# Video games for good

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**DOI**
10.1016/j.entcom.2025.100928

**Publication date**
2025

**Document Version**
Final published version

**Published in**
Entertainment Computing

**License**
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Entertainment Computing 53 (2025) 100928

Contents lists available at ScienceDirect

Entertainment Computing

journal homepage: www.elsevier.com/locate/entcom

# Video games for good: Active perspective-taking fosters empathy and reduces implicit bias toward gendered violence victims

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A R T I C L E I N F O

*Keywords:*
Video games
Gendered violence
Empathy
Perspective-taking
Implicit bias

A B S T R A C T

Many victims of gendered violence suffer from systematic stigmatization. A novel approach to reduce the negative bias toward victims of gendered violence is the use of video games. In this study, we explore how playing video games can contribute to fostering empathy and reducing bias toward victims of gendered violence. To test our hypotheses, we conducted a lab experiment ($N = 166$). The result showed that taking the perspective of a gendered violence victim in a video game increases players' embodiment of the game character and in turn increases player's empathy toward gendered violence victims. No moderation was found for gender and also no relationship between empathy and implicit bias was found. All in all, the study demonstrates the potential of video games to be an empathy intervention tool for increasing empathy toward gendered violence victims.

## 1. Introduction

Today, one in three women worldwide is affected by gender-based violence in their lifetime [1]. Gender-based violence is defined as violence that disproportionately affects people of a specific gender [2], and often refers to violence against women. This violence includes various forms of human rights violations, such as physical, sexual, psychological, and economical harm, and the general suffering of women.

On top of this, victims of gendered violence often also suffer systematic stigmatization for being a victim [3,4]. For example, they might be perceived as shameful or weak. This stigmatization is generally implicit and can seriously affect victims negatively. Women who are being stigmatized might feel ashamed, isolated, and discriminated against, and will be less likely to disclose the abuse or seek help [3]. This is highly problematic, and it is therefore important to explore how this stigmatization can be mitigated. A potential novel approach to reduce the negative bias toward victims of gendered violence is the use of video games.

Video games are no longer considered mere sources of entertainment. Nowadays, video games act as a significant cultural medium and contribute to the shaping and expression of culture, values, and beliefs [5–7]. In this capacity, video games can be used to reduce bias. In the past, video games have been used to successfully reduce implicit bias in other contexts, such as racial and gender biases [8].

Building on this potential, the aim of this research is to explore how active perspective-taking in video games can contribute to fostering empathy and reducing bias toward victims of gendered violence. In this study, we also examine to what extent embodiment mediates the relationship between active perspective-taking and empathy, and whether the effect of empathy on implicit bias is the same for men and women. To study this, we adopted an experimental method, which allowed us to assess causal relationships among the variables of this study.

The findings of this study have both theoretical and societal implications. On a theoretical level, the findings will enrich the literature on media effects, embodiment, empathy, and attitude change, confirming whether the current understanding of how these constructs interact still stands within a gendered violence context. On a societal level, our study offers implications for designers of video game interventions aimed to reduce negative biases and promote prosocial behavior toward victims of gendered violence. In a broader context, this research is a stepping stone to creating a more empathic environment for the victims of gendered violence. By doing so, this research also hopes to contribute to the United Nations' fifth sustainable development goal (SDG 5: Achieve gender equality and empower all women and girls), for which eliminating all forms of violence against women and girls is one of the key targets.

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https://doi.org/10.1016/j.entcom.2025.100928
Received 13 February 2024; Received in revised form 4 December 2024; Accepted 28 January 2025
Available online 30 January 2025

## 2. Background

### 2.1. Perspective-Taking, Embodiment, and empathy

Perspective-taking, the process of adopting the viewpoint, experiences, or role of another character within the game [9], is often used to induce psychological outcomes, such as empathy [10,11]. Empathy, which includes affective and cognitive components, can help individuals understand other's feelings according to their emotions and behaviors [12,13]. The effect of perspective-taking on empathy could be explained by the theory of mind [14]. The theory of mind refers to the ability to understand and infer the mental states of others. This ability allows individuals to recognize that others may have thoughts and feelings that are different from their own, and in turn, enables individuals' ability to take other people's perspectives and increases empathy.

To induce perspective-taking, researchers use different media, from storytelling text [15], pictures with emotional context [16], video content [15], to video games [17], as media could trigger visuospatial signals and empathic signals. These are the two commonly acknowledged signals to trigger perspective-taking: Visuospatial and empathic signals.

Visuospatial signals emphasize visual signals and spatial signals, in short, 'how something looks' [18–20]. It is achieved by trying to take other's physical perspectives. Empathic signals emphasize emotional signals such as *how something feels* [21,22]. It is achieved by employing *imagine-the-others* instructions. Notably, traditional media are not as effective in triggering visuospatial and empathic signals and inducing perspective-taking compared to innovative technology.

Video games offer more stimulation than texts and pictures due to their interactive nature [23–25]. They provide a goal-oriented virtual space for players to discover, explore, and interact with promptly [23], which requires spatial manipulation. Often, video games also involve the player in a narrative with multisensory stimulation that requires emotional investment and attention [26,27], which means that players tend to focus entirely on the video game via the use of large screens and powerful sounds and be involved in the narrative that requires empathic perspective-taking during the gameplay [28].

Gee [29] calls the unique perspective-taking induced via roleplaying video games *projected identity*, and illustrates that a video game can allow players to emerge the game character with their own identity, and attribute certain mental states to the game character. These attributed mental states can reflect on players' mental states. Those who engage in the gameplay not only imagine how another person (the video game character) feels but also actively decide how that person reacts. The autonomy brought by the latter is what differentiates active perspective-taking induced by video games from passive perspective-taking [17].

People who passively experience perspective-taking do not get to decide how the main character reacts, and therefore attribute fewer mental states to the game character, as a result, do not experience the same effect of perspective-taking on empathy. This type of media effect is in line with the general learning model, that exposure to a certain media stimulus could lead to changes in people's internal states [30]. This is also in line with the later research on how perspective-taking is the basis of the empathetic process [31]. To empathize with someone, which requires changes in the internal states, it is necessary to take their perspective.

Per definition, the mechanism of perspective-taking is rooted in the embodiment of one another [32] through self-other merging [33]. This means that individuals are expected to take traits and behaviors of the target whose perspective they are taking [22,34]. Gee [29] has also explained how active gameplay induces self-other merging. Therefore, successful active perspective-taking should result in more embodiment of the character of the perspective compared with passive perspective-taking.

In addition, studies have shown that brain regions associated with empathy, also known as the core empathy network, are more active for events happening to a single person than a group of people [35]. Suggesting that it is easier to empathize with an individual than a group of people. Notably, individual-level perspective-taking is more strongly linked to a feeling of empathy compared to group-level perspective-taking [36]. Video games provide such an opportunity for players to embody an individual by individual-level perspective-taking, which would then be effective in arousing empathy toward the character.

Past literature has provided proof for embodiment and perspective-taking: Body swapping with a Black person in VR led to higher empathy scores compared to control groups [37], the effect persists when embodying a person of same race but different racial identity [38]. This mechanism is also found to be effective in settings beyond reducing racial bias, such as in public services [39], in organization [40], and education [41].

In sum, we expect that perspective-taking encourages individuals to step beyond their own experiences and consider another's viewpoint, ultimately fostering empathy. Video gameplay can effectively trigger signals for inducing perspective-taking due to its interactive nature. This results in a projected identity where players embody the game character and attribute mental states to the character, which in turn explains the mechanism behind perspective-taking inducing empathy. We hypothesize that:

**H1.** Active perspective-taking (playing the video game) increases empathy toward gendered violence victims compared to passive perspective-taking (watching others play the video game).

**H2.** Embodiment mediates the effect of active perspective-taking (compared to passive perspective-taking) on empathy toward gendered violence victims.

### 2.2. Gender and empathy

Empathy is believed to be a multidimensional construct and consists of an affective and a cognitive dimension [42]. One of the two constructs that makes up the affective dimension of empathy is caring, which is defined as behaviors aimed at addressing another person's immediate needs. Feminist theories [43] explain that the concept of caring reflects femininity uniquely, as women are more likely to consider how their decisions will affect others on a personal and relationship level compared to men [42]. Therefore, females are more likely to show stronger affective empathic responses toward the same stimuli compared to males.

One of the two constructs that make up the cognitive dimension of empathy is interpersonal sensitivity, which is defined as the communication process between individuals that relies on their understanding of each other's body language and facial cues. Although King Jr. [42] did not explicitly state that women tend to show higher interpersonal sensitivity than men, he argued that the ability to understand body language and facial expression is dependent on gender role expectation–which in turn implies that females are more likely to show stronger cognitive empathic response compared to males. This is supported by the research done by Alaerts et al. [44] who showed that females took less time to recognize body language compared to males. In sum, this suggests that females and males might differ in both their affective and cognitive empathic responses to the same stimuli.

There is also empirical evidence supporting this. For example, a study found that females' empathic responses are triggered by the perception of others' emotional states, while male's empathic responses are mediated by self-interest, which in turn reduces their empathic response [45]. From a biological perspective, it is recognized that females show higher emotional responsivity in affective empathy than males, because of a difference between genders in the neurological network processing empathy [46]. This logic applies in a perspective-taking study context. Gutierrez et al. [17] found that women in the passive perspective-taking group showed significantly higher levels of empathy for the game character than men.

Therefore, past research has provided sufficient theoretical ground as well as empirical evidence for the current study to hypothesize that there is a gendered difference in the effect of perspective-taking on empathy. We therefore hypothesize that:

**H3.** The effect of perspective-taking on empathy toward gendered violence victims is stronger for females than for males.

### *2.3. Empathy in reducing implicit bias*

As proposed in the general learning model [30], the changes in the internal states, in this case, affective and cognitive empathic responses, affect attitudes and beliefs. Therefore, we expect that empathy could reduce implicit bias. There has been a lot of previous research that uses empathy as a way to reduce stereotypes and biases [16,47,48]. For example, research has shown that empathy induced by video games could result in behavioral changes such as reduction of bias and stereotypes [8,49] or promote prosocial behavior [50–52]. A direct example of empathy predicting prosocial tendencies would be the study done by Gutierrez et al. [17], when actively taking a Black graduate student's perspective, high empathy could predict lower levels of implicit race bias. Given the established link between empathy and reduced biases as demonstrated in various studies we hypothesize that:

**H4.** Higher empathy toward gendered violence victims predicts a decrease in implicit bias toward the gendered violence victim.

See Fig. 1 for a visualization of the theoretical model.

## 3. Method

### *3.1. Participants and procedure*

To test the hypotheses, we conducted an experiment ($N = 166$) with a single factor (active perspective-taking vs. passive perspective-taking) between-subjects design. This study received ethical approval from the Ethics Review Board of the University of Amsterdam (Approval reference: FMG-1477).

Data cleaning involved deleting participants who did not experience the gendered violence scene during the gameplay, participants who identified as neither male nor female and participants who did not meet the implicit association test's *d*-score computation criteria [53]. Based on a power analysis on G-power, we determined that 88 participants would be required per group for both the experimental and the control group to achieve a power of 0.95 when assuming a medium effect size ($d = 0.5$). In total, we aimed for 176 participants. The final sample was close to this number and consisted of 166 participants (78.9 % female) with an average age of 21.14 years old ($SD = 2.71$). There are 73 participants in the control group and 93 participants in the experimental group.

In most of the experiment sessions, participants arrived in pairs. After entering the lab, participants were instructed to sit back-to-back with each other facing the computer monitor. The participants were given the informed consent form and were asked whether they wished to continue participating after reading the consent form. They were also given a printed copy of the information sheet for them to take home.

After the participants gave their consent, they were first asked to complete an implicit association test (IAT) on the computer, where they were reminded to place both of their hands on the keyboard for maximum efficiency and not to be affected by the other participant. Upon completing the first IAT, the two participants were randomly assigned to either play a destinated chapter of the stimulus game (player) or watch the other participant play the stimulus game (viewer) with a coin toss. In some cases, only one participant signed up for a one-time slot, they were automatically assigned to be a player to minimize the differences among subjects, considering the potential differences between watching another participant play and other alternatives such as watching a YouTube video of the game chapter. This also explains the differences between the ideal sample size and the actual sample size. Participants are then instructed to sit next to each other in front of the gaming laptop for gameplay. See Appendix A for the technical details of the gameplay and the instructions posed during the gameplay. After the gameplay, the participants were asked to return to their seats and were asked to fill out a questionnaire. Finally, the participants were asked to complete an identical IAT test as the first IAT test. See Appendix B for a detailed description of the compensation and the procedures for signing up for the research.

### *3.2. Stimulus material*

The video game used in the research is 'Detroit: Become Human,'

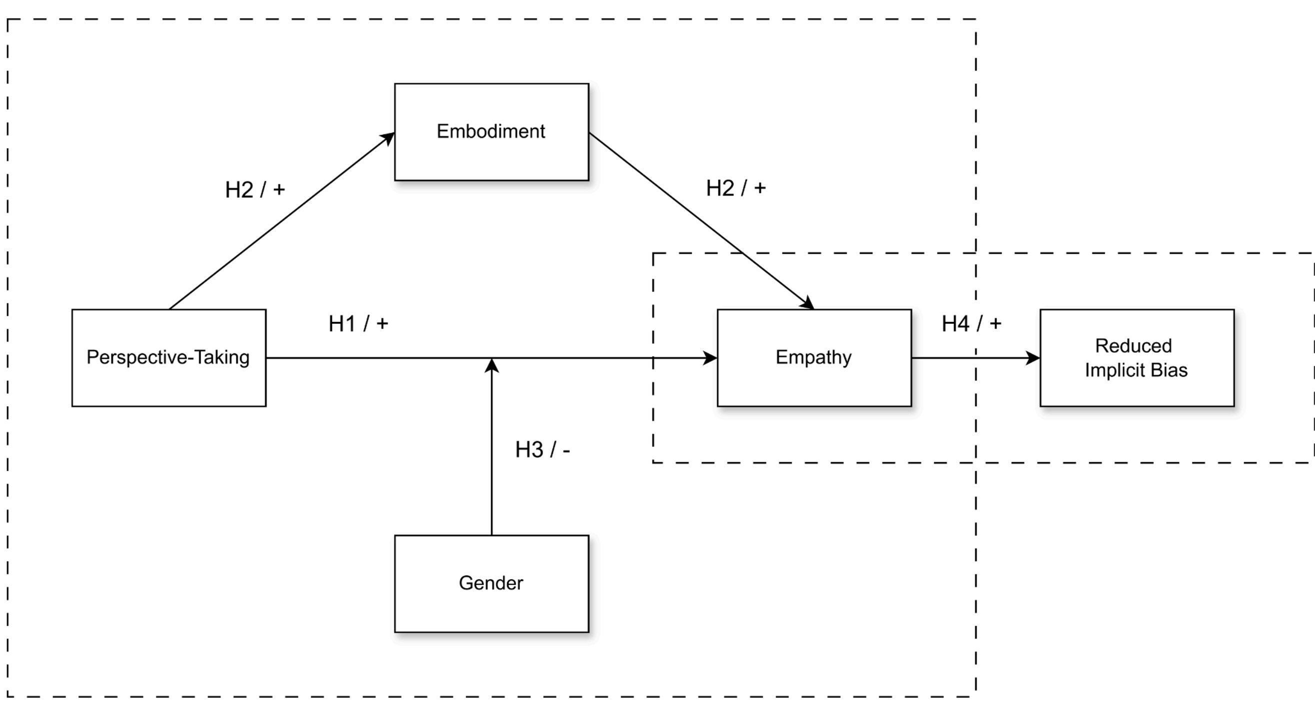


**Fig. 1.** Visualization of the theoretical model.

more specifically the chapter 'Stormy Night.' This video game was chosen as the stimulus material as it contains a scene that depicts gendered violence in a domestic violence context. There are several ways this chapter can be played out, and the players were free to choose how they wanted to play. See Appendix C for a brief description of the plot.

### 3.3. Measures

#### 3.3.1. Implicit bias toward gendered violence victims

A stereotype implicit association test (IAT) was used to measure the implicit bias toward gendered violence victims. IAT has been commonly used to measure the extent of a societal stereotype a person holds, ranging from gender stereotypes [54,55] to racial stereotypes [17,56]. Therefore, it is used in this study to measure participants' implicit bias toward gendered violence victims.

Identical to the original IAT developed by Greenwald et al. [57], the IAT used in this study consists of two target concepts (victims of gendered violence and women) and two attribute concepts (strong and weak). The reason for choosing the two target concepts is that victims of gendered violence are commonly compared to those who are not victims of gendered violence. Comparing participants' responses to the two target concepts would effectively show participants' implicit bias toward the victims. Participants were asked to classify the stimuli in the center of the screen into two response categories by pressing 'F' and 'J' on the keyboard based on the concepts located on the top left and top right of the screen accordingly. See Appendix D for a detailed procedure of the implicit association test.

See Tables 1 and 2 for the sequence of stimuli presentation initiating the IAT with incongruent and congruent phases respectively. The difference between table 1 and 2 is whether an incongruent phase comes first followed by a congruent phase or the other way around. The participants received sequences of Tables 1 and 2 at random for counterbalancing the order of the two combined tasks and the sides initially assigned to each category. This practice was introduced as one of the best research practices for using the IAT [53]. See Table 3 for the word list used in the IAT.

#### 3.3.2. Embodiment

A four-item 5-point Likert scale was used to measure embodiment [59]. The scale ranged from 1 (*Strongly disagree*) to 5 (*Strongly agree*). Higher scores indicate a higher level of embodiment with the video game character. A principal axis factor analysis shows that the four items form a unidimensional scale: only one factor has an eigenvalue above 1 (eigenvalue 2.83). This factor explains 70.78 % of the variance in the original variable. The scale is reliable in measuring participants' embodiment of the video game character ($M$ = 3.66, $SD$ = 0.91, Cronbach's alpha = 0.86).

#### 3.3.3. Empathy toward gendered violence victims

Empathy toward victims of gendered violence is measured by the none-in-three responsiveness assessment scale [60]. The scale was designed to measure empathy toward victims of intimate partner violence instead of gendered violence in general, therefore, minor adjustments on the items were made to adapt to the current study. For example, replacing 'her partner' in the items with 'a man.' The scale consists of a 5-point Likert rating from 1 (*Strongly disagree*) to 5 (*Strongly agree*). It has two eight-item subscales measuring affective responsiveness, the scores range from 2.75 to 5 and cognitive responsiveness, the scores range from 1.13 to 5. A higher score indicates greater affective and cognitive empathy toward the victims of gendered violence victims. This scale is reliable in measuring affective ($M$ = 4.40, $SD$ = 0.51, Cronbach's alpha = 0.89) and cognitive ($M$ = 3.53, $SD$ = 0.87, Cronbach's alpha = 0.90) empathy toward gendered violence victims.

**Table 1**
Sequence of Stimuli Presentation Initiating the IAT with Incongruent Phase.

| Blocks | Trials | Phase | Left Key (F) Categories | Right Key (J) Categories |
|---|---|---|---|---|
| B1 | 12 | Practice | Victims of gendered violence | Women |
| B2 | 16 | Practice | Strong | Weak |
| B3 | 28 | Incongruent | Victims of gendered violence/Strong | Women/Weak |
| B4 | 16 | Practice | Weak | Strong |
| B5 | 28 | Congruent | Victims of gendered violence/Weak | Women/Strong |

**Table 2**
Sequence of Stimuli Presentation Initiating the IAT with Congruent Phase.

| Blocks | Trials | Phase | Left Key (F) Categories | Right Key (J) Categories |
|---|---|---|---|---|
| B1 | 12 | Practice | Victims of gendered violence | Women |
| B2 | 16 | Practice | Weak | Strong |
| B3 | 28 | Congruent | Victims of gendered violence/Weak | Women/Strong |
| B4 | 16 | Practice | Strong | Weak |
| B5 | 28 | Incongruent | Victims of gendered violence/Strong | Women/Weak |

**Table 3**
Word List.

| Women | Victims of Gendered Violence | Strong | Weak |
|---|---|---|---|
| Female | Abused | Powerful | Fragile |
| Girl | Exploited | Dominant | Vulnerable |
| She | Harmed | Secure | Unstable |
| Her | Victimized | Solid | Dependent |
| Sister | Survivor | Robust | Submissive |
| Daughter | Mistreated | Tough | Delicate |
| | | Potent | Wobbly |
| | | Mighty | Helpless |

*Note.* The word list was based on Jones et al. [58].

#### 3.3.4. Control variables

The control variables of the study include general empathy, previous exposure to the stimulus material, previous experience with gendered violence, and explicit bias toward gendered violence victims.

General empathy ($M$ = 3.61, $SD$ = 0.40, Cronbach's alpha = 0.83) is measured by the interpersonal reactivity index [61]; Previous exposure to the game is measured by one item, "Have you played 'Detroit: Become Human' or watched content that is related to 'Detroit: Become Human' before? (e.g. playthroughs, live-streaming)." The participants have the option to choose from *Yes* or *No*. Previous experience with gendered violence is measured by one item, "Have you experienced gendered violence yourself?" with the definition of gender-based violence by the World Health Organization on the side [62]. The participants have the option to choose from *Yes*, *No*, *I'm not sure* and *I prefer not to say*. Explicit bias toward gendered violence victims is measured by one of the subscales (victim blame) of the domestic violence blame scale ($M$ = 1.30, $SD$ = 0.47, Cronbach's alpha = 0.79) [63].

## 4. Results

### 4.1. Randomization checks

To check whether the sample data were distributed equally across the two conditions, we performed randomization checks with the control variables and the demographic variables. No differences were found for general empathy ($t$ (164) = 1.51, $p$ = 0.133), explicit bias toward gendered violence victim ($t$ (164) = -1.71, $p$ = 0.090), past experience with the stimulus game ($\chi^2$ = 0.67, $p$ = 0.414), past experience with gendered violence ($\chi^2$ = 0.77, $p$ = 0.380), age ($t$ (164) = -1.90, $p$ = 0.060), education ($\chi^2$ = 2.01, p = 0.734), country ($\chi^2$ = 34.60, p = 0.749), and gender ($\chi^2$ = 3.52, $p$ = 0.061) between the control and experimental groups. This suggests that the participants were successfully randomly assigned.

### 4.2. Hypothesis testing

#### 4.2.1. Direct effect of Perspective-Taking on empathy

To test Hypothesis 1, we ran two $t$-tests with perspective-taking as the independent variable and the affective and cognitive empathy scores as the dependent variables. No significant differences were found between the experimental group and the control group for affective empathy ($t$ (164) = -0.41, $p$ = 0.683, 95 % CI [-0.38, 0.25]) and cognitive empathy ($t$ (164) = 1.43, $p$ = 0.153, 95 % CI [-0.09, 0.54]) toward gendered violence victim. This means Hypothesis 1 is not supported.

#### 4.2.2. Indirect effects of perspective-taking on empathy

*4.2.2.1. Embodiment as mediator.* To test Hypotheses 2 and 3, a mediated moderation model [64] was estimated using PROCESS (Model 5) [65] that predicted empathy toward gendered violence victims. The model was run for affective empathy and cognitive empathy respectively. See Table 4 for the correlations among study variables, and Fig. 2 for a visualization of the path model with affective empathy, Fig. 3 for a visualization of the path model with cognitive empathy.

The overall model predicting affective empathy toward gendered violence victims, including perspective-taking (independent variable), embodiment (mediator), and gender (moderator), was significant ($F$(4, 161) = 6.08, $p$ < 0.001). The model explained 13.12 % of the variance in affective empathy toward gendered violence victim. Within this model, perspective-taking did not have a significant direct effect on affective empathy ($b$ = 0.16, $SE$ = 0.17, $t$ = 0.97, $p$ = 0.333, 95 % CI [−0.17, 0.50]). Although perspective-taking had a significant direct effect on embodiment ($b$ = 0.48, $SE$ = 0.15, $t$ = 3.14, $p$ = 0.002, 95 %CI [0.18, 0.78], embodiment did not have a significant direct effect on empathy ($b$ = 0.09, $SE$ = 0.08, $t$ = 1.16, $p$ = 0.248, 95 % CI [−0.06, 0.24]). All in all, embodiment did not mediate the effect of perspective-taking on empathy ($b$ = 0.04, $SE$ = 0.04, 95 % CI [−0.03, 0.14]; Hypothesis 2 is thus not supported.

The model predicting cognitive empathy was also significant ($F$(4, 161) = 9.89, $p$ < 0.001), indicating that this model can be used to predict cognitive empathy toward gendered violence victims. The model explained 19.72 % of the variance in cognitive empathy toward gendered violence victim. Within the model, perspective-taking did not have a significant direct effect on cognitive empathy ($b$ = -0.32, $SE$ = 0.17, $t$ = -1.90, $p$ = 0.059, 95 % CI [-0.64, 0.01]). Embodiment, $b$ = 0.25, $SE$ = 0.07, $t$ = 3.33, $p$ = 0.001, 95 % CI [0.10, 0.40], had a significant direct effect on cognitive empathy, indicating that embodiment influenced cognitive empathy independent of perspective-taking and gender. At the same time, perspective-taking significantly predicted embodiment ($b$ = 0.48, $SE$ = 0.15, $t$ = 3.14, $p$ = 0.002), suggesting that active perspective-taking had a positive effect on embodiment. Notably, the results showed that the embodiment of the video game character fully mediated the effect of perspective-taking on cognitive empathy toward gendered violence victims ($b$ = 0.12, $SE$ = 0.06, 95 % CI [0.03, 0.25]. Therefore, Hypothesis 2 is supported for the effect on cognitive empathy.

*4.2.2.2. Gender as moderator.* Furthermore, the results showed that the interaction effect of perspective-taking and gender on empathy was not significant for both affective empathy ($b$ = −0.17, $SE$ = 0.39, $t$ = −0.43, $p$ = 0.667, 95 % CI [−0.94, 0.60]) and cognitive empathy ($b$ = 0.42, $SE$ = 0.38, $t$ = 1.10, $p$ = 0.271, 95 %CI [−0.33, 1.18], indicating that the effect of perspective-taking on empathy does not differ between females and males. Therefore, Hypothesis 3 is not supported.

#### 4.2.3. Direct effect of perspective-taking on implicit bias

To test Hypothesis 4, we ran two linear regressions with the dimensions of empathy toward gendered violence victims as predictor variables and reduced implicit bias as outcome variable. The results showed that there was no significant relationship between affective empathy toward gendered violence victims and reduced implicit bias, $b$ = 0.06, $t$ (165) = 0.80, $p$ = 0.425, as well as between cognitive empathy and reduced implicit bias, $b$ = 0.04, $t$ (165) = 0.50, $p$ = 0.621. This suggests that higher levels of empathy toward gendered violence victims cannot predict higher levels of reduced implicit bias. All in all, Hypothesis 4 is not supported.

### 4.3. Exploratory analysis

#### 4.3.1. Direct effect of perspective-taking on implicit bias

As an exploratory analysis, we ran a linear regression for perspective-taking on reduced implicit bias, aiming to explore whether the perspective-taking could directly influence reduced implicit bias, $F$(1, 165) = 5.44, $p$ = 0.021, $R^2$ = 0.03. The results showed a positive relationship between perspective-taking and reduced implicit bias ($b$ = 0.36, $SE$ = 0.15, $t$ (165) = 2.33, $p$ = 0.021, 95 % CI [0.06, 0.66]). The model accounted for 3 % of the variance in reduced implicit bias. Thus, the result indicates that active perspective-taking can predict higher levels of reduced implicit bias than passive perspective-taking.

### 4.4. Robustness checks

Several factors were identified that could potentially impact the outcome variables (namely empathy toward the gendered violence victim, embodiment, and reduced implicit bias). Therefore, robustness checks were performed with these observed factors for the experiment group and the control group respectively. Notably, we were only able to collect information regarding some of these factors (namely researcher intervention, violent scene presence, and gun presence) halfway through the data collection, as they were not included in the original study design, therefore the robustness check could only be run among the participants who participated later in the study ($n$ = 66).

No difference was found for all factors among the outcome variables

**Table 4**
Correlations for Study Variables.

| Variable | $N$ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1. Perspective-taking[a] | 166 | | | | | |
| 2. Embodiment | 166 | 0.238** | | | | |
| 3. Cognitive empathy | 166 | −0.111 | 0.240** | | | |
| 4. Affective empathy | 166 | 0.032 | 0.122 | 0.370** | | |
| 5. Gender [b] | 166 | 0.160* | −0.058 | −0.361** | −0.340** | |
| 6. Reduced implicit bias | 166 | 0.179* | 0.174* | 0.039 | 0.062 | −0.039 |

*$p$ < 0.05. **$p$ < 0.01.
[a] 0 = passive perspective-taking and 1 = active perspective-taking.
[b] 0 = female and 1 = male.

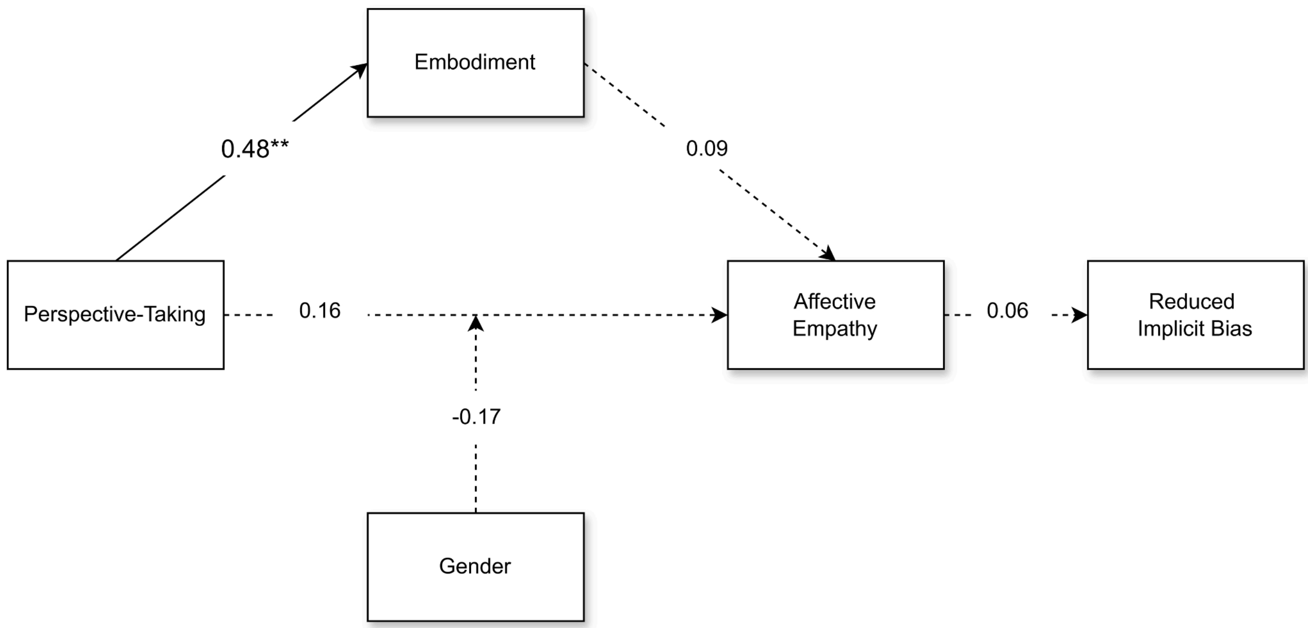


**Fig. 2.** Visualization of the Path Model for Affective Empathy. **p < 0.01.

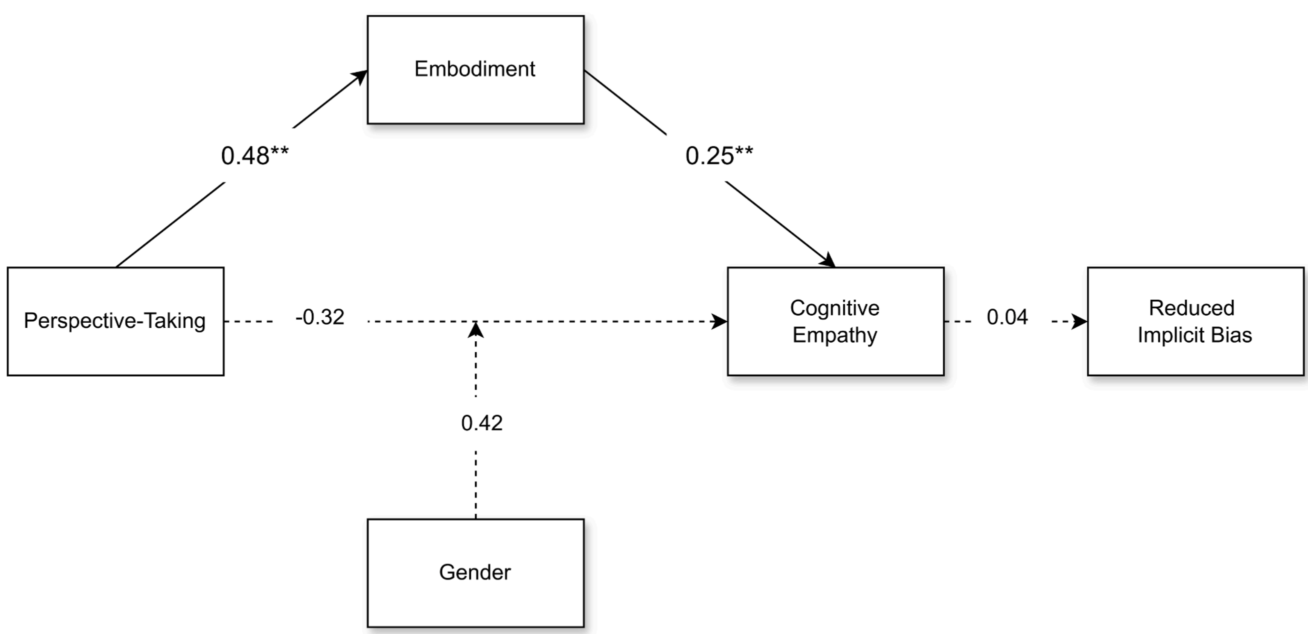


**Fig. 3.** Visualization of the Path Model for Cognitive Empathy. **p < 0.01.

of the control and the experimental group respectively, except for whether the gun scene was involved during the gameplay. The gun presence has a significant effect on reduced implicit bias for the control group, $t$ (27) = -2.12, $p$ = 0.043. However, the gun presence is not included as a covariate in the main analysis due to the limited number of participants in which this factor was recorded. This will be discussed in the discussion section. See Appendix E for the results of the robustness checks.

## 5. Discussion

The aim of this study was to examine the relationships between perspective-taking, embodiment, empathy, and implicit bias in the context of gendered violence using video games. The findings shed light on the complex relationships between these variables and emphasized the importance of considering factors such as embodiment in gaming experiences. The limitations of this study highlight areas for improvement and suggest directions for future research, enabling further advancements in the field of reducing implicit bias toward gendered violence victims.

Overall, we can draw four conclusions: (1) perspective-taking of a gendered violence victim does not directly lead to increased empathy toward gendered violence victims; (2) taking the perspective of a gendered violence victim in a video game increases player's embodiment toward the game character, and, in turn, increases player's cognitive empathy toward gendered violence victims; (3) the effect of perspective-taking on empathy does not differ between females and males; and (4) higher empathy toward gendered violence victims does not predict higher reduced implicit bias.

### 5.1. Interpretation

#### 5.1.1. Perspective-Taking in empathy development

In this study, we expected that active perspective-taking of a gendered violence victim could increase empathy toward them. Contrary to this expectation, the results show no evidence for such a direct effect. This means that actually playing a video game and watching someone else play induced the same level of increased empathy. Notably, this finding does not contradict perspective-taking being the basis of the empathic process, which is rooted in the definition of perspective-taking [31], as both passive and active perspective-taking are perspective-taking. This could mean that the stimulus material induced the same level of perspective-taking between the players and viewers. Gutierrez et al. [17] found similar results in their study, in which active perspective-taking via video games does not differ in perspective-taking scores from passive perspective-taking via narrative text. There may be a similar cognitive process behind active and passive perspective-taking induced by video games, which results in a similar empathy level.

#### 5.1.2. Embodiment as mediator for empathy development

Although we did not observe any direct effects of perspective-taking on empathy, the mediated effect through embodiment highlights the importance of considering embodiment as part of the mechanism for empathy development. The media effect of video games on empathy, explained by embodiment, is also in line with the general learning model where media exposure could affect a person's internal states, in this case, their level of empathy [30]. As a result, this research shows that actively playing a video game could increase people's embodiment of the video game character who is a gendered violence victim, which in turn increases people's cognitive empathy toward gendered violence victims in general.

It is worth noting that embodiment mediating the relationship between media use and increased cognitive empathy aligns with the differential susceptibility to media effects model (DSMM) [66]. This model suggests that cognitive, emotional, and excitative media response states mediate the relationship between media use and effects. Embodiment can be considered as both emotional and cognitive media responses based on the definition of embodiment on the physical and intentional dimensions [59], and it mediates the relationship between video gaming (media use) and cognitive empathy (media effect). Notably, although it is common to apply the general learning model or the differential susceptibility to media effects model in studying the effects of playing video games, there has not been previous research applying them to perspective-taking within a gendered violence context. The current research suggests a new context that the two theories can be applied to.

#### 5.1.3. Gender differences in empathy response

We expected the effect of perspective-taking on empathy to be stronger for females than for males. However, the results showed no support for this, for we found similar effects of perspective-taking on empathy between females and males. These findings are in line with recent work, challenging the perception that males and females have different emphatic responses. For example, Pang et al. [67] provided neurological evidence through EEG that females do not show stronger empathic responses to the same stimuli compared to males. Instead, Pang et al. proposed that the difference between male and female empathic responses found in previous research could be explained by social expectations of gender norms on empathic responses. The current research result is in line with the neurological evidence.

Alternatively, the absence of a significant interaction effect of gender in this study could be explained by the distinct gender ratio. After data cleaning, there were significantly more female participants ($n$ = 131) than male participants ($n$ = 35). The imbalanced sample size in two groups can lead to insufficient statistical power due to a lack of representation of the smaller group, in this case, the male group [68].

#### 5.1.4. Empathy and implicit bias

Finally, we expected that that higher levels of empathy toward gendered violence victims would result in higher levels of reduced implicit bias, however, also for this expectation we found no support. This is interesting, because it does not align with many previous studies [69,70] and with the general learning model that suggests changes in internal states could lead to change in behavior and attitudes [30]. However, it should be noted that it is also not uncommon for researchers to find that inducing empathy does not effectively result in attitude and behavior change. For example, Lai et al. [16] tried to use two empathy training games to elicit more positive attitudes toward outgroup members in two different studies, but both games turned out to be ineffective in decreasing implicit preferences. This is in line with the results of the current study, where inducing empathy does not result in attitude change.

For the current study, it is crucial to note that the absence of a significant relationship between empathy and reduced implicit bias in this study does not dismiss the potential role of empathy in behavior change. There may also be other mechanisms explaining the relationship between perspective-taking and attitude change without involving empathy as suggested in the exploratory analysis, where perspective-taking does predict reduced implicit bias. This is discussed in the theoretical implication of this study.

### 5.2. Limitations and future research

Even though the study makes several clear contributions to the literature, the study also has limitations. For example, the experiment was designed in a way that all the data of a participant could be collected in a single lab session. As a result, the pretest implicit association test is conducted right before the gameplay. It has been shown that the first implicit association of a participant generally shows a more polarized result than any of the subsequent tests of this participant [71]. Although the experiment design of the study followed the recommendation of Greenwald et al. [53] for avoiding this issue by including a control group, this may not be sufficient.

In addition, although the current study compensates participants with both study credits and monetary rewards, the sample is limited to the [details omitted for double-anonymized peer review] subject pool, which primarily consists of students. This restriction impacts the diversity of the sample and may limit the generalizability of the study results. Future studies should consider replicating the current research by recruiting participants outside universities to enhance the replicability of the findings [72].

As mentioned in the robustness checks section, there was a variable, gun presence, that accounts for reduced implicit bias on some level. This variable ended up not being included in the main analysis as a covariate due to limited data collected. This could have been avoided by more comprehensive pilot testing the materials. During the pilot study researchers have the chance to observe factors in the game that may affect the research. This is especially true for video game studies where a certain degree of freedom is offered to the participants for an autonomous embodiment experience, which in term result in more potential factors (i.e. multiple endings) that could influence the research outcome. Future studies should prioritize conducting more comprehensive pilot tests to ensure methodological robustness.

Previous researchers using pre- and post-test implicit association tests tend to separate the pretest session and the experimental session [73,74]. Separating pretest and experimental sessions helps account for natural variations and stability in participants' attitudes or behavior over time, which allows researchers to capture more reliable and valid measurements of the baseline before the treatment. Therefore, for future research, we recommend to conduct a pretest implicit association test earlier, preferably one week before the main study, so that it can provide a baseline measure and enhance the validity of the results. This would allow for a more accurate assessment of the potential changes in implicit bias after the intervention [53].

In addition, some may argue, according to Baron and Kenny [75], that there is no mediation effect of embodiment since there is no direct effect of perspective taking on empathy. However, Hayes [65] has argued that in a mediation model, the correlation between the independent variable (X) and the dependent variable (Y) is neither sufficient nor necessary to claim that X affects Y. Instead, Hayes proposed that it is more important to focus on the indirect effects in a mediation model, as the indirect paths are more accurate in explaining the relationships in the model. Rucker et al. [76] made the same argument several years prior to Hayes.

Nevertheless, in the context of this study, the reason for no direct effect of perspective taking on empathy could be that there is a similar cognitive process behind the passive and active perspective taking via video gaming as discussed in the interpretation section. While it is commonly acknowledged that playing serious video game could take up some cognitive load [23], there is no previous research on the cognitive mechanism behind passive and active perspective taking via video games respectively. Future research could explore whether there is a difference on playing and watching the video game to examine how to best induce embodiment and empathy using video games.

Finally, future research could explore how immersive technologies, such as virtual reality (VR) or augmented reality (AR), enhance embodiment experiences and their impact on empathy [77]. Prior research has shown that these technologies offer heightened emotional responses [78,79], sensory feedback [80,81], and sense of presence [82–85]. These, in turn, could potentially amplify the effects of perspective taking, making it a promising tool for interventions aimed at reducing implicit bias. By integrating insights from embodiment research with the affordances of immersive technologies, future studies could develop and refine interventions aimed at fostering empathy toward gendered violence victims.

### 5.3. Implications for theory and practice

The findings of this study have implications for both theoretical understanding and practical applications.

The mediation effect of embodiment on perspective-taking and empathy found in the current study is in line with the general learning model [30], and the differential susceptibility to media effects model [66]. As a result, the study improves the validity of these theories by providing evidence that the theories are accurate in describing the mechanism of the media effect. The current study also helps explore the possibility of applying the theories in a gendered violence context.

It is worth noting that a lack of difference in both affective and cognitive empathic responses between females and males challenges the claims about genders in the structure of empathy in social work practice proposed by King Jr. [42]. According to King Jr., the reason females supposably have both higher levels of affective and cognitive empathic responses is rooted in their ability of caring and interpersonal sensitivity, however, it is not the case in the current study. The result derives from the theory and proposes a possibility of an update in the structure of empathy in social work practice that empathic responses do not differ between males and females, the reason may be that caring and interpersonal sensitivity are not dominated by females anymore, therefore no difference was found on empathy between males and females.

While there has been extensive research studying how to reduce implicit prejudices and bias via various types of interventions, most research has a racial context. For example, in the systematic review of interventions designed to reduce implicit prejudices and implicit bias done by FitzGerald et al. [47], out of the 47 different interventions chosen, 40 interventions were in a racial context, mainly on bias toward Black communities. Little attention was given to interventions designed to reduce prejudices toward gendered violence victims, the current research makes up for this. More specifically, a study done by Gutierrez et al. [17] proved that perspective-taking could be used to reduce implicit race bias toward Black students in academia, the current study provided evidence that the same mechanism also applies in a gendered violence context.

Concerning the exploratory analysis, the finding suggests the possibility of a different mechanism underlying perspective-taking and reduced implicit bias. It is conceivable that empathy does not play a significant role in reducing implicit bias in the current study, which is contrary to previous literature, however, it is shown that perspective-taking can predict reduced implicit bias to some extent. It is not surprising that only a little variance of reduced implicit bias can be explained by perspective-taking, as there are many more factors such as dispositional, developmental, and social factors that can influence media effects as proposed in the differential susceptibility to media effects model [66], it can be inferred that other factors are playing a role in perspective-taking via video game and reducing implicit bias toward a group, for example, working memory capacity of video gaming, prior knowledge on gendered violence and language background.

With regards to the practical relevance of this study, the results suggest that video games can be a valuable tool for increasing empathy and reducing implicit bias toward gendered violence victims, and therefore have the potential of being used in educational and empathy-inducing interventions. There is then a base for game developers and future researchers to optimize the embodiment experience utilizing gaming mechanisms as it has been stated in this study that enhancing the sense of embodiment, where players can identify with the character experiencing gendered violence, can be crucial for eliciting greater empathy and attitudinal change.

**Funding Statement**

This work was supported by the Digital Communication Methods Lab (digicomlab).

**Declaration of Generative AI and AI-assisted technologies in the writing process**

During the preparation of this work the authors used ChatGPT 4o in order to copy edit specific sections. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

### CRediT authorship contribution statement

**Sweeney Jing Li:** Writing – original draft, Visualization, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Zeph M.C. van Berlo:** Writing – review & editing, Supervision, Resources, Project administration.

### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Appendix A:. Gameplay environment and instructions

This study was conducted in the lab building of [details omitted for double-anonymized peer review]. The lab room has two PCs positioned opposite of each other, and another laptop for the video game on the other side of the room.

The gameplay was on a 15.6-inch MSI GP66 Leopard with an i7-10870H @ 2.20 GHz processor, 16.0 GB RAM, a Windows 10 (64-bit) operating system, and an Nvidia GeForce RTX 30 GPU, using a PlayStation 4 controller. Before the gameplay, the light in the room would be turned off to ensure a good gaming experience, because the game itself is rather dark, therefore a darker room could potentially make the content in the game more visible. The participants were asked to not communicate with each other during the gameplay. The player participants would be asked to familiarize themselves with the gaming controller. Before the actual plot starts in the gameplay, the player would also be asked to walk around the room within the game for one lap to familiarize the perspectives and controls of the game. The player would then be informed that the video game used in the research has a high degree of freedom, therefore they are free to make their own choices.

During the gameplay, if the player does not choose to intervene when the father is beating up the daughter, it is not possible for them to actively experience the perspective of a gendered violence victim, which contradicts the purpose of the study, making the stimulus material ineffective. Therefore, when the father is heading upstairs with a belt in his hand in the game and the player still does not choose to move, the researcher would then intervene by repeating the instruction before the gameplay such as "This is a very autonomous game, you are free to make your own choices." This is due to the nature of the game design, that there is not much time after the father heads upstairs for the protagonist to intervene and save the daughter.

## Appendix B:. Compensation and procedure for participation

The data collection started on April 11, 2023, and ended on May 19, 2023. From April 11th to April 26th, initially, research credits were offered as compensation; from May 8th to May 19th, either research credits or 7.50 euros were offered as compensation, and participants were free to choose from either option. Monetary compensation was offered when the recruitment of participants using only research credit slowed down. This is because the compensations have an impact on the sample. Communication science research credits are likely to attract more Communication Science Bachelor students than any other population, while monetary compensation can attract a wider population from the subject pool. Therefore, offering monetary compensation after the recruitment of participants using only research credits slows down and utilizes the benefit of offering monetary compensation for participation. When monetary compensation was offered, participants were able to choose how they wanted to be compensated, either 4 communication science research credits or 7.50 euros.

When the study was published on the [details omitted for double-anonymized peer review], participants in the subject pool could see the study information and the possible compensations and sign up for themselves if they wish to participate. Participants first read the recruitment text of the study on the [details omitted for double-anonymized peer review] page and learned the three exclusion criteria for participating: the participants need to be aged above 16; the participants have not played the stimulus game or watched content such as live streaming and detailed review of the stimulus game before; the participants must be fluent in English as the stimulus material is only available in English. They were then informed about how this research could involve shocking, frightening, and triggering content as the stimulus material includes gendered violence in a domestic violence context, that it is advised for those who have had similar gendered violence trauma experiences such as domestic violence and sexual violence as well as those who are easily disturbed or have mental health problems to carefully consider whether they would want to participate in the study. If the participant decided to participate in the study, they were able to choose from a range of available time slots to come to the lab to suit their time.

## Appendix C:. Detroit: Become Human, chapter 'Stormy Night'

'Detroit: Become Human' is a 2018 adventure video game developed by Quantic Dream. In the chapter 'Stormy Night,' the player plays the female android protagonist named Kara who owns a family of two, a father and a daughter. In the game, Kara intervenes in a domestic violence situation between the father and the daughter by standing up against the father and ultimately escapes the household together with the daughter. While standing up to the father and defending the daughter, the protagonist is also treated aggressively by the father, where the player gets to experience the perspective of a gendered violence victim.

## Appendix D:. IAT procedure

Each IAT test contains 5 blocks.

As demonstrated in Tables 1 and 2:

In Block 1, participants classify words that describe victims of gendered violence and women accordingly.

In Block 2, participants classify words that are associated with strong and weak accordingly.

In Block 3, participants respond to words that describe victims of gendered violence as strong (weak) with the left key, women and weak (strong) with the right key.

In Block 4, participants repeat Block 2 but with the left and right reversed.

In Block 5, participants respond to words that describe victims of gendered violence and weak (strong) with the left key, women and strong (weak) with the right key.

## Appendix E:. Robustness checks

| Condition Experiment | Condition Type | | No Condition *M* | *SD* | Condition *M* | *SD* | *t* | df | *p* |
|---|---|---|---|---|---|---|---|---|---|
| | Single participant | Victim empathy | −0.12 | 0.99 | −0.02 | 0.85 | −0.41 | 91 | 0.680 |
| | | Embodiment | 0.20 | 0.81 | 0.24 | 0.94 | −0.16 | 91 | 0.873 |
| | | Reduced implicit bias | 0.07 | 0.90 | 0.40 | 0.91 | −1.49 | 91 | 0.140 |
| | Light on | Victim empathy | −0.16 | 0.94 | 0.10 | 0.98 | −1.18 | 91 | 0.242 |
| | | Embodiment | 0.24 | 0.79 | 0.13 | 0.97 | 0.55 | 91 | 0.583 |

(continued on next page)

(*continued*)

| Condition Experiment | Condition Type | | No Condition *M* | *SD* | Condition *M* | *SD* | *t* | df | *p* |
|---|---|---|---|---|---|---|---|---|---|
| | | Reduced implicit bias | 0.10 | 0.94 | 0.27 | 0.82 | −0.78 | 91 | 0.435 |
| | Researcher intervention | Victim empathy | −0.14 | 1.01 | 0.24 | 0.89 | −1.11 | 35 | 0.274 |
| | | Embodiment | 0.31 | 0.94 | 0.28 | 0.88 | 0.08 | 35 | 0.937 |
| | | Reduced implicit bias | 0.24 | 0.93 | 0.09 | 0.92 | 0.46 | 35 | 0.646 |
| | Violence scene | Victim empathy | −0.10 | 1.22 | −0.01 | 0.98 | −0.15 | 35 | 0.884 |
| | | Embodiment | 0.77 | 0.21 | 0.12 | 0.92 | 1.21 | 35 | 0.234 |
| | | Reduced implicit bias | −0.46 | 1.21 | 0.25 | 0.88 | −1.29 | 35 | 0.207 |
| | Gun presence | Victim empathy | −0.01 | 1.01 | −0.06 | 0.92 | 0.12 | 35 | 0.905 |
| | | Embodiment | 0.14 | 0.93 | 0.32 | 0.76 | −0.45 | 35 | 0.652 |
| | | Reduced implicit bias | 0.20 | 0.85 | 0.11 | 1.29 | 0.22 | 35 | 0.827 |
| Control | | | *M* | *SD* | *M* | *SD* | *t* | df | *p* |
| | Light on | Victim empathy | −0.07 | 1.13 | 0.31 | 0.98 | −1.36 | 71 | 0.178 |
| | | Embodiment | −0.24 | 1.18 | −0.34 | 1.03 | 0.34 | 71 | 0.738 |
| | | Reduced implicit bias | −0.10 | 0.93 | −0.46 | 1.33 | 1.32 | 71 | 0.192 |
| | Researcher intervention | Victim empathy | 0.30 | 1.05 | −0.19 | 1.06 | 1.22 | 27 | 0.232 |
| | | Embodiment | 0.22 | 1.15 | −0.00 | 1.16 | 0.51 | 27 | 0.611 |
| | | Reduced implicit bias | 0.22 | 0.92 | −0.18 | 1.01 | 1.11 | 27 | 0.279 |
| | Violence scene | Victim empathy | −0.17 | 0.46 | 0.10 | 1.10 | −0.34 | 27 | 0.739 |
| | | Embodiment | 0.36 | 0.29 | 0.10 | 1.18 | 0.30 | 27 | 0.764 |
| | | Reduced implicit bias | 0.14 | 0.06 | 0.03 | 1.00 | 0.16 | 27 | 0.875 |
| | Gun presence | Victim empathy | −0.02 | 0.94 | 0.58 | 1.59 | −1.15 | 27 | 0.261 |
| | | Embodiment | −0.03 | 1.142 | 0.85 | 0.88 | −1.62 | 27 | 0.116 |
| | | Reduced implicit bias | −0.13 | 0.865 | 0.82 | 1.13 | −2.13 | 27 | 0.043* |

## Data availability

Data will be made available on request.

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