describes location and interaction aspects of mediated environments, whereby transportation mainly refers to getting immersed into a story plot and depends on content factors (Green & Brock, 2000, 2002; Hofer, 2013; Nowak, 2001; Pressgrove & Bowman, 2021; Wissmath, Weibel, & Groner, 2009). Therefore, we will focus on the effects of presence and transportation, when examining the effects of immersive historical environments on empathy and moral development.

As previous research indicated that technological immersion affects the subjective experience of users to be part of and located in the computer-mediated environment (Breves, 2020; Fonseca & Kraus, 2016; Lee et al., 2017, Troeger & Tümler, 2020), we assume that when dealing with immersive historical media the richness of technological immersion positively affects presence. Although previous research indicated that technological immersion does not have an impact on transportation (Pressgrove & Bowman, 2021), for instance, no differences in transportation between text and movies were found (Green, Kass, Carrey, Herzig, Feeney, & Sabini, 2008), we assume that higher technological immersion of historical immersive media also enhances transportation as it offers more insights into the story and in turn enhances the narrative engagement (e.g., what is happening behind; Sukalla, Bilandzic, Bolls, & Busselle, 2016). We expect that the slight technological immersion aspects of the immersive historical 360° experiences (panoramic view) involve recipients more deeply in the narration, as they get the opportunity to influence their direction of view in the immersive historical environment. At the same time recipients were not overwhelmed by a high number of technological functions which distract from the story itself (for instance, when using HMD). In sum, we assume positive effects of technological immersion on presence, as well as transportation.

H1: Technological immersion affects [a] presence and [b] transportation positively.

2.4 Immersive Media as the "Ultimate Empathy Machine"

Research indicates that presence offers "a platform for the experience of empathy" (Schutte & Stilinović, 2017, p. 709), as it leads to a deeper understanding of other perspectives (De la Peña et al., 2010). For instance, Fonseca and Kraus (2016) experimentally showed higher levels of empathy in the VR condition which are accompanied by a greater extent of presence compared with the video condition. Moreover, research indicates that especially presence leads to the creation of empathy (Barreda-Ángeles et al., 2020). Herrera et al. (2018) found that individuals who were put into the perspective of a homeless person in VR showed higher levels of empathy regarding homeless people than before. While participants of the VR condition did not report higher empathic feelings compared to the traditional media condition, the authors pointed out stronger positive long-term effects on empathy in the VR

condition. Likewise, Barreda-Ángeles et al. (2020) showed in an experiment that the immersive presentation of journalistic stories increased empathy when they instructed participants to view various 360° videos dealing with different topics (e.g., refugees, the textile industry in Bangladesh) and measured empathy afterward. Also, Bal and Veltkamp (2013) report an increase in both empathy and presence when being transported into a fictional story and Johnson (2012) found that being transported into a story is positively related to affective empathy. These findings indicate that empathy as "the ability to recognize what other people are thinking and feeling, and the ability to engage with other people in a social manner" (Stueber, 2013, p. 1) can be supported with the aid of immersive media. Therefore, VR is frequently discussed as "the ultimate empathy machine" (Barreda-Ángeles et al., 2020, p. 683). However, the effects of VR on empathy were mixed and mainly shown for affective empathy, not cognitive empathy (Martingano, Hererra, & Konrath, 2021). Moreover, whether VR is an appropriate tool to educate recipients' empathic skills is much debated (Lara & Rueda, 2021; Nakamura, 2020; Ramirez, Elliott, & Milam, 2021). It is criticized that such VR applications aim to create the impression of being someone else, which will indeed never be possible (Nakamura, 2020). For instance, being a prisoner in the GDR in VR will never show what it was exactly like to be a prisoner in the GDR. Therefore, it is important to emphasize that those VR applications rather enable recipients to be in someone else's shoes (e.g., prisoner) which is always affected by the recipients' perspective, experiences, and imagination skills (Lara & Rueda, 2021).

Nevertheless, presence and transportation are closely connected to an individual's empathy (Bal and Veltkamp, 2013; Fonseca & Kraus, 2016). Therefore, we assume that presence and transportation affect empathy positively. Previous research mainly focused on context-related empathy (e.g., empathy toward the homeless; Herrera et al., 2018). Based on the findings of Mado, Herrera, Nowak, and Bailenson (2021) which indicated the effects of VR experiences on non-context specific empathy, we will investigate whether the subjective experience of being in the immersive historical environment affects the recipients' empathy in general.

H2: [a] Presence and [b] transportation affect empathy positively.

2.5 Empathy and Moral Development

Kohlberg (1958) assigned an important and central role to empathy in his theory of moral development. Building on the assumption that humans are intrinsically motivated to explore their environment, he assumed that empathy and perspective-taking build the basis of moral development (Althof, 1996; Kohlberg, 1958). According to Kohlberg's theory (1958), a moral judgment can be reached only by a process of reasoning and reflection (Kohlberg & Kramer, 1969), which includes empathy as an emotional component of perspective-taking (Althof, 1996). For instance, when a child tries to decide whether it is right or wrong to steal a toy from another child, it is important to empathize with the other child and find out how he or she would feel about it and derive that it is not the right thing to do. Also, Eisenberg et al. (2005) argued that empathizing with others goes along with higher levels of moral orientation, the "use of a person's moral voice, specifically, an ethic of care or an ethic of justice, or both" (Liddell & Davis, 1996, p. 485).

In general, Kohlberg (1958) assumed that the individual's moral development proceeds in six successive stages, whereby each stage describes another state of moral orientation, and two successive stages represent one level of moral orientation: pre-conventional, conventional, and post-conventional (see Figure 1). Each of the six stages, in turn, represents the individual's ability to understand and integrate diverse points of the individual's moral orientation (Kohlberg, 1976). The preconventional level (stages 1 to 2) is characterized by the orientation toward close relatives (Kohlberg, 1976). In stage one, individuals orientate toward punishment and obedience: actions that are forbidden and are met with punishment are wrong.

In stage two, individuals tend to aim for rewards and act according to rules such as "you scratch my back,

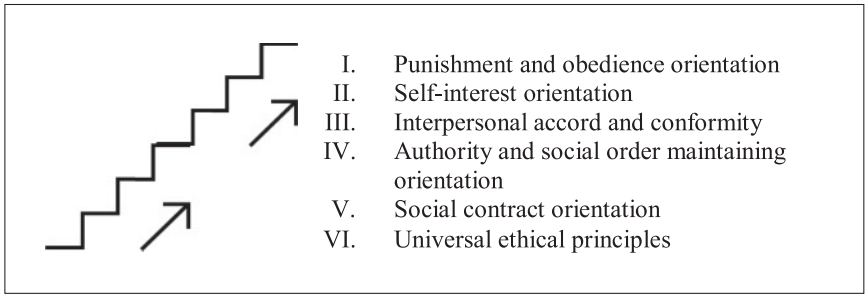

Figure 1. *Self-created illustration of the moral stages according to Kohlberg (1958).*

I'll scratch yours." On the conventional level (stage 3 to 4) individuals orientate themselves toward a larger group (e.g., family, friends, society, state). In stage three, everything that is considered as desirable by their environment (e.g., family, friends) is considered as good. Therefore, stage three is also named "good boy/girl orientation" (Kohlberg, 1976). In stage four, individuals orient toward loyalty and order. When the post-conventional level is reached, individuals focus on a wider circle. The moral orientation on the post-conventional level leads from the orientation toward justice and social contracts in stage five to the orientation to universal ethical principles (e.g., equality of human beings) in stage six. Kohlberg (1958) assumed the moral development to always proceed in a successive order following the six stages.

In summary, the moral orientation according to Kohlberg's theory of moral development (1958) can be distinguished based on these six stages of moral orientation. Moreover, it is assumed that perspective-taking and empathy build the basis of moral development. As immersive historical environments offer users the opportunity to get an impression of how it feels to be someone in the past, they may expand their horizons and form their moral orientation.

Moreover, previous research showed that different types of media can affect the recipients' morality (video games, movies, series; Eden, Tamborini, Grizzard, Lewis, Weber, & Prabhu, 2014; Grizzard, Shaw, Dolan, Anderson, Hahn, & Prabhu, 2017; Grohmann, Holl, & Melzer, 2021; Hodge, Taylor, & McAlaney, 2019; Holl & Melzer, 2021). Referring to the social-intuitionist perspective of morality (moral foundations; Haidt & Joseph, 2007), Tamborini (2012) describes in the *Model of Intuitive Morality and Exemplars* (MIME) that media consumption can affect the salience of related moral foundations. For instance, watching a movie that deals with loyalty might promote the salience of the foundation loyalty by recipients. Along with this, Eden et al. (2014) showed that the consumption of a series over eight weeks affects the salience of the recipients' related moral foundations.

However, as we focus on a rationalist view of the morality of Kohlberg (1958), we assume that the new perspective on the past that immersive historical virtual environments offer promotes the recipients' moral development. Moreover, it is assumed that moral development can be reached by processing stories that deal with moral conflicts which promotes the recipients' empathy (Kohlberg, 1976; Upright, 2002; Wismaliya, Hakam, & Agustin, 2018). Therefore, we assume that empathy, triggered by immersive historical environments, promotes moral development according to higher stages of moral orientation.

H3: Empathy affects moral orientation positively.

Despite the well-known attitude-behavior gap (Fishbein & Ajzen, 1975; Hardy, 2006), research has demonstrated a relationship between moral orientation and moral behavioral intention (Althof, 1996; Lu, Zou, Chen, & Long, 2020; Shields, Funk, & Bredemeier, 2018). Therefore, we assume a relationship between moral orientation and moral behavioral intention.

H4: Moral orientation affects moral behavioral intention.

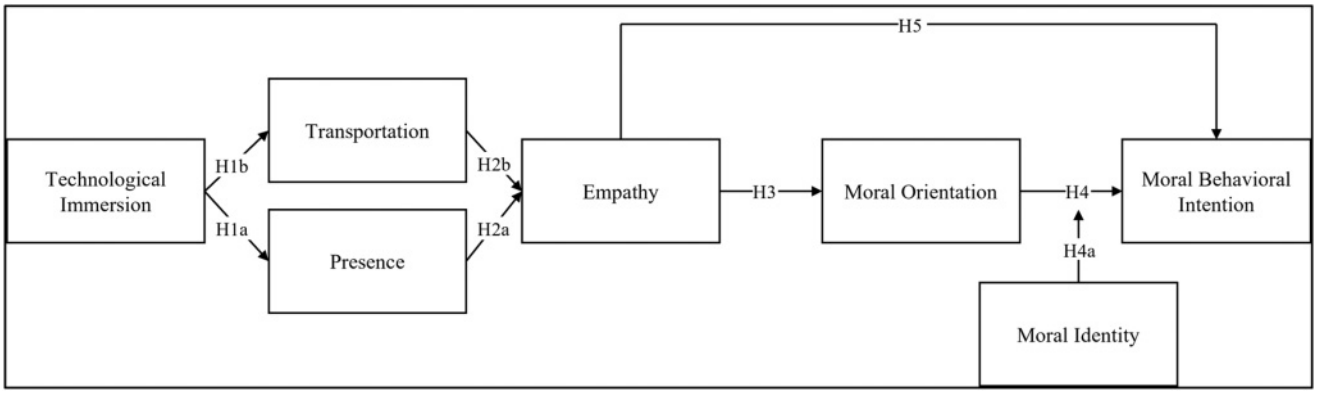

Figure 2. *Illustration of the derived integrative model including hypotheses one to five (H1–H5).*

Furthermore, when focusing on moral behavior, moral identity, as an individual's importance to be a moral person (Hardy & Carlo, 2011), is considered as a kind of moral motivator. It is assumed that someone who shows a high extent of moral identity will more likely act morally. It is argued that moral identity could be the best predictor of moral actions (Damon & Hart, 1992). Therefore, we assume that moral identity influences the relation between moral orientation and moral behavior positively.

H4a: The effect of moral orientation on moral behavioral intention is moderated by moral identity.

Additionally, research indicates that empathically aroused people tend to help others in need, as empathy supports altruistic motives (Stocks, Lishner, & Decker, 2009) and prosocial behavior (Eisenberg & Miller, 1987). Even in the context of immersive media applications, previous studies showed that immersive environments that elicit empathy led to prosocial, as well as pro-environmental behavior (Ahn et al., 2014; Breves, 2020; Bujić, Salminen, Macey, & Hamari, 2020; Fonseca & Kraus, 2016; Herrera et al., 2018; Li & Kyung Kim, 2021; Ma, 2020; Pressgrove & Bowman, 2021). As relations between prosocial behavior and moral behavior can be assumed (Ding et al., 2018), we argue that empathy promotes moral behavioral intention directly.

H5: Empathy affects moral behavioral intention positively.

2.6 Research Model

The relationships hypothesized in *H1–H5* will be integrated into a model (see Figure 2) that investigates whether immersive historical environments can promote moral development according to Kohlberg's theory (1958) by giving users the possibility to take another perspective in an immersive historical environment. In more detail, it will be examined whether the immersive characteristics support the experience to be part of the historical computer-mediated environment and narration. Moreover, the effects on the recipients' empathy and moral development will be examined.

2.6.1 Emotional Impact on Subjective Experienced Immersion. Literature highlights that the effect of media on the recipients' morality relies on the consumed media content (Tamborini, 2012). As historical immersive media applications often deal with atrocities of the past, it is important to focus on the evoked (negative) emotions. Previous research showed that transported individuals are emotionally involved in the story plot and a positive relation between the emotional impact and presence (Barbot & Kaufman, 2020; Gorini et al., 2011). Also, Green and Brock (2000) argued that emotional involvement is one part of transportation. It was shown that a higher experienced presence leads to an increase in viewers' emotions, whereby becoming emotionally involved promotes becoming present in the computer-generated environment, as well. This highlights that

both presence and emotions influence each other (Riva et al., 2007). Therefore, emotions are considered an important factor that affects the subjective experience of individuals to be in a computer-mediated, narrative environment. Accordingly, it is important to examine the effects of evoked emotions on the subjective experience of historical immersive media. Based on the beforementioned findings, we assume that individuals who become transported or present in historical immersive environments are getting more emotionally involved and that being emotionally involved in historical immersive environments enhances feeling present and becoming transported. Thus, we postulate that presence, as well as transportation, as human reactions to immersive historical environments, are affected by the emotional impact and vice versa.

H6: There is a positive relationship between emotional impact and [a] presence and [b] transportation.

3 Method

To test the derived hypotheses and research questions, we conducted an online experiment. We used a between-subject design with three experimental conditions representing the independent variable of the investigation. Consequently, we employed three different media types that differ only in their degree of technological immersion: text, video, and 360° video. The study design was approved by the local ethics committee and was preregistered on OSF[2] in advance of data collection.

3.1 Stimulus Material

The historical content of the stimulus material: text, video, and 360° video (UV), was the same throughout all conditions, to ensure that the examined effects only depend on technological immersion aspects. The content contained the perspective of a prisoner in the 1980s in the state security service (Stasi) prison Hohenschönhausen in Berlin, in the German Democratic Republic (GDR; see the footage on YouTube, 2017[3]). The story includes seven scenes. It starts with the welcoming by three prison guards in front of the prison, followed by a first interrogation by two officials. After that, the prisoner gets adhesive clothing in the third scene. Then the person is photographed by two other officials in the fourth scene. In the fifth scene, the prisoner is brought to a cell before the person is interrogated the second time in the sixth scene. In the last scene, the prisoner is back in the cell and hears the screams of other prisoners. This three-minute-long 360° video production of the Berlin-Hohenschönhausen memorial and IntoVR 360 GmbH served as a template for all stimuli and the original version was used for the 360° video condition. For the second condition, we converted the same video into a standard two-dimensional video format. The stimulus material of both conditions is illustrated in Figure 3. The picture top left shows the standard video view in which recipients were able to see only one perspective throughout the whole video. The other three pictures show additional views of the 360° video condition. By using the mouse or keyboard, recipients of the 360° video can reach a 360° view and get a complete overview of the whole scenario (for instance, what happens behind them).

For the third condition, we first put the content of the seven scenes of the video down in writing, including the conversations and descriptions of the protagonist's actions. Furthermore, we added an image to each of the seven scenes to present the atmosphere of the scenes (see OSF[2]). Consequently, all conditions showed the same story plot. In the 360° video condition, the only addition was the possibility to look around and have an insight into the whole scene/environment by using the mouse or keyboard, which did not deliver any relevant additional information for understanding the story plot. We decided to let the participants watch the 360° video through a video player (instead of asking them to create VR glasses themselves by using cardboard and their smartphones at home) to ensure that all participants in the 360° video condition watched the 360° under the same conditions.

[2]https://osf.io/a7uhm; all mentions in this article to visit Open Science Framework (OSF) are at this address.

[3]https://www.youtube.com/watch?v=lXldN4obTys

Figure 3. *Stimulus material: Standard video view of the prison area (top left) and additional views of the 360° video (fifth scene).*

Reading the story or watching the videos took about three minutes.

3.2 Measures

3.2.1 Presence. Presence was assessed by the Spatial Presence Experience Scale (SPES) of Hartmann et al. (2015), consisting of eight items reflecting two dimensions of spatial presence: user's self-location (e.g., "I felt like I was actually in the environment of the presentation"; $\alpha = .93$; $M = 2.5$, $SD = 1.0$) and perceived possible actions (e.g., "I had the impression that I could be active in the environment of the presentation"; $\alpha = .84$; $M = 3.0$, $SD = 1.2$). Answers were given on a 5-point Likert Scale (1 = *I strongly disagree* to 5 = *I strongly agree*; $M = 2.8$, $SD = 1.0$).

3.2.2 Transportation. Transportation was measured by the eleven general items of the Transportation Scale by Green and Brock (2000) and adjusted to the media types (e.g., "While I was watching the video [reading the text], I could easily picture the events in it taking place"; "I could picture myself in the scene of the events described in the video [text]"; $M = 2.8$, $SD = 0.6$). Participants indicated their agreement with the statements on a 5-point Likert Scale, ranging from 1 = *not at all* to 5 = *very much*. We excluded one item ("While I was reading the narrative [watching the video], activity going on in the room around me was on my mind") to increase internal consistency ($\alpha = .70$) and ended up in an acceptable Cronbach's alpha of .76.

3.2.3 Empathy. Empathy was assessed by the Questionnaire of Cognitive and Affective Empathy (QCAE; Reniers, Corcoran, Drake, Shryane, & Völlm, 2011). The questionnaire consists of 31 items, displaying two factors: affective and cognitive empathy. Affective empathy contains the subscales: emotion contagion (4 items, e.g., "I am happy when I am with a cheerful group and sad when the others are glum"; $\alpha = .75$), peripheral responsivity (4 items; e.g., "I usually stay emotionally

detached when watching a film"; $\alpha = .40$) and proximal responsivity (4 items; e.g., "I often get emotionally involved with my friends' problems"; $\alpha = .64$). The factor cognitive empathy comprises the two subscales: perspective taking (10 items; e.g., "I can easily work out what another person might want to talk about"; $\alpha = .90$) and online simulation (7 items; e.g., "People I am with have a strong influence on my mood"; $\alpha = .80$). Answers were given on a 5-point Likert scale (1 = *I strongly disagree* to 5 = *I strongly agree*; $M = 3.4$, $SD = 0.5$). Based on low internal consistency ($\alpha = .40$) we excluded the subscale peripheral responsivity from our analyses.

3.2.4 Moral Orientation. We self-developed a questionnaire that measures the moral orientation according to Kohlberg's theory of moral development (1958). The questionnaire consists of four dilemmas dealing with situations in which the protagonists must decide whether they protect their family or help others oriented toward the Moral Judgment Interview (Colby et al., 1983) and the Defining Issue Test (Rest, 1975; e.g., protect persecuted vs. protect family). The dilemmas in full length can be found on OSF.[4] After reading each dilemma, participants indicated their agreement with the arguments on how the protagonist should decide on a 6-point Likert scale (1 = *I strongly disagree* to 6 = *I strongly agree*). The arguments were developed based on moral orientation according to Kohlberg (1958). An explanatory factor analysis revealed three factors represented in 70 items that display all moral stages of Kohlberg's theory of moral development (1958). The first factor represents the pre-conventional and conventional level (26 items; e.g., "X should not help Y because he would endear himself to the government"; $\alpha = .96$). The second factor is the social contract orientation of the post-conventional level (13 items; e.g., "X should help Y because it always right to help your family"; $\alpha = .93$). The third factor is the orientation toward universal ethical principles of the post-conventional level (31 items; e.g., "X should help Y because it shows solidarity and tolerance"; $\alpha = .95$). Moreover, we analyzed, as already pre-registered, relations of homophobia and antipathy towards academics on the moral orientation questionnaire, as the dilemmas deal with the persecution of gay people and academics. All analyses can be found on OSF.[4] As moral orientation is assumed to be directive according to Kohlberg (1958), we calculated a net score describing the level of moral orientation to ensure that a higher score indicates a higher level of moral orientation. Therefore, we first computed the arithmetic mean of the post-conventional level (factors 2 and 3) and pre-conventional and conventional level oriented toward Lind (1978). After that, we subtracted the mean of the pre-conventional and conventional levels from the mean of the post-conventional level.

3.2.5 Moral Behavioral Intention. The moral behavioral intention was assessed based on eight vignettes based on Sommer et al. (2010). Each vignette describes a moral everyday life dilemma (e.g., "At a department store you discover your dream clothes. On the way to the cash register, you remember a report on child labor that you have recently seen on TV. The brand name of the clothes you want to buy was mentioned there, too. What would you do?"). Participants answered their behavioral tendency on a 7-point Likert Scale (e.g., 1 = *buy the clothes* to 7 = *do not buy the clothes;* $M = 4.9$, $SD = 1.0$). The internal consistency was low ($\alpha = .57$).

3.2.6 Moral Identity. Moral Identity was measured based on the Moral Identity Questionnaire of Aquino and Reed (2002). In this questionnaire, a list of nine personal characteristics was presented to the participants first ("caring, compassionate, fair, friendly, generous, helpful, hardworking, honest, and kind"). They were instructed to imagine a person who has these characteristics and how that person would feel, think, and act. After that, they rated ten items on a 7-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*; e.g. "It would make me feel good to be a person who has these characteristics"; "Being someone who has these characteristics is an important part of who I am"; $M = 4.9$, $SD = 0.8$) when they had a clear image of this person in mind. According to the internal consistency, we removed one item of the subscale internalization ($\alpha = .57$) and ended up therefore with five items of the subscale

[4] https://osf.io/a7uhm

symbolization ($\alpha = .75$) and four items of the subscale internalization ($\alpha = .65$).

3.2.7 Emotional Impact. The emotional impact was assessed by the German version of the Positive and Negative Affect Schedule (PANAS; Breyer & Bluemke, 2016). A list of 20 feelings and perceptions, ten positive ($\alpha = .84$) and ten negative ($\alpha = .89$), were presented to the participants and they were instructed to read every word and mark the intensity of how they currently feel on a 5-point Likert Scale (1 = *not at all* to 5 = *extremely*; e.g., "active," "angry," "nervous"; $M = 50.7$, $SD = 11.7$).

3.2.8 Manipulation Check. To analyze the perception of the experimental manipulation (text, video, 360° video) and to check whether the participants watched the video or read the text attentively, we asked the participants to briefly summarize the video they saw or the text they read in two to three sentences.

Furthermore, we asked the participants about their prior knowledge of GDR (e.g., "Have you ever visited a museum or memorial that deals with the GDR?") and when they watched the 360° video, if they used the 360° function of the video and if they had already seen a 360° video in the past.

3.3 Procedure

At the beginning of the online study, participants answered questions regarding their sociodemographic information. Afterward, a soundcheck was administered to assure that their audio output was turned on and at an appropriate volume. They were then asked to read a text, watch a video, or 360° video in which they were put into the role of a prisoner in the state security service prison Hohenschönhausen in Berlin, Germany in the 1980s. Participants who were assigned to the 360° video condition received a brief introduction to the functionality and usability of 360° videos before watching the video.

After watching the video or reading the text, participants were asked to answer a questionnaire regarding their emotions and then asked to briefly summarize the content of the video/text. Afterward, they were asked to answer the questionnaires regarding presence, transportation, moral orientation, empathy, moral identity, moral behavioral attention, and several (open) questions. It took on average 45 minutes ($SD = 11.7$) to complete the questionnaire.

3.4 Sample

In total, 303 participants, recruited via an online panel (respondi.com) and different online platforms (e.g., surveycircle.de, facebook.de) to create a sample that is as heterogeneous as possible, completed the online study. Respondents recruited via the online panel were paid a small number of Euros for their participation (~10 Euro per hour). To ensure reliable data, we first removed participants who had particularly short processing times from the dataset (< 30 min), which ended up in a data set containing 293 participants. Afterward, especially as the participation took a lot of time, we conducted a long string analysis (Landers, 2020), based on the answers given to a questionnaire (MFQ) consisting of 15 items. Those three participants who ticked the same answer option to all items were removed from the data set. Therefore, the final data set contains 289 participants (173 women) aged between 18 and 69 ($M = 41.5$, $SD = 15.4$). Most of them had a university degree (39.8%), university entrance qualification (22.8%), or secondary school certificate (21.1%).

Almost all participants in the 360° video condition indicated that they had used the 360°-function (95.5%), and approximately half of them stated that they watched a 360° video before (56.8%). Furthermore, 40 participants reported that they had lived in the German Democratic Republic (GDR), and about one-third indicated that they know someone, family or friends, who had lived in the GDR. All in all, participants indicated in total a moderate knowledge about the GDR ($max. = 100$, $min. = 1$, $M = 51.1$, $SD = 26.5$).

4 Results

4.1 Preliminary Analysis

Firstly, a MANCOVA (using SPSS 27) was calculated to check whether presence and transportation

Table 1. *Results of the MANCOVA Examining the Differences in Transportation and Presence Between the Experimental Groups*

	text ($n = 102$)	video ($n = 99$)	360° video ($n = 88$)			
	$M\,(SD)$	$M\,(SD)$	$M\,(SD)$	$F(2, 283)$	p	η^2
Presence (PA)	9.2 (3.7)	9.2 (4.1)	12.1 (3.8)	25.4	<.001	.152
Presence (SL)	11.6 (4.6)	11.7 (4.6)	13.0 (4.14)	7.87	<.001	.053
Transportation	31.3 (6.1)	30.6 (6.4)	31.2 (6.4)	1.19	.307	.008

Table 2. *Results of the Pairwise Bonferroni Correction Examining Differences in Presence Between the Experimental Groups*

AV			p
Presence SL	Text	Video	.512
	Text	360° Video	**<.001**
	Video	360° Video	**.027**
Presence PA	Text	Video	.743
	Text	360° Video	**<.001**
	Video	360° Video	**<.001**

differ depending on technological immersion. We added emotional impact, gender, and age as covariates in the calculation as effects of both on immersion can be assumed (see OSF[5]). As shown in Table 1, the subscales presence self-location (SL), $F(2,283) = 7.87$, $p < .001$, and presence possible action (PA), $F(2,283) = 25.4$, $p < .001$, were significantly different between the experimental conditions, while there were no differences in transportation, $F(2,283) = 1.19$, $p = .307$.

Furthermore, the analysis revealed mixed effects of the covariates on the relation between technological immersion and presence and technological immersion and transportation (for detailed results see OSF[5]).

Additionally, pairwise comparisons with Bonferroni correction were employed to examine differences in detail (see Table 2). The analysis showed differences in presence self-location and presence possible action between the text and 360° video condition ($p < .001$) and the video and 360° video condition (SL), $p = .027$; PA: $p < .001$, showing higher values of both in the 360° video condition. However, there were no differences in presence between text and video (Table 2).

[5]https://osf.io/a7uhm

4.2 Main Analyses

The integrative model including hypotheses one to five (*H1–5*) was tested using structural equation modeling with observed variables using maximum likelihood estimation (using R version 4.0.3). We added the experimental groups as an ordinally scaled variable to the model representing the construct technological immersion (1 = text, 2 = video, and 3 = 360° video). The original derived integrative model showed a strong correlation between the two constructs transportation and presence, $r = .66$, $p < .001$, that suggests closeness to multicollinearity ($r > .80$; Shrestha, 2020). Though the verification of well-known statistical multicollinearity indices did not show any conspicuous values (Daoud, 2017; Mansfield & Helms, 1982; Shrestha, 2020), the relation between technological immersion and transportation in the model was suspicious. Contrary to the results of the preliminary analysis, which showed no differences in transportation between the experimental groups (technological immersion), the original pre-registered path model revealed a negative significant relationship between technological immersion and transportation, $\beta = -.15$, $p < .001$. As also literature highlights a relation between the two constructs, transportation and presence (Nowak, 2001), it was decided to calculate two separated models, each containing either transportation or presence, to prevent high error rates (Grewal et al., 2004). Furthermore, one adaption was made according to modification indices:

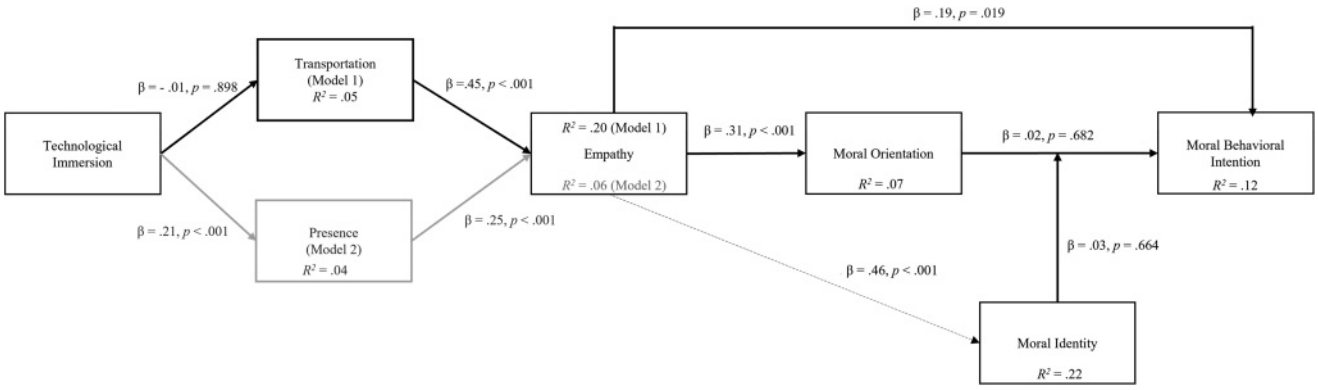

Figure 4. *Illustration of the paths of the two calculated models in summary.*
Note: Grey lines represent the additional paths of the model, including presence instead of transportation. The dashed line displays the additionally added path based on the model indices.

a path from empathy to moral identity was included (see Figure 4).

The model containing transportation, provided a good fit according to frequently used fit indices: χ^2 (14) = 8.02, p = .843, χ^2/df = 1.3, CFI = 1.00, TLI = 1.01, RMSEA = .00 (90% CI from .00 to .03), SRMR = .036 (Hu & Bentler, 2010). Also, the model including presence provided a good model fit: χ^2 (14) = 16.91, p = .204, χ^2/df = 1.4, CFI = 0.96, TLI = 0.94, RMSEA = .03 (90% CI from .00 to .06), SRMR = .038 (Hu & Bentler, 2010). Both models are illustrated in Figure 4, as only the first two paths from technological immersion to presence/transportation and from presence/transportation to empathy differ between the models.

Concerning hypotheses one, which assumed a positive effect of technological immersion on presence (*H1a*) and transportation (*H1b*), the models revealed that technological immersion positively affects presence, $\beta = .21$, $p < .001$, and does not significantly affect transportation, $\beta = -.01$, $p = .898$. Thus, *H1a* was accepted, while *H1b* had to be rejected. Regarding hypotheses two, results showed that presence (*H2a*), $\beta = .25$, $p < .001$, as well as transportation (*H2b*), $\beta = .45$, $p < .001$, positively affect empathy.

Consequently, the data supported hypothesis two, which assumed a positive effect of presence (*H2a*) and transportation (*H2b*) on empathy. Moreover, hypothesis three (*H3*) is supported by the empirical model as there is a significant relationship between empathy and moral orientation, $\beta = .31$, $p < .001$.

Focusing on hypothesis four (*H4*), the analysis revealed no significant associations between moral orientation and moral behavioral intention, $\beta = -.06$, $p = .207$, and consequently no moderation of moral identity on this (*H4a*), $\beta = .03$, $p = .629$, as the interaction term did not show a significant effect. Thus, *H4* and *H4a* are not supported by the data. Though, the model's positive connection between empathy and moral behavioral intention, $\beta = .21$, $p = .005$, supports hypothesis five (*H5*).

Additionally, the added paths that were not part of the hypotheses revealed a positive association between empathy and moral identity, $\beta = .46$, $p < .001$. The explained variance of each construct can be found in Figure 4.

Furthermore, hypothesis (*H6*) that assumed that emotional involvement and presence (*H6a*) and transportation (*H6b*) depend on each other was tested. To analyze the relationship of the constructs, we conducted a separate correlation analysis. The analyses showed a significant moderate correlation between emotional involvement and presence, $r = .45$, $p < .001$, and a strong correlation between emotional involvement and transportation, $r = .55$, $p < .001$. Therefore, data support hypotheses *H6a* and *H6b*.

5 Discussion

The current study investigated whether immersive historical environments support the recipients' empathy and morality, in terms of moral orientation and moral behavioral intention. Moreover, it was examined whether the recipients' immersion in an immersive historical environment has a positive impact on an individual's empathy and morality compared to conventional historical representations (texts, videos). Consequently, we assumed that feeling present and becoming transported in an immersive historical computer-mediated environment enhances empathy and therefore supports moral development.

5.1 Effects of Technological Immersion on Presence and Transportation

Firstly, results showed that even subtle technological immersion aspects promote presence. These findings indicate that presence, the feeling of being part of and having the opportunity to act in a virtual environment (Hartmann et al., 2015), increases with the extent of technological immersion (360° view, interaction). Previous research mostly compared media that varied widely in their degree of technological immersion (e.g., Head Mounted Displays vs. Text; Fonseca & Kraus, 2016; Herrera et al., 2018; Lee et al., 2017). Compared to these investigations, the current study could highlight that even small technological immersion aspects, the 360° view and the possibility to actively look around in the immersive historical environment by using the mouse or keyboard, enhanced presence compared to video and text. According to Slater and Wilbur (1997), different technological properties are essential characteristics of immersive media: the extent of sensory input, surroundingness, vividness, and proprioceptive matching. As the present study could show higher presence values in the 360° video condition which offered surroundingness (360° view) and interactivity (look around in the 360° video by using the mouse or keyboard), it is not possible to fathom which technological property is the decisive factor for the experience of presence. However, findings indicate that surroundingness and interactivity might be important factors for the experience of presence. Consequently, even slightly immersive media, like 360° videos, can involve people more deeply in historical content compared with standard videos and texts.

In addition, results showed that technological immersion does not affect transportation, the feeling of diving into the narration (Green & Brock, 2000), as we found almost similar transportation values throughout all experimental groups (360° video, video, text). This is in line with previous findings (Green et al., 2008; Pressgrove & Bowman, 2021). Nevertheless, as transportation values were almost similar across all experimental conditions, we can assume on a speculative level that transportation can occur in regular videos as well as 360° videos, which goes along with the assumption that transportation is not limited to textual narration (Green & Sestir, 2017).

Moreover, our results highlight a strong relation between presence and transportation. As presence is defined as "the sense of being there" (Lombard & Ditton, 1997), and transportation is considered as diving into narration (Green & Brock, 2000) the relation seems plausible in the first place and both constructs are partly also used synonymous (Nowak, 2001). Otherwise, literature highlights that presence and transportation are different constructs (Hofer, 2013; Nowak, 2001; Wissmath, Weibel, & Groner, 2009). Phillips and McQuarrie (2010) argued that presence is primarily considered as the reaction to visual elements, whereas narrative transportation is mainly grounded in the story plot. As mentioned beforehand, our results support those assumptions as well, as we found that presence depends on technological immersion while transportation is not affected by technological immersion. Based on these findings, we can speculate that technological immersion does not affect the possibility of deeply diving into a story and may distract from the story itself (Balakrishnan & Sundar, 2011), as we only manipulated the extent of technological immersion throughout the experimental groups (text, video, 360° video) and maintained the same story plot. Anyway, it is surprising that even though presence and transportation are highly related to each other, one of them depends on technological properties whereby

the other is not affected by technological properties. This indicates that even though both constructs were often used synonymously (Agrawal et al., 2020; Nowak, 2001), presence might be a unique phenomenon of immersive media, whereby transportation might be a phenomenon of narrative media.

5.2 Effects of Presence and Transportation on Empathy

Moreover, we could show that both presence and transportation promote non-context-specific empathy. These are essential findings as previous research on the relation between immersion and empathy focused primarily on empathy regarding context-specific topics (e.g., environmental protection, attitudes toward homeless; Ahn et al., 2014; Breves, 2020; Herrera et al., 2018; Shin, 2018). Furthermore, we were able to extend the effect of transportation on empathy to immersive media (360° videos), as previous research primarily focused on textual narration (Bal & Veltkamp, 2013). These findings suggest that immersive media can be an effective means of increasing individuals' general empathy. Additionally, our results highlight that transportation affects empathy stronger than presence, which indicates that narration might be an important factor in the elicitation of empathy through media.

5.3 Empathy and Moral Orientation

Most importantly, building on these findings, we investigated based on experimental data that a relation between empathy and moral orientation exists (Kohlberg, 1958). We were able to demonstrate that a greater extent of empathy is associated with higher levels of moral orientation, according to Kohlberg's (1958) moral stages. This confirms the assumption that supporting empathy is an important aspect of moral development and expands it through the findings that it can be supported through immersive historical environments.

Nevertheless, our findings highlight that moral thinking does not automatically predict moral behavioral intention, as results showed no relation between moral orientation and moral behavioral intention. This confirms the "moral-action gap" that was also found in previous research (Aquino & Reed, 2002; Hardy, 2006).

However, we could reveal a relationship between empathy and moral behavioral intention. We disclosed that empathic people tend to behave more likely morally in daily-life situations. This strengthens the assumption of a relationship between empathy and morality (Eisenberg et al., 2005; Kohlberg, 1958). Furthermore, it highlights the importance of empathy when focusing on morality. Based on our findings, we can conclude that immersive historical environments can support moral orientation as well as moral behavioral intention through promoting empathy. Furthermore, we assign a key role to empathy in the context of moral development, as both moral orientation and moral behavioral orientation are positively affected by empathy. Based on this, we can assume that supporting empathy through immersive historical environments might be an effective and useful way to support an individual's moral orientation and moral behavior.

Additionally, against our expectations, we could not show that moral identity affects the relation of moral orientation to moral behavioral intention. However, data revealed a relation between empathy and moral identity. In more detail, findings indicate that empathy influences moral identity positively. These findings go along with the assumptions of Hardy and Carlo (2011), who assume that empathy, guilt, and shame build the base of moral identity. Additionally, these findings highlight the key role of empathy when focusing on moral orientation and moral behavior.

5.4 Emotional Impacts on Presence and Transportation

Furthermore, our results support the assumption that immersion goes along with emotions (Green & Brock, 2000; Wirth, Hofer, & Schramm, 2012), as we found moderately positive relations between emotional involvement and transportation and presence. This is in line with previous research that highlighted that emotional involvement affects presence (Wirth et al., 2012). Moreover, based on our findings we can suppose that

the content's emotionality of immersive historical environments plays a significant role when evoking presence. We showed that experiencing presence is accompanied by emotional involvement in the mediated environment. The findings highlight that especially producers of immersive historical applications should be aware of the extent of emotions the application's content elicits as it could lead to emotional overload which has to be prevented to ensure the cognitive reflection of the viewed content (Bunnenberg, 2020). For instance, this applies to immersive historical applications that are dealing with terrible events of the past, which are always emotional (e.g., Berlin Hohenschönhausen, Anne Frank House; Rosenwein, 2001). Furthermore, it gives rise to the question of which role the content's emotionality of immersive media plays when focusing on the creation of presence and transportation and, along with this, the promotion of empathy. In the light of the present study, we can assume that emotional immersive media content might be effective when trying to elicit empathy with the aid of immersive media, as we found that presence and transportation are positively related to empathy.

5.5 Limitations and Further Research

It is always important to consider the study's limitations when interpreting its findings. First, the generalizability of the findings is limited as the sample is not representative, because it contains a high number of female and highly educated individuals. Moreover, participants answered all questionnaires in the same order. Therefore, it is important to keep in mind that due to a long time of participation (~ 45 minutes) fatigue could have affected the answer behavior. Additionally, we have to note that we could not quite ensure that participants watched or read the stimulus material attentively, as we made use of an online experiment. Also, implications to virtual reality applications have to be taken with care, as we investigated only the effects of less immersive media (360° videos). It might be useful to examine those effects in the context of more immersive technologies like head-mounted displays. Furthermore, the study gives rise to the question of which role narration and the content's emotionality play when focusing on empathy-eliciting media. As the current study focused on only one content that can be seen as moderate narrative and emotional, we recommend exploring differences in presence, transportation, and empathy, depending on the extent of narration and emotionality of the presented immersive historical media content. Moreover, when focusing on the relation of presence and transportation on empathy, research indicates that next to context-specific factors, personality factors are essential aspects. For instance, the *need for affect*, the extent individuals seek emotional situations, is named an important factor when focusing on the creation of empathy (Green & Sestir, 2017; Shin, 2018). Therefore, it might be interesting to examine interpersonal differences in transportation, presence, and empathy in this context, as well. Lastly, effects regarding moral behavioral intention have to be taken with care, as such kinds of measurements that deal with prosocial behavior intentions go along with a particularly high social desirability (Fernandes & Randall, 1992). In this case, using implicit measures might be interesting for further research.

6 Conclusion

In summary, our findings support the assumption that immersive historical environments (e.g., 360° videos) can promote empathy and therefore support moral development. Firstly, our results showed that even subtle technological immersion aspects promote presence, the subjective experience of users to be in a computer-mediated environment, whereby it does not affect transportation, the immersion in narration. Based on this, we found that presence and transportation play a significant role when eliciting empathy with the aid of immersive historical environments. Additionally, we found that transportation has a stronger effect on an individual's empathy than presence, which implicates an important role of narration in empathy-eliciting immersive historical environments. Furthermore, we demonstrated that empathy promotes moral orientation and further highlighted the key role of empathy when focusing on moral development through immersive media. Based on our findings, we can

conclude that supporting empathy through historical immersive media might be an effective and useful way to support individuals' moral orientation and moral behavior.

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