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Feeling the News? The Differential Effects of Immersive Journalism on Emotional Response

Hannah Greber^a , Sophie Lecheler^a , Loes Aaldering^b , Yael De Haan^c ,
Sanne Kruikemeier^{d*} , Nele Goutier^c and Kiki De Bruin^{e*} 

^aDepartment of Communication, University of Vienna, Wien, Austria; ^bDepartment of Political Science and Public Administration, Vrije Universiteit Amsterdam, Amsterdam, Netherlands; ^cResearch Centre Journalism in Digital Transition, HU University of Applied Sciences, Utrecht, The Netherlands; ^dAmsterdam School of Communication Research ASCoR, University of Amsterdam, Amsterdam, Netherlands; ^eResearch Centre Journalism in Digital Transition, HU University of Applied Sciences, Utrecht, The Netherlands

ABSTRACT

Immersive journalism (IJ) is often assumed to be inherently emotion-inducing. Through using inclusive technology, interaction possibilities and immersive narratives, the audience should ideally experience *what feels like* to be in a certain situation. However, for the most part we do not know to which extent and in what form IJ influences the experience of emotions. We wanted to investigate, whether, and if so, which characteristics of IJ are related to the experience of emotions, and which role the personality trait empathy tendency plays in this respect. This is important, as the evaluation of IJ often relies on the emotion-inducing assumption thereof. Four different experiments comparing one immersive journalistic characteristic (level of inclusion, interaction possibilities, immersive narratives) to the respective non-immersive counterpart were conducted. Results indicate that while the level of inclusion and interaction possibility increase the intensity of the experience, the immersive narrative influences the valence dimension of emotions. Additionally, empathy tendency is found to be a relevant moderator for these effects. Conclusions are threefold. First, the narrative form of IJ is key; second, the analysis of IJ needs to go beyond the level of inclusion; third, including emotions when assessing IJ is fundamental to understand its impact.

KEYWORDS


Immersive journalism;
emotional response;
empathy tendency;
inclusion; interactivity;
immersive narrative

Introduction

Recently, journalism has expanded its offers beyond storytelling to storyliving (Maschio 2017). Through the use of immersive journalism (IJ) audiences get to visit

CONTACT Hannah Greber  hannah.greber@univie.ac.at

*Additional affiliation: Strategic Communication Group of Wageningen University & Research (WUR), Wageningen, Netherlands

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refugee camps (Arora and Milk 2015), experience what it feels like to suffer a psychosis (KRO-NCRV 2017), or are transported into an operating room (Süddeutsche Zeitung 2018). Similarly, in academic research, IJ has seen rising interest in its nascent phase, be it for its empathy-evoking potential in contrast to more traditional formats (see Schutte and Stilinović 2017), or for novel ethical challenges that might accompany it (see Mabrook and Singer 2019).

Beyond its use of novel immersive technologies, such as Virtual Reality (VR) (Lecheler 2020), IJ is also about emotion-evoking storylines (Gynnild et al. 2020; Bujić and Hamari 2020). Evolved in accordance with an increased interest in the emotional aspects surrounding journalism, the aim of IJ was to provide access to “the feelings and emotions that accompany the news” (De la Peña et al. 2010, 292). This was seen as beneficial, as emotions carry information, and thereby add to the process of decision making (Bandes and Salerno 2014), establish connections between the audience and journalists (Beckett and Deuze 2016) and can elicit behavioral intentions, such as seeking information and engaging with a story (McIntyre 2015) or take action towards a cause (Baden, McIntyre, and Homberg 2019).

However, to what extent IJ is an emotional form of journalism requires further investigation. Many assessments and normative evaluations of IJ are, at this moment, based on the assumption of emotionality derived either from studies in psychology, or when compared to media types such as text rather than their respective counterparts. There are a number of studies in the field of psychology that investigate the affective dimension of the underlying technology VR (e.g., Diemer et al. 2015); but journalistic productions are more complex and have different aims than VR used in psychology to induce emotions. In journalism, studies test IJs impact on empathy (e.g., Schutte and Stilinović 2017). More recently, Bujić, Salminen, and Hamari (2021) indicate that VR, in contrast to reading an article, noticeably increases the experience of negative affect; additionally, Wu et al. (2021) found no effect of interaction possibilities on emotional response.

Moreover, IJ consists of more characteristics than only the technology (de Bruin et al. 2022), with each having a potentially differing influence on emotions. A majority of previous studies on IJ focus on the impact of levels of inclusion, *that is, the level to which a technology shuts out physical reality* (Slater and Wilbur 1997), by comparing VR stories to videos or texts (see Bujić, Salminen, and Hamari 2021; Sundar, Kang, and Oprean 2017). These approaches - albeit important - tend to reduce IJ to the modality. However, a content analysis shows that immersive stories can not only differ in the type of modalities (differing based on their level of inclusion), but also by the level of interactivity, *which refers to the extent in which technology allows participants to “modify form and content” of an experience* (Steuer 1992, 14) (i.e., looking around) *and the resulting feeling of autonomy by the user called agency* (Moore, 2016); and the type of immersive narrative, *which provide an active rather than a passive role (i.e., first vs. third-person narrative perspective)* (de Bruin et al. 2022). Thus, we want to investigate the differential effects of the dimensions of IJ. We argue that to continue a debate on emotional IJ – and on whether this is expedient – we need to test if the results from other fields, such as psychology (Diemer et al. 2015), also hold true for journalistic pieces, and to which extent they depend on the different characteristics of IJ.

Additionally, we know little about the conditionality of these effects. But to practice IJ means to connect with a fragmented audience (Van Damme et al. 2019), and to bridge “the gap between *you* and *them* or *there*” (Bujčić and Hamari 2020, 136 [italics original]). Emotions are seen as a way to reconnect with a distant audience (Beckett and Deuze 2016). However, effects of IJ such as empathy are dependent on personality traits such as empathy tendency (Shin 2018), which likely also moderates emotional response (Gillath et al. 2008; Wallach, Safir, and Samana 2010). To understand IJ as an emotional form of journalism, we also need to understand whether IJ also influences the emotional response of an often emotionally distant part of the audience.

This article tests whether, and in what form, IJ in commonly used formats induces individual-level emotional responses. Using four experimental studies, we examine which characteristics of IJ (inclusion, narratives or interaction) lead to elevated levels of emotionality. By comparing the presence and absence of each characteristic respectively, we go beyond previous studies, which mainly compared outcomes of IJ to text or video stimuli. This approach allows us to attribute changes in emotional responses to the specific characteristics of IJ, and to what extent they depend on the personality trait *empathy tendency*.

Immersive Journalism – A Different Way to Experience the News

IJ was introduced by Nonny De la Peña, who developed computer-animated (CGI) VR experiences based on news stories, which enabled participants to have a first-person account of an event (De la Peña et al. 2010). Since then, IJ has captured the interest of media actors, who are fascinated by its ability to emotionally engage the audience (Goutier et al. 2021; Sánchez-Laws 2019), and potentially aid their economic survival by appealing to a younger audience (Jones 2017). Accordingly, media organizations such as *The New York Times*, *The Guardian*, *Al Jazeera* and *Euronews* have started to use IJ.

An operational definition of IJ sees it consisting of three characteristics (de Bruin et al. 2022; Baía-Reis and Coelho 2018). First, the technology used for IJ products differ regarding its level of *inclusion*, which refers to the extent to which technologies replicate and shut out physical reality (Slater and Wilbur 1997). This is also often referred to as the “immersiveness” of a technology. Essentially, it relates to the extent to which technologies include different senses in their replication of the world. Immersive technologies are set on a spectrum with regards to their level of inclusion, with, e.g., 360-degree video viewer being less inclusive than a VR experience. Second, and originating from work on “narrative visualism” (Baia-Reis & Coelho 2018), IJ ideally includes *immersive narratives*, that is narrative structures which provide the audience with an active, rather than a passive role within a story (Domínguez, 2017). Importantly, immersive narratives are centered around the audience and refers to the manner in which a story is conveyed, rather than the technological setup underpinning the immersive experience (Gröppel-Wegener and Kidd 2019). A core example for this narrative form is a first-person narrative perspective, which puts users at the center of the story and allows them to experience a story as if it happened to them (de Bruin et al. 2022). Third, the temporal co-occurrence of inclusive technologies and *interaction possibilities* are fundamental to IJ (Baia-Reis and Coelho 2018). Interaction possibilities

mean for instance looking around, or changing the point of view within a story (de Bruin et al. 2022; Ryan 2008; Paíno Ambrosio and Rodríguez Fidalgo, 2020). Overall, IJ is defined by the combination of these characteristics, which taken together replicate a form of reality, with which the audience can interact (Karlin et al. 2018). These characteristics form a spectrum of IJ, and are at a basic level present in each IJ experience.

A majority of studies explain the *effects of immersive journalism* through the so-called *sense of presence*. Presence is often held to be a defining aspect of IJ (de Bruin et al. 2022; Sundar, Kang, and Oprean 2017; Van Damme et al. 2019). A common consequence of IJ is its alleged function as an “empathy machine” (see Schutte and Stilinović 2017). Indeed, the underlying technology of IJ, VR, increases emotional empathy (Martingano et al. 2021). This effect is also connected to questions of whether it leads to more topic engagement (Van Damme et al. 2019), and pro-social behavior (Ma 2020).

Emotions in Journalism

During recent years, there has been an increase in studies focusing on the role of emotions in journalism – something that has been referred to as the “emotional turn” in journalism studies (Lecheler 2020; Wahl-Jorgensen 2020; Orgeret 2020). This growing literature has focused on many aspects of emotion in journalism, such as on how they integrate their own and their sources’ emotional expressions in their reporting (Pantti 2010; Wahl-Jorgensen 2013), how they use emotions such as empathy in their work (Glück, 2016), and most prominently what emotions journalistic news production elicit in audiences (Hermans and Prins 2022)

Importantly, the literature on emotion in journalism has also focused on the impact technological innovation has had on emotions (Lecheler 2020). With the emergence of deeply “affective” technologies such as VR, and the development of IJ and other forms of technology-driven journalistic innovation alongside it, has come the question of the extent of the impact this development will have on journalistic work and audiences (Kukkakorpi and Pantti 2020). IJ specifically was developed with the intent to “lead to more comprehensive information internalization, both cognitively and emotionally” (Bujčić and Hamari 2020, 136). It thus relies on emotion as the key to its success.

This interest in the use of emotions in journalistic productions lies in the effects mediated emotions can have on individuals. Psychological research has long shown that humans understand the social world not only cognitively, but that they draw relevant information from their emotional responses (e.g., Bandes and Salerno 2014). Emotion-inducing content is remembered better by individuals (Kensinger 2009), and emotional responses function as heuristics to forming opinions and attitudes (Igartua, Moral-Toranzo, and Fernández 2011). Along the same lines, the use of emotional testimony can lead to the reduction of knowledge gaps between high and low educated groups (Bas and Grabe 2015). From a journalism studies perspective, this all signifies that emotional responses to a journalistic product, in combination with information-processing, can lead to a deeper core of human understanding and perhaps a higher level of caring for the topic, events, and actors mentioned in that product (Beckett and Deuze 2016).

However, importantly, emotions have differential effects, meaning that it matters which emotional experience or response is included in a journalistic product. The

emotion literature is sharply divided into conceptualizations of emotion that refer to discrete emotions (e.g., anger, joy; Arpan and Nabi 2011), and those referring to dimensional approaches (e.g., positive/negative affect and arousal; Russell 2003). When conceptualizing emotional dimensions, findings suggest for instance that, news eliciting negative emotions may impede engagement with public life, while positive emotions may enhance the intention to act (Baden, McIntyre, and Homberg 2019; McIntyre 2015). The valence of emotions combined with an arousal dimension further help to distinguish different effect patterns. For instance, in a study about immigration portrayal, while low arousal-negative affect can influence attitudes and counterarguing, it seems that high arousal-negative affect negatively influences intentions to help (Boyer 2023).

The effect patterns of emotion are infinitely more complex when thinking about discrete emotions. For example, Valentino and colleagues have shown (2008, Valentino et al. 2011) that, the negative emotion of anger is mobilizing in political contexts, while experiences of anxiety lead to information-seeking. On the other hand, positive experiences such as enthusiasm have only limited political effects (Valentino et al. 2011). However, other research points to the important role of positive emotions in journalism (McIntyre 2015), suggesting that positive emotions may be particularly impactful in the context of journalistic news – where negativity is the norm (Hermans and Prins 2022).

In sum, the widely tested effect patterns of emotional response are one of the founding principles of the spread of IJ. This means that most scholars and practitioners *simply assume* that these mechanisms may be observable for exposure to IJ. However, there is little empirical evidence supporting these assumptions, nor do we know what characteristic of IJ actually causes emotional responses.

Is Immersive Journalism Emotion Inducing?

Many scholars assume that exposure to IJ causes strong emotional responses (Uskali and Ikonen, 2020). Mabrook and Singer (2019, 2103) state “[v]irtually all of it is designed to pack some sort of emotional punch.” This assumption is predominantly based on knowledge surrounding one of the most prominent technologies of IJ: VR. VR refers to a technology that replicates an environment, often through CGI (Gynnild et al. 2020), that can be experienced through a Head-Mounted display (Sánchez-Laws 2019). A VR experience can elicit an emotional response. For example, VR environments are found to induce anxiety in an anxious environment, and relaxation in a relaxing environment (Riva et al. 2007; Gorini et al. 2009), and to evoke specific and intended emotions (Moghimy et al. 2016). However, IJ compasses more than the technology of VR and is produced in a professional and social context vastly different from psychological treatments. VR conditions created to investigate emotion-inducing effects are created in isolation, with often extensive CGI footage and a wide range of interaction possibilities, while journalistic VR productions include complex, multilayered information, different types of narratives, different scenes and are based on real stories.

So, how do the three defining aspects of IJ – inclusion, immersive narration, and interaction (de Bruin et al. 2022) – elicit emotional responses? Many studies investigating IJ are interested in the effects of different technologies used to create IJ. The characteristic that distinguishes these technologies is the level of inclusion, which refers to the extent that one's immediate surrounding is shut out by technology. Whether technological inclusion leads to stronger experiences of emotion is contested. Some studies have found stronger effects on emotional experiences when technology was inclusive (Visch, Tan, and Molenaar 2010; Juan and Pérez 2009; Rupp et al. 2019; Li and Lee 2022), while other studies did not identify such an effect (Gold and Windscheid 2020). Visch, Tan, and Molenaar (2010) suggest that the level of inclusion affects arousal, which in turn affects emotions differently, depending on whether the emotion itself is a highly arousing emotion (Juan and Pérez 2009; Susindar et al. 2019), or a less arousing emotion, such as relaxation (Baños et al. 2008). Concerning journalism, higher levels of inclusion are associated with a more prominent effect on emotional response of IJ (Bujic, Salminen, and Hamari 2021). In addition, inclusion is tied to the experience of affective empathy, which means that participants tend to take on the emotions of characters in a VR story (Li and Lee 2022; Sundar, Kang, and Oprean 2017). However, other studies find no effect on effects related to an emotional response, such as emotional involvement (Van Damme et al. 2019).

Are immersive narratives responsible for inducing emotions in IJ? In a meta-analysis of the relationship between VR, presence and emotions, Diemer et al. (2015) find that while system factors affect presence, content factors influence emotions. Similarly, not technological inclusion, but the narrative influences the change of prosocial attitudes (Pressgrove and Bowman 2020). Immersive narratives typically provide the audience with a more active perspective and can comprise first-person perspectives and embodiment (de Bruin et al. 2022). In psychological experiments, embodiment and a first-person perspective lead to heightened physiological responses (Slater, Spanlang, and Corominas 2010), a stronger reaction to threat (Debarba et al. 2017), stronger emotional responses concerning arousal, valence and dominance (Gall et al. 2021), and a stronger experience of fear, vulnerability and helplessness (Gonzalez-Liencrees et al. 2020). Concerning the effect on emotions, the first-person in contrast to a third-person perspective did not influence the evaluation of emotional intensity (Iriye and Jacques 2021). Overall, the relative impact of immersive narratives, particularly in the form of first-person perspective, on emotional response can be expected.

Concerning interaction possibilities, there is not a clear effect described in the available literature. Schutte and Stilinović (2017) found that in an IJ production, the possibility to look around did not lead to more empathic concern. Similarly, Wu et al. (2021), find that including interaction possibilities and freedom to explore the news led to a higher degree of emotion, while interaction in a similar study did not influence the emotional response and involvement in contrast to no-interaction (Wu et al. 2021; Van Damme et al. 2019).

We test the assumption that all three characteristics – level of inclusion, immersive narratives in the form of a first-person perspective and interaction possibilities – lead to a more intense experience and a stronger emotional response in the form of valence dimensions than their non-immersive counterparts. We do so predominantly

based on the often-repeated argument within the theoretical literature on the emotional impact of IJ (e.g., Mabrook and Singer 2019; Uskali and Ikonen 2020) – thus, we want to explicitly test whether these assumptions hold true. We formulate the following hypotheses:

H1a) Inclusion in IJ has a positive effect on emotional responses: VR leads to stronger emotional responses than video.

H1b) Immersive narratives in IJ have a positive effect on emotional responses: first-person perspective leads to stronger emotional responses than a third-person perspective.

H1c) Interaction in IJ has a positive effect on emotional responses: interaction possibilities lead to stronger emotional responses than no interaction possibilities.

Empathy Tendency as a Moderator for Emotions

Even though IJ productions are expected to evoke strong emotional responses, not every media consumer will respond in the same way. Emotional responses to a media experience are moderated by individual characteristics, such as personality traits (Valkenburg and Peter 2013). Empathy tendency – the ability to be empathetic (Banissy et al. 2012) – is a personality trait closely related to the experience of emotions: empathy can be understood as imagining oneself in another person's position and taking on the role of the other by imitating their experiences and emotions (Lamm, Batson, and Decety 2007). Thus, empathy tendency most likely conditions the impact of (immersive) journalistic productions on emotional reactions.

Indeed, empathy tendency is shown to influence affective reactions, with more empathetic individuals showing stronger emotional reactions (Davis 1983) and a higher arousability (Mehrabian, Young, and Sato 1988). In the context of responses to IJ, it is shown that more empathic people experience stronger embodiment and engagement (Shin 2018) and stronger presence (Wallach, Safir, and Samana 2010) when exposed to VR productions.

Thus, empathy tendency influences the way in which individuals experience IJ and a higher empathy tendency is related to stronger emotional reactions. Therefore, we expect that the experience of emotions based on IJ depends on individuals' empathy tendency:

H2: The relationships defined in H1a-c are moderated by empathy tendency in the way that more empathic individuals have a stronger emotional response to the characteristics of IJ.

Method

Design

To test the hypotheses, four experiments were conducted, each comparing one characteristic of IJ to its non-immersive counterpart. The data was collected in a nationwide study in the Netherlands, funded by National Coordinating Body for Practice-Based Research, in 2019 and 2020, and was part of a larger study design¹. Data was collected in various venues (a museum, a public library, a concert hall, a university) to achieve a diverse sample. In each experiment, participants filled out an online

Table 1. Overview of experiments.

	Experiment 1	Experiment 2	Experiment 3	Experiment 4
IJ Characteristics	Inclusion	Inclusion	Immersive narrative	Interactivity
Manipulation	VR vs Smartphone Viewer	VR vs Smartphone Viewer	First-person vs third-person perspective	Looking around & picking up smartphone vs no looking & no picking up smartphone
IJ production	Kiya	Support for Refugees	The confused man	The confused man
Topic	Domestic violence	Refugee crisis	Psychosis	Psychosis
Inclusion	Manipulated	Manipulated	VR	VR
Narrative	Third-person perspective	First-person perspective	Manipulated	First-person perspective
Interactivity	Looking around	Looking around	Looking around	Manipulated
N	110	40	90	106

questionnaire on a tablet, asking for consent, demographic information, empathy tendency and VR knowledge. Then, they were randomly assigned to one of two experimental conditions. Next, they filled out an online questionnaire, asking for emotional responses, manipulation checks and the control variables, after which they received a gift card of 10€ and a thorough debrief. Table 1 presents an overview of the experimental setup of the four experiments.

Experiment I focuses on the level of inclusion, comparing a VR production with a video seen on a Smartphone viewer. This allows us to test to what extent shutting out physical reality in the IJ production affects the experience of emotions. The stimulus was the immersive production “Kiya,” created by the Emblematic Group and Al Jazeera America. The computer animated production shows an act of domestic violence in the USA. In the inclusive condition ($n = 54$), participants wore a VR-headset, while in the non-inclusive condition ($n = 56$) participants watched the video on a smartphone using headphones.² Manipulation proved successful, as the participants in the inclusive condition felt more strongly “cut off from the immediate environment by the technology” ($\chi^2 = 9.37$, $p = .009$). However, as many Dutch participants had difficulty following the story due to the Southern American accent, the study was replicated in experiment II. Here, the production “Support for Refugees: Refugee Crisis” created by Fairness Works provides a first-person account of the journey of a refugee. As in experiment I, inclusion was manipulated by wearing a VR-headset ($N = 20$) or watching the video on a smartphone viewer ($N = 20$)³ and manipulation was successful ($\chi^2 = 13.3$, $p = .001$).

Experiment III focuses on comparing a first-person with a third-person perspective. Thereby, we test to what extent providing the audience with a more active perspective has an impact on the emotional responses. As stimulus, the immersive production “The confused man [De Verwarde Man]” by the Dutch public broadcasting company “KRO-NCRV” was used. The first-person condition ($N = 43$) applies the original production and shows an animated experience of a psychosis. The control-condition was created by the authors and shows an interview with the man whose experience of a psychosis formed the basis of *The Confused Man* ($N = 47$). The narrative and the technology used (VR headset) remained similar in both conditions.⁴ Manipulation was successful, as participants in the immersive narrative condition more strongly identified as the protagonist in the story ($\chi^2 = 36.35$, $p = .000$).

Table 2. Descriptive statistics.

Scale	Items	Exp.I inclusion			Exp.II inclusion			Exp.III immersive narrative			Exp.IV interaction		
		M	SD	CA	M	SD	CA	M	SD	CA	M	SD	CA
Negative emotions	9	3.65	1.26	.878	4.16	1.07	.831	2.94	1.15	.851	3.22	1.19	.854
Positive emotions	5	2.35	.96	.7	2.1	.75	.499	3.09	1.09	.734	3.04	1.05	.696
Intensity of experience	–	4.36	1.7	–	5.45	1.58	–	4.37	1.6	–	4.57	1.79	–
Empathy tendency	6	5.14	.77	.643	5.10	.97	.849	5.33	.823	.768	3.22	1.19	.645

Mean, standard deviation and Cronbach's Alpha for the DVs negative & positive emotions and intensity, and moderator empathy tendency.

The fourth experiment focuses on interactivity and tests the effect of interacting with the environment on the emotional reaction. Here, the original animated, first-person perspective of “The confused man” was used and all participants watched the production in VR. In the interactive condition ($N=58$), participants were able to “look around” and had to grab a device, such as a smartphone, to start the story, while in the non-interactive condition ($N=48$) participants were not able to change their point of view or interact with devices to enter the story.⁵ Manipulation was successful; in the interactive condition participants more strongly agreed with the statement that they could “determine the pace of the story themselves” ($\chi^2=59.82$, $p<.001$).

We conducted *randomization checks* including gender, VR and gaming knowledge, age and education. The results can be found in [Tables B1–B4 in Appendix B](#), and show that the randomization was successful in each experiment.

Measures

Similar to Gorini et al. (2009), who utilize the framework of core affect (Russell 2003), emotional response is defined along the lines of positive and negative valence and includes an intensity evaluation. This approach aligns with the conclusion of Diemer et al. (2015), that VR might evoke emotional responses via arousal, rather than the valence. To measure post-treatment *emotional response*, a list of 14 discrete positive and negative emotions based on the widely validated (e.g., Von Humboldt, Monteiro, and Leal 2017) PANAS scale (Watson, Clark, and Tellegen 1988) was utilized, in which participants were asked to which extent the emotion occurred while watching the video (1= *not at all*, 7= *absolutely*). Subsequently, the discrete emotions were grouped into negative (disgust, anger, guilty, indignant, anxious, afraid, nervous, sadness and unhappy) and positive emotions (enthusiastic, hopeful, pride, joy, and happy). As the stimuli in the experiments were more prone to elicit negative emotions, we expect stronger impact of the IJ production on the negatively valenced responses than on the positive ones. Nonetheless, we are considering positive valence, as an increase of negative emotions goes hand in hand with a decrease of positive emotions (Szabo and Hopkinson 2007). In addition, we measure the perceived *intensity of an experience*, based on the assumption that the perceived intensity of an experience is related to physiological arousal (MacDowell and Mandler 1989). One item was used asking to what extent participants agreed to the statement that the experience was intense (1= *totally disagree*, 7= *totally agree*).

To measure *empathy tendency*, a scale of nine items was utilized, asking to what extent (1= *totally disagree*, 7= *totally agree*) participants agree with statements such as *I try to*

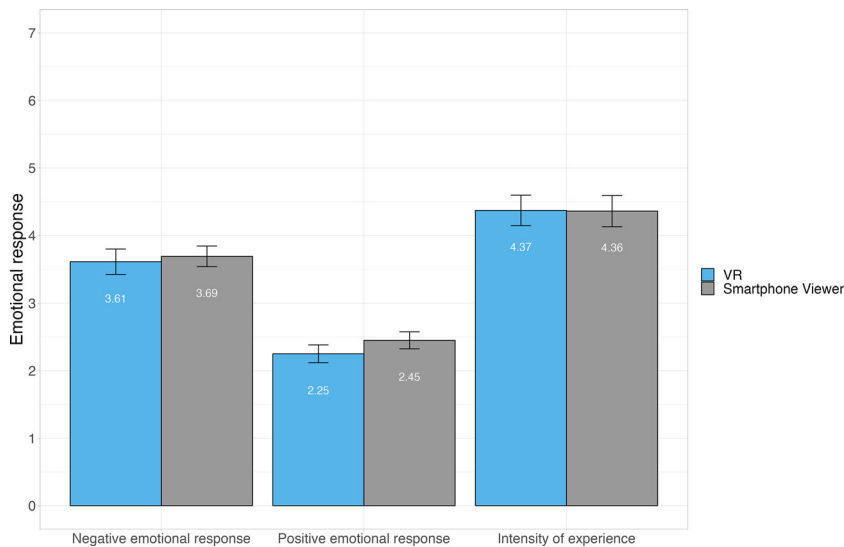


Figure 1. Experiment I testing effect of inclusion on emotional response, barplot with standard error bars. Note: Full regression, see Table 3.

understand my friend's feelings better, by putting myself in their shoes, I trust my feelings or I try not to be guided by feeling (Lietz et al. 2011). After conducting a factorial analysis and inspecting Cronbach's α results, the scale was minimized to include six items.

Table 2 shows the means, standard deviations, and Cronbach alpha scores for the negative and positive emotional response scales, the intensity of the experience and empathy tendency. The pre- and post-treatment questionnaire can be found in Appendix A. Based on Taber (2018), the two relatively low Cronbach's alpha scores of empathy tendency (experiment I: CA = 6.43; experiment IV: CA = 6.45) are accepted, but interpreted with caution. However, the positive emotions scale in experiment II (CA = .499) will be excluded from analysis.

Results

H1: Effects of IJ Characteristics on Emotional Responses

To test hypothesis H1a that that inclusion has a positive effect on emotional responses, a simple linear regression was conducted in which we regress the manipulated inclusion (VR vs Smartphone viewer) on positive emotions, negative emotions and intensity respectively, see Figures 1 and 2 (Table 3 shows regression analyses). The findings show that in both experiments, the level of inclusion does not influence the experience of negative emotions (exp I, model 1: $b = -.083$, $p = .731$; exp II, model 1: $b = .000$, $p = 1$) nor positive emotions (exp I, model 3: $b = -.195$, $p = .289$). This indicates that, contrary to our expectations, participants in the VR condition do not show a stronger emotional response in terms of their discrete emotions than participants that watched the video. In the first experiment, inclusion also does not affect the evaluation of intensity (exp I, model 5: $b = .013$, $p = .967$). However, there is a positive and significant effect of inclusion on intensity in experiment II: participants in the VR

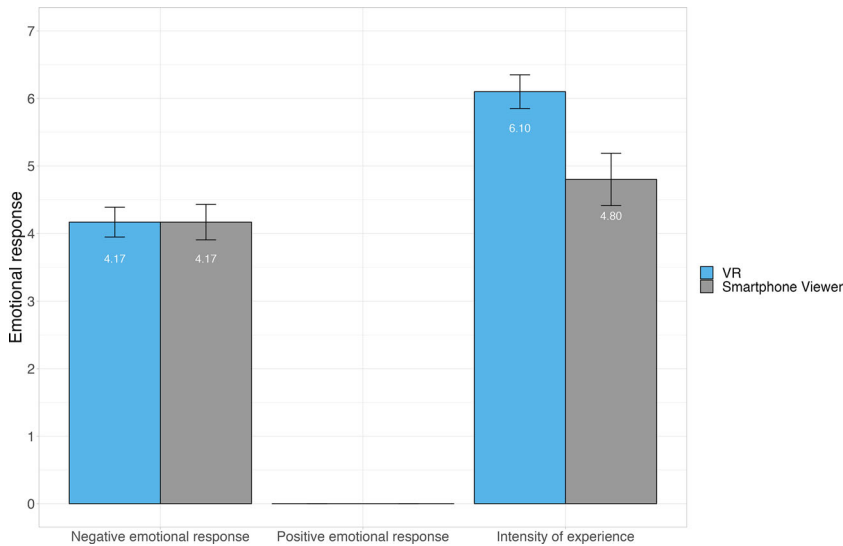


Figure 2. Experiment II testing effect of inclusion on emotional response, barplot with standard error bars. *Note:* Only result of intensity is significant ($b = 1.3$, $se = .462$, $p = .008$).

condition evaluated the experience as more intense ($M = 6.10$) than in the video condition ($M = 4.80$; exp II, model 5: $b = 1.300$, $p = .008$). Thus, H1a is rejected for the effect of inclusion on valence emotional responses, and partially accepted for the impact of inclusion on intensity evaluation.

Figure 3 presents the findings for testing H1b: the impact of a first-person narrative perspective on emotional responses (see Table 3, experiment III). The results show a positive effect on negative emotions: the first-person perspective elicits a stronger negative emotional response ($M = 3.27$) than the third-person perspective ($M = 2.65$; exp III, model 1: $b = .621$, $p = .010$). However, no effects are found of a first-person narrative perspective on the experience of positive emotions (exp III, model 3: $b = -.174$, $p = .453$) nor on the evaluation of the intensity of the experience (exp III, model 5: $b = .511$, $p = .140$). So again, there is only partial support for H1b.

Figure 4 shows the results for the influence of interaction possibilities on emotional responses (H1c) (Table 3, experiment IV). Results indicate no effect of interaction possibilities on negative emotions (exp IV, model 1: $b = -.092$, $p = .694$) and positive emotions (exp IV, model 3: $b = -.068$, $p = .742$). However, a positive effect was found for intensity evaluation: participants that had control over the start of the story evaluated the experience as more intense ($M = 4.98$) than participants that did not have control over the start of the story ($M = 4.05$; exp IV, model 5: $b = .932$, $p = .012$). Thus, H1c is rejected for the effect of interaction possibilities on valence emotional responses, and accepted for the impact on intensity evaluation.

H2: The Moderating Role of Empathy Tendency on the Effects of IJ Characteristics on Emotional Responses

To test whether the personality trait empathy tendency conditions the impact of IJ characteristics on emotional responses, a moderation analysis was conducted. Table 3

Table 3. Effect of IJ characteristics on emotional responses.

Experiment		<i>Emotional Response</i>					
		Negative Emotions		Positive Emotions		Intensity	
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
		B(SE)	B(SE)	B(SE)	B(SE)	B(SE)	B(SE)
Experiment I: Inclusion	Inclusion	-.08 (.24)	−2.09 (1.65)	-.19 (.18)	.58 (1.24)	.01 (.32)	−2.61 (2.11)
	Empathy tendency	–	-.08 (.22)	–	.05 (.16)	–	.29 (.28)
	Inclusion*Empathy tendency	–	.39 (.32)	–	-.14 (.24)	–	.50 (.40)
	(Intercept)	3.69 (.16)	4.09 (1.13)	2.44 (.18)	2.16 (.85)	4.36 (.23)	2.91 (1.45)
	R ²	.00	.02	.01	.01	.00	.07
	N	110	109	110	109	110	109
Experiment II: Inclusion	Inclusion	.00 (.34)	.22 (1.91)	–	–	1.30** (.46)	−3.01 (2.48)
	Empathy tendency	–	.29 (.23)	–	–	–	.00 (.30)
	Inclusion*Empathy tendency	–	-.05 (.37)	–	–	–	.84 (.48)
	(Intercept)	4.18 (.24)	2.71 (1.18)	–	–	4.80 (3.26)	4.79 (1.53)
	R ²	.00	.06	–	–	.17	.27
	N	40	40	–	–	40	40
Experiment III: Immersive narrative	Immersive narrative	.62* (.24)	1.29 (1.54)	-.17 (.23)	4.03** (1.49)	.51 (.34)	.62 (.79)
	Empathy tendency	–	.47* (.19)	–	.49** (.18)	–	.07 (.28)
	Immersive narrative* Empathy tendency	–	-.13 (.29)	–	-.79** (.28)	–	-.02 (.43)
	(Intercept)	2.65 (.26)	.17 (.99)	3.18 (.16)	.55 (.97)	4.49 (.24)	4.12 (1.51)
	R ²	.07	.16	.01	.01	.02	.02
	N	90	89	90	89	90	89
Experiment IV: Interactivity	Interactivity	-.09 (.23)	2.39 (1.86)	-.07 (.21)	3.12 (1.64)	.93* (.37)	6.90* (2.77)
	Empathy tendency	–	.39 (.24)	–	.36 (.22)	–	1.34*** (.36)
	Interactivity*Empathy tendency	–	-.46 (.18)	–	-.60 (.31)	–	-1.14* (.52)
	(Intercept)	3.27 (.17)	1.17 (1.31)	3.08 (.15)	1.16 (1.16)	4.05 (.27)	−2.97 (1.89)
	R ²	.00	.03	.00	.04	.07	.20
	N	106	104	106	104	92	92

Cell entries are OLS unstandardized regression coefficients with standard errors in between brackets. * $p < .05$; ** $p < .01$; *** $p < .001$.

shows that empathy tendency does not moderate the effect of inclusion on negative (exp I, model 2: $b = .392$, $p = .22$; exp II, model 2: $b = -.048$, $p = .89$), nor positive emotions (exp I, model 4: $b = -.144$, $p = .546$). Additionally, the evaluation of intensity of the experience was not conditional upon empathy tendency (exp I, model 6: $b = .497$, $p = .22$; exp II, model 6: $b = .836$, $p = .088$). Thus, contrasting our expectations, these results show that the impact of inclusion (VR vs. Smartphone viewer) on emotional reactions is not dependent on a person's ability to be empathetic.

Furthermore, Table 3 shows that empathy tendency does not moderate the effect of first-person perspective on negative emotions (exp III, model 2: $b = -.132$, $p = .64$), nor on the evaluation of intensity of the experience (exp III, model 6: $b = -.024$, $p = .955$).

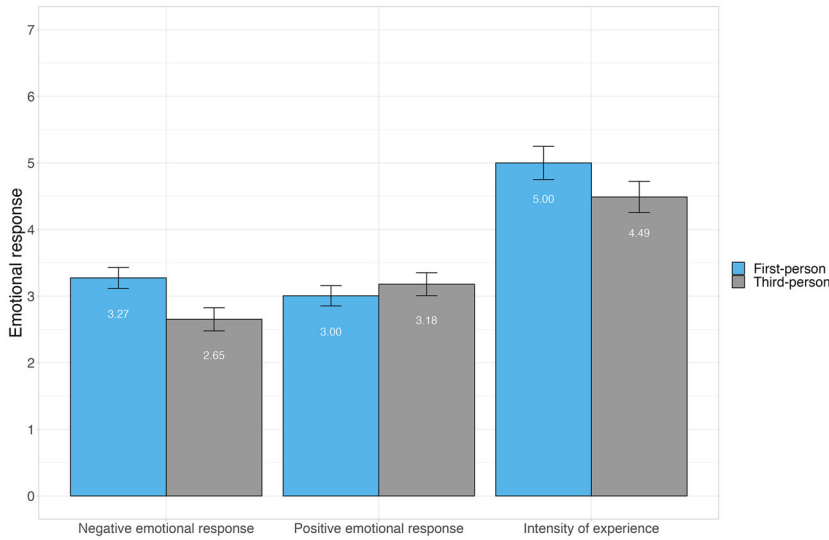


Figure 3. Effect of immersive narratives on emotional response, barplot with standard error bars. *Note:* Only negative emotions ($b=.621$, $se=.236$, $p=.01$) is significant.

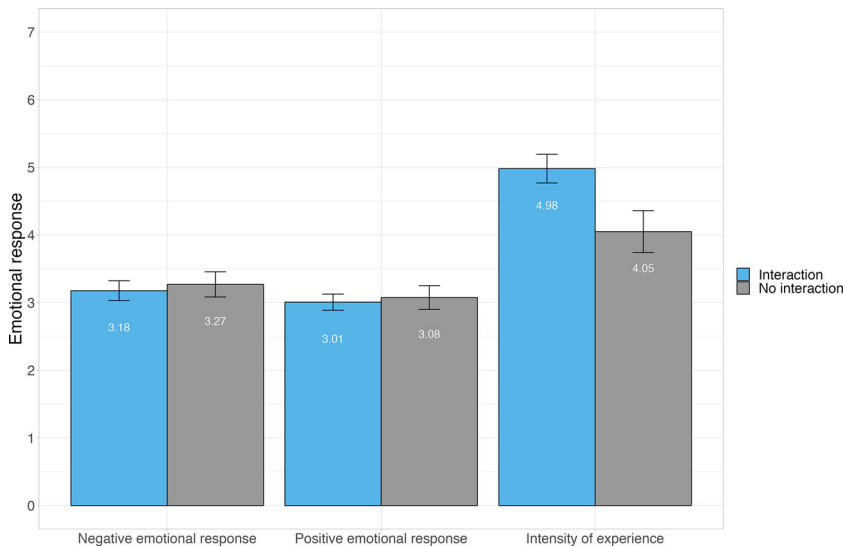


Figure 4. Effect interaction possibilities vs. no interaction possibilities on emotional response, barplot with standard error bars. *Note:* Only result of intensity ($b=.932$, $se=.365$, $p=.01$) is significant.

However, the effect of a first-person narrative perspective on positive emotions is shown to be moderated by empathy tendency (exp III, model 4: $b = -.787$, $p = .006$). **Figure 5** plots the marginal effects and shows that the effect of the first-person narrative (vs third-person perspective) on positive emotions is positive and significant for those participants that score low (below 5) on the empathy tendency scale, while it is negative and significant for those participants that have a high empathy tendency (above 6). To reiterate, the stimulus material in this experiment shows the experience

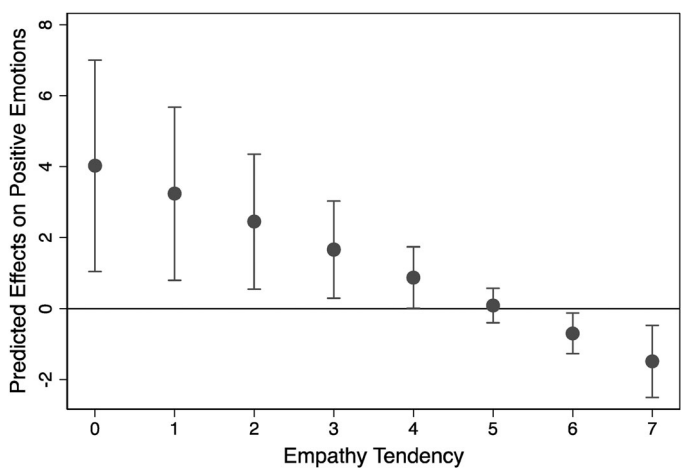


Figure 5. Marginal effects plot of moderating role of empathy tendency on effect of immersive narrative on positive emotions. *Note:* Adjusted predictions of effect of immersive narrative with 95% CIs.

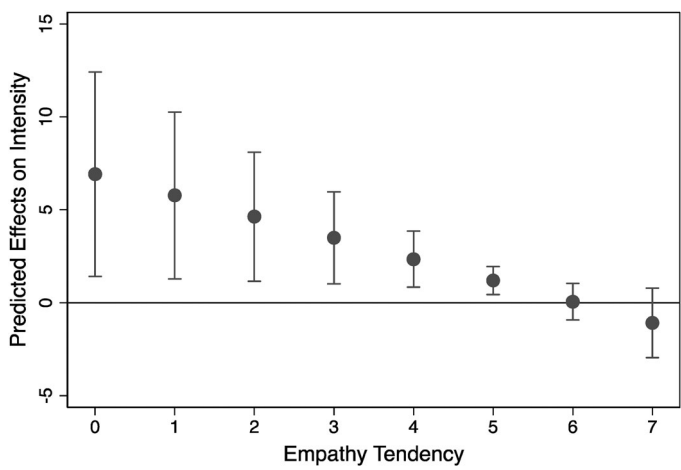


Figure 6. Marginal effects plot of moderating role of empathy tendency on effect of interactivity on intensity evaluations. *Note:* Adjusted predictions of effect of interactivity with 95% CIs.

of a psychosis. Thus, strongly empathic participants experience fewer positive emotions when they see the first-person production compared to the third-person production, while participants with less abilities to show empathy experience more positive emotions in the first-person than in the third-person condition. A possible explanation for this result could be that highly empathic people, who are more likely to take on the emotions of others (Lamm, Batson, and Decety 2007), are prompted by the first-person experience to do so even more.

Lastly, we test for the moderating role of empathy tendency on the impact of interaction possibilities on emotional responses. As it turns out, empathy tendency does not moderate the relationship between interaction possibilities and negative emotions (Table 3, exp IV, model 2: $b=.464$, $p=.18$), nor positive emotions (exp IV, model 4: $b=-$

.60, $p=.052$). However, empathy tendency does moderate the effect of interactivity on intensity evaluation (exp IV, model 6: $b=-1.14$, $p=.03$). Figure 6 plots the marginal effect and shows that the effect of interactivity on the evaluation of intensity is positive and significant for participants who score low (five or less) on empathy tendency, while participants with a high empathy tendency (six and higher) are not significantly affected. Contrasting our expectations, the effect of interacting with devices on intensity evaluation is weaker for participants that are more empathetic.

Overall, the findings for the conditionality of the impact of IJ characteristics on emotional responses on one's ability to be empathic are mixed. Contrary to expectations, for most types of emotional responses, we do not find a moderating influence of empathy tendency on the effect of IJ characteristics on emotional reactions. For the impact of interactivity on intensity we even find the opposite of what was hypothesized: empathic people are *less strongly affected* by IJ interactivity. Only for the effect of first-person narrative perspective on positive emotional responses we find results that fit with our expectations: the more empathic people are, the lower their positive emotional response after watching the first-person perspective (compared to the third-person perspective) story of someone experiencing a psychosis. Overall, empathy tendency rarely functions as a moderator for the effect of different immersive characteristics on emotional response. Therefore, we reject Hypothesis 2.

Discussion

We examined whether, in what form, and for whom IJ evokes an emotional response. This is a worthwhile question, as IJ is often claimed to be a more emotional, all-encompassing medium allowing for a deeper understanding of the world (see Bujić and Hamari 2020). However, based on our results, the use of technology in IJ is not a more emotional approach to journalism per-se. Rather, the results of the four experiments offer a nuanced view on which aspects of IJ have an effect on reported emotions.

First, in both studies comparing an inclusive to a non-inclusive counterpart, no effect on the valence dimensions could be detected. However, the inclusive condition in the second experiment resulted in a higher evaluation of intensity. This result aligns with previous studies, indicating that the level of inclusion does not have a direct impact on positive or negative emotions, but that it can influence the experience of arousal (Diemer et al. 2015). While IJ is characterized by the combination of inclusion, immersive narratives and interaction possibilities, a wide number of studies on IJ only manipulate the level of inclusion (e.g., Shin and Biocca 2018). While the level of inclusion is of importance for other effects commonly associated with an immersive experience, such as the sense of presence (Cummings and Bailenson 2016) and the experience of affective empathy (Sundar, Kang, and Oprean 2017; Li and Lee 2022) it does not seem to play a role when it comes to evoking emotional responses beyond the evaluation of intensity.

Second, concerning the impact of the first-person experience, it has led to an increase in negative emotions in contrast to the third-person narrative perspective. Empathy tendency did moderate the effect of the narrative perspective on positive

emotions, in that participants with a high empathy tendency experienced fewer positive emotions, while participants with lower empathy tendencies experienced more positive emotions. These results align with previous findings, indicating that content factors more directly influence emotions in contrast to system factors (Diemer et al. 2015; Slater, Spanlang, and Corominas 2010).

Third, interaction possibility did not influence positive or negative emotional responses; however, the interactive condition led to a higher reported intensity than the non-interactive condition. Additionally, and counter-intuitively, the effect of the interactive condition on the evaluation of intensity was moderated by empathy tendency, in that participants with lower empathy tendencies evaluated the interactive condition as more intense, while people with high empathy tendency do not show a significant difference regarding their intensity evaluation between conditions. While Palmer (2020) evaluates the basic interaction such as looking around as “not interactive in any significant sense” (p. 15), based on these results we claim that the possibility to explore the environment of an immersive journalistic story might be important to enhance the intensity of an experience in particular of those people who are harder to involve.

The implications of these findings are threefold. First, our results highlight the relative importance of immersive narratives in form of a first-person narrative perspective when it comes to creating an emotional experience with regard to the valence dimensions. While initially the level of inclusion was seen as the unique addition to journalism, this study underlines that storytelling is key (Pressgrove and Bowman 2020). Through incorporating a first-person narrative perspective, IJ provides a setup for the creation of encompassing, emotionally involving journalism. However, this becomes problematic when considering that immersive journalistic productions only rarely make meaningful use of narrative possibilities, such as using a first-person narrative (de Bruin et al. 2022). Journalists need to refocus on this core aspect of journalism and ask themselves, how the narrative of IJ could augment their approach to storytelling.

Second, future studies should go beyond the assessment of IJ based on inclusion and take into account immersive narratives and interaction possibilities. Only disentangling and understanding the effects of the different characteristics and their combinations will allow for a holistic evaluation of the effects of IJ.

Third, we call attention to the importance of emotions when discussing, but also when assessing IJ. As the expanding literature on emotions in journalism shows (Orgeret 2020), emotions play a central role in evaluating technologically driven forms of journalism. In light of the relative emotional power associated with IJ, a call for guidelines was made to regulate the production of VR content in order not to harm the audience (Mabrook and Singer 2019). Based on our results, we can say that what makes IJ emotional is not merely the form, but the storytelling itself. Thus, we suggest further discussions to move beyond assessing impacts of the form of IJ, and focus on what the form does to the presentation and choice of content.

This experimental setup has limitations. In particular the results of experiment I and its replication, experiment II, need to be treated with caution. In experiment I, participants were struggling to follow the American pronunciation. The experiment was replicated with a different production and a lower number of participants, potentially

affecting the power of the results. In addition, the empathy tendency measurement in experiment I and experiment IV led to low Cronbach alpha scores. These results should be treated with caution. Additionally, our measure for intensity could be read as being ambiguous by participants, as we asked how they rate the intensity of the experience rather than the intensity of the emotional experience. Furthermore, the two conditions in experiment III, focusing on the effect of immersive narratives, did not only differ in their perspective, but also in their style of production. While the first-person experience was animated, the third-person account was captured with real footage. Professionals explained they use animated VR content in those cases when they want to bring complex social experiences closer to the audience (e.g., Steed et al. 2018). This observation might provide an avenue for further research: what are the effects of animated vs. real-life footage in the context of IJ, not only on emotional responses but also on credibility?

Future studies should test the effect of the combinations of immersive stimuli. The division of the experiments along the lines of inclusion, interactivity and immersive narratives, allowed us to disentangle the different effects of these characteristics and made the experimental setups feasible. Simultaneously, this means that results cannot be directly compared – which immersive feature and which combinations had the strongest effect cannot be read from these results. Additionally, to evaluate the potential of IJ, future studies should go beyond our basic manipulations of IJ characteristics to tease out what meaningful manifestations of IJ are. In light of research showing that more inclusive conditions tend to elicit a stronger affective empathic response (Li and Lee 2022; Sundar, Kang, and Oprean 2017), a closer investigation of how affective empathy is related to the emotional reactions of IJ would be fruitful. Such an investigation should also take into account different ways of measuring emotional responses, and should include more elaborate (e.g., physiological) measures of arousal in combination with positive and negative valence dimensions (Boyer 2023).

Notes

1. An overview of the project can be found here: <https://immersievejournalistiek.nl/>
2. 51.4% male, 45% female 3.7% no gender identity. Mean age 40 ($SD = 39.9$).
3. 52.5% male, 47.5% female. Mean age 51 ($SD = 17.3$).
4. 46.7% male, 50% female, 2.2% no gender identity. Mean age 34 ($SD = 16.1$).
5. 46.2% male, 51.0% female, 2.8% no gender identity. Mean age 38 ($SD = 16.3$).

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ORCID

Hannah Greber  <http://orcid.org/0000-0002-1680-9344>
 Sophie Lecheler  <http://orcid.org/0000-0001-7320-1012>
 Loes Aldering  <http://orcid.org/0000-0002-2266-4751>
 Yael De Haan  <http://orcid.org/0000-0002-4688-3166>
 Sanne Kruike-meier  <http://orcid.org/0000-0002-8053-8200>
 Kiki De Bruin  <http://orcid.org/0000-0001-6254-7827>

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