Understanding the User Preferences in the Types of Video Censorship

SOHYEON PARK, Ewha Womans University, Republic of Korea
KYULEE KIM, Ewha Womans University, Republic of Korea
URAN OH, Ewha Womans University, Republic of Korea

Video on demand (VOD) platforms provide immersive, inspiring, and commercial-free binge watching experiences. Recently, the number of these platform users increased dramatically as users can enjoy various contents without physical and time constraints during Covid-19. However, such platforms do not provide sufficient video censorship services while there is a strong need. In this study, we investigated the users' desire for video censorship when choosing and watching movies on VOD platforms, and how video censorship can be applied to different types of scenes to increase the censoring effect without diminishing the enjoyment. We first conducted an online survey with 98 respondents to identify the types of discomfort while watching sexual, violent, or drug-related scenes. We then conducted an in-depth online interview with 18 participants to identify the effective video filtering types and regions for each of the three scenes. Based on the findings, we suggest implications for designing a censor application.

CCS Concepts: • **Human-centered computing → Empirical studies in accessibility**; *User studies.*

Additional Key Words and Phrases: video censorship, video masking, survey, interview

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1 INTRODUCTION

With the advancement of online video on demand (VOD) platforms such as Netflix (netflix.com) and Hulu (hulu.com), where people can access various movies and TV shows at home on their personal devices, the use of such platforms has increased for its immersive, inspiring, and commercial-free binge watching experience [20]. Moreover, the popularity of such services has recently dramatically grown with COVID-19, as people can enjoy any contents of interests without physical and time constraints [2, 28]. While VOD platforms have many advantages, they have regulation problems. To be specific, young children may get exposed to inappropriate contents that require parental guidance as they do not have censors applied unlike movie theaters or TV shows. In addition, it is found that adults also do not wish to watch or hear scenes that could cause discomfort, such as scenes that depict sexual, violent, and drug use contents [18]. As a solution, they use certain systems that allow users to watch videos provided by VOD platforms with certain censorship, to filter out the uncomfortable scenes or audios. For instance, YouTube Kids (youtube.com/kids) enables parents to customize video contents suitable for the age region of their children. Based on the settings, it only allows children to access contents that have been approved and handpicked by their parents. Automatic video filtering service such as VidAngel (vidangel.com) and ClearPlay (clearplay.com) are other examples. They provide a number of filtering options, and users can choose depending on what they do not wish to watch or hear. After this, the tool skips and mutes unpleasant or inappropriate scenes and languages while streaming the video contents on native VOD platforms or online streaming services.

Even though these prior solutions provide users with a full control over customization based on their individual preferences [11], they still block users from understanding the full context of the movie. Trimming certain scenes may cause confusion for people in understanding the story. Especially, cutting the videos forces viewers to imagine in order to keep up with the story and as the number of these cuts increases, it can overload the viewers' cognitive capability, leading to memory loss [12, 16].

In this paper, we investigated the most efficient way of censor application for different types of scenes. The research questions are:

- *RQ1. What types of scenes do people find uncomfortable to watch?*
- *RQ2. What types of censors do users prefer the most?*
- *RQ3. How should the censors be applied for different scenes to eliminate discomfort while preserving the enjoyment?*

To understand what types of scenes cause the most discomfort and when, we first conducted an online survey and analyzed 98 responses. We focused on three types of scenes, which are sexual, violent, and drug scenes that people feel significant discomfort [18]. Through the survey, we discovered that many people have felt strong discomfort when watching violent scenes, while relatively smaller amount of people have experienced discomfort in sexual and drug scenes. For the need of censors, among those who had felt discomfort while watching the scenes, only a small proportion of the participants wished to have censors applied to sexual scenes. Compared to this, approximately half and the majority of the participants expressed a need for censors for violent and drug scenes, each. The results regarding where the censors should be targeted can be found in Section 3.

Moreover, the survey results show that there are those who desire to have censors applied to such uncomfortable scenes, which confirms the findings from prior studies [17, 18, 21, 23]. It led us to conducting a semi-structured interview to further investigate the preference in specific types of censors when they are watching uncomfortable scenes with others. The results revealed that even though the preference for pixelization is not significantly strong for

Authors' addresses: Sohyeon Park, Ewha Womans University, Republic of Korea, shpark911@ewhain.net; Kyulee Kim, Ewha Womans University, Republic of Korea, kl.kim@ewhain.net; Uran Oh, Ewha Womans University, Republic of Korea, uran.oh@ewha.ac.kr.

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the sexual scene, people still generally favored pixelization in all three scenes, since it is better at blurring out the unpleasant parts and more familiar. Moreover, the preferred region for each type of censor differed depending on the scenes. For pixelization, people favored the medium region for sexual scene, large region for violent scene, and small region for drug scene. For posterization, people preferred the small region for sexual scene, and the large region for both violent and drug scene. The specific details of the interview results can be found in Section 4.

The results of the survey and the interview will help us determine in what situation people desire the need of censors, which type of censor should be used, and where such censors should target in the scenes. Based on this, we present a guideline for the most effective censor application method depending on different types of situations.

2 RELATED WORK

2.1 The Negative Impacts Movies Can Have on People

Various studies have been conducted to understand the discomfort people feel while watching certain scenes, such as those that contain strong sexual, violent, and drug contents. Especially, there are those who mainly focused on the negative impact of violent scenes [6, 13, 26, 29]. As an example, Haidt *et al.* [13] discovered that violence such as envelope violation and death elicits strong disgust, and are disturbing enough for people to turn off the tape before the end of the scene. They defined the feeling of disgust as a defensive emotion to maintain a line between humans and animals. Similarly, Carruthers *et al.* [6] conducted an experiment of having the participants watch a recording of violent depictions. This revealed that participants showed biological changes correspondent to repulsion while watching graphically violent scenes in the movie.

Moreover, various studies have been conducted to identify the negative impact of smoking and drinking depiction in movies, and whether regulation is required [14, 22, 24, 25]. As an example, Hanewinkel *et al.* [14] and Sargent *et al.* [24] claims that it is significant to have a rating system to prevent young people from being exposed to alcohol and smoking. They discovered that parental restriction for children from watching movies that are targeted for adults decreases the risk of harmful substance use in the future. This result presents the importance of the censorship application for inappropriate scenes and objects, especially for children and adolescents. In addition to this, Sargent *et al.* [25] revealed that exposure to smoking scenes urged adult smokers to feel an impulse for smoking. Similar results with exposure to smoking scenes are shown in exposure to alcohol depiction in several research. For instance, Hanewinkel *et al.* [15] investigated on the relationship between alcohol exposure and alcohol initiation among low-risk adolescents. The results revealed that adolescents who had never drunk started drinking after watching drinking scenes in movies.

Unfortunately, little research has been conducted regarding sexual contents, due to ethical concerns [5]. However, there are rising concerns with erotic materials because they can have several negative impacts, such as sexual callousness, being cynical towards love, and encouraging promiscuity to be perceived as normal [1, 31]. As such, it is clear that people feel strong discomfort while watching scenes that include unpleasant contents, and are in the need of filters that help them to reduce the negative impacts.

2.2 The Influence of Video Manipulation in Watching Movies

Several research focused on whether cutting out the uncomfortable contents affects users' overall enjoyment while watching movies. Among them, Diener *et al.* [8] examined whether editing out the violent scenes affects users enjoyment. The results revealed that the presence of violence did not necessarily enhance the program's liking and was actually perceived significantly more violent than the manipulated version. This indicates that the manipulation had the desired effect of deducting the unpleasantness. In addition to this, Lichtman *et al.* [18] analyzed the VidAngel data they received from the VidAngel company, which is an accumulated record of approximately four million filtered streams that included which filters (cutting out the video or muting the sound) had been used and how long they had been applied, and investigated the market for filtered videos. The analyzed results revealed that people showed a propensity of applying more filters as the MPAA (Motion Picture Association of America) rating got higher. Also, those who used filters to watch uncomfortable scenes showed the same degree of enjoyment as those who watched the unedited version. Their findings also identified that most of the filters were used on scenes that illustrated sexual activities, violence, and drug use.

Moreover, Berry *et al.* [3] investigated the effects of cutting off graphic scenes in a movie and had the participants watch three versions (2 cuts, 1 cut, uncut) of a movie. They discovered that the participants perceived the cut versions to be significantly less violent and showed a subtle increase in enjoyment among women, while the difference was not large for men. Weaver *et al.* [30] also investigated on the relationship between violence and viewers' enjoyment and concluded that filters do not have a significantly positive effect. They had the participants randomly watch one of 15 conditions, where five different videos were edited into three versions each (graphically violent version, a sanitized violent version, and a nonviolent version), and report their enjoyment and emotional reactions. This revealed that the participants favored the nonviolent content the most and the presence of violence actually detracts users' focus on the quality of the plot, which refutes the prevalent belief that violence increases entertainment.

There were much prior research focusing on investigating whether cutting out the uncomfortable scenes have a positive effect on the enjoyment while watching movies. However, compared to this, studies on the various methods of effectively applying censorship lack.

3 FORMATIVE STUDY: AN ONLINE SURVEY

We conducted an online survey to understand the types of discomfort people feel while watching certain scenes. Particularly, we focused on scenes that include sexual, violent, or drug use contents, based on the results of a prior study [18]. In addition, we investigated the preference on the need for and the targets of censorship.

3.1 Participants

The survey was distributed in various online local communities including the institution that researchers belong to. A total of 98 participants (64.6% female, 31.3% male, 4% preferred not to specify)[1] responded to the survey, whose average age was 33.1 (SD = 8.9). Most of them reported that they used the VOD platforms multiple times in a week as found in existing survey results [7, 27]; 30.3% of them watched movies more than twice in a week, 26.3% answered once a week, and 16.2% answered everyday. Moreover, almost 80% of the participants responded that they watch movies alone when using VOD platforms (78.8%).

3.2 Procedure

We used Google Forms to create the survey and collected responses for 2 weeks (from July 12th, 2021 to July 26th, 2021). It consisted of in total 32 questions which was designed to take 10 to 15 minutes to complete. We specified the criteria that participants need to be between 18 and 65 of age and are current subscribers for VOD platforms such as Netflix. Participants were opted to draw for a $5 gift card at the end of the survey.

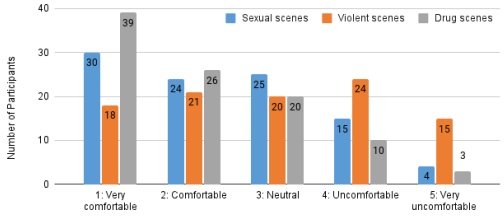


Fig. 1. The histogram of the number of respondents for each discomfort rating for sexual, violent and drug scenes (N = 98).

3.3 Findings

3.3.1 The Overall Discomfort Differed Depending on the Uncomfortable Scenes. To understand if the level of comfort varies depending on the scenes, we asked the participants to rate their comfort when watching each of the three scenes that depict sexual, violent, and drug contents. As shown in Figure 1, we found that a greater number of respondents tended to perceive violent scenes to be more uncomfortable compared to the other two scenes. A Chi-square for independence revealed that types of scene has an affect on the level of discomfort; $\chi^2_{(2,4)} = 27.2$, $p < .001$. Moreover, as revealed in Figure 2a, the number of participants who answered that they had felt discomfort while watching uncomfortable scenes varied depending on the type of scene. Similar to the comfort ratings the respondents gave for each scene, a greater number of participants had faced discomfort while watching violent scenes, in contrast to sexual and drug scenes.

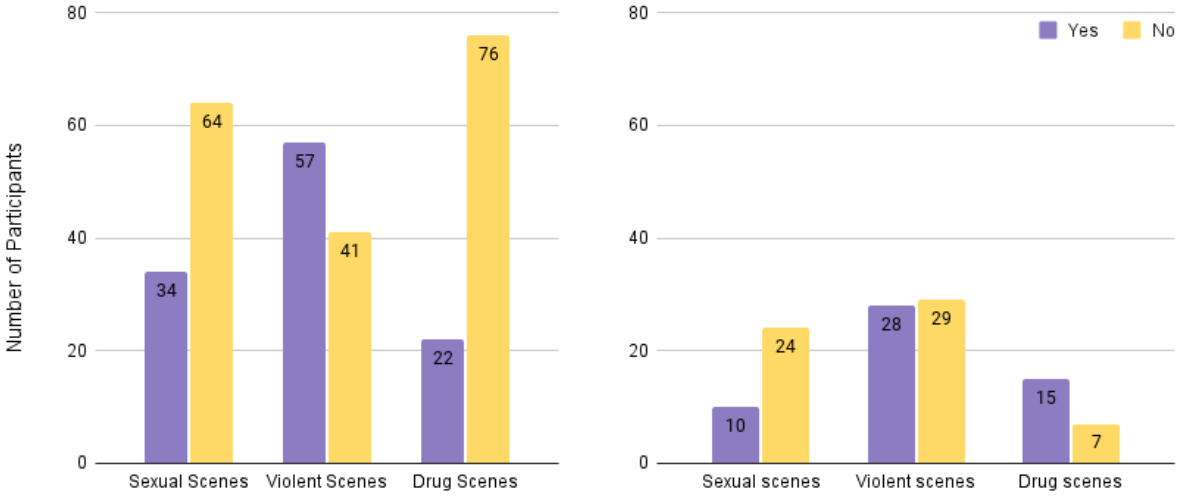
[1]Note that the ratio of female respondents is higher than that of male respondents as our institution is a women's college.

3.3.2 The Reasons for Discomfort Differed Depending on the Uncomfortable Scenes and the Presence of Others. To understand if the reason for discomfort vary depending on the scene type, we asked the participants, who had answered that they had experienced discomfort while watching the scenes, why they felt uncomfortable for each scene type. The findings are listed below:

- **People mostly do not wish to watch scenes where detailed sexual activities are depicted, especially when with others.** The top reason for the participants (N = 34) to feel discomfort while watching sexual scenes was *'embarrassing to watch with family or friends'* (61.7%), followed by *'unnecessary scene in the overall content'* (44.1%), and *'unpleasant to watch when alone'* (35.3%). Further responses can be found in Figure 3.
- **People mostly do not wish to watch the process and the results of violence, when watching alone.** The reasons for those (N = 57) who found violent scenes uncomfortable were, as revealed in Figure 5, because it was unpleasant to watch when alone (75.4%), seemed likely to have it registered in the memory (54.4%), and too violent to watch when alone (54.4%).
- **People mostly do not wish to watch the presence and use of drug related substances, when alone.** The reason to why the participants (N = 22) found drug scenes uncomfortable varied. More than half of the participants (63.6%) mentioned that they found the scene disturbing, 40.9% felt that the scene seemed unnecessary in the overall content, and 36.4% answered that they perceived the scene to be inappropriate to watch with friends and families. More details can be found in Figure 7.

3.3.3 The Personal Strategies for Relieving Discomfort Differed Depending on the Uncomfortable Scenes. To identify if there are certain strategies people apply to relieve discomfort, and if so, what types they might be, we asked a question regarding this matter for each scene.

- **Fast-forwarding sexual scenes.** When watching scenes that included sexual contents that triggered discomfort, 47.1% of the respondents mentioned that they fast forwarded the scene, while 44.1% chose to watch until the end without applying any methods to avoid the scene, and 38.2% answered that they manually skipped the scene. More details can be found in Figure 9.
- **Covering the eyes or screen for violent scenes.** The respondents applied various ways to relieve discomfort while watching violent scenes. As revealed in Figure 9, the most used method was covering their eyes or the screen to avoid watching (42.1%). The other following ways were fast forwarding the scene (35.1%) and ignoring the scene by paying attention to other activities (31.6%).
- **Watching the drug scenes without applying any strategies.** When asked what types of strategies the participants usually utilize to relieve discomfort while watching drug scenes, 36.4% of them chose to watch the scene without any avoidance, 27.3% skipped the scene, and 18.2% either did not



(a) Experience of discomfort (N = 98).

(b) Need for censors.

Fig. 2. The number of participants (a) who had or had not experienced discomfort, and (b) either desire to have or not have censors applied while watching sexual (N = 34), violent (N = 57), and drug scenes (N = 22).

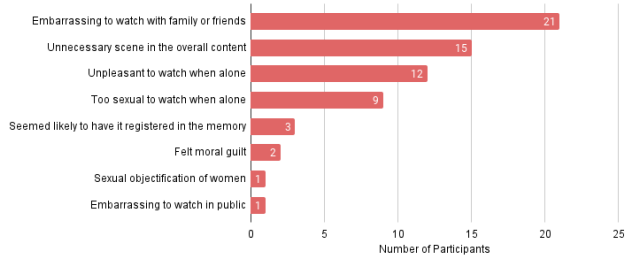


Fig. 3. Reasons for discomfort while watching sexual scenes (N = 34).

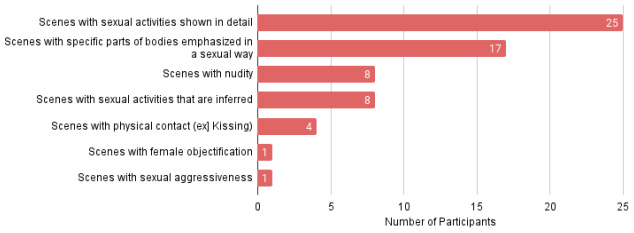


Fig. 4. The types of sexual scenes that caused discomfort to the participants (N = 34).

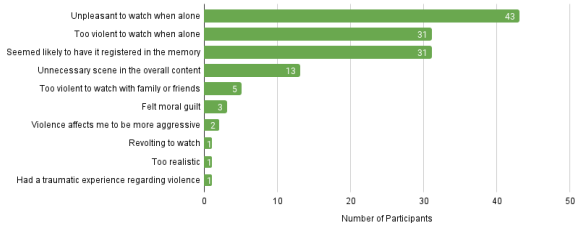


Fig. 5. Reasons for the participants in feeling discomfort while watching violent scenes (N = 57).

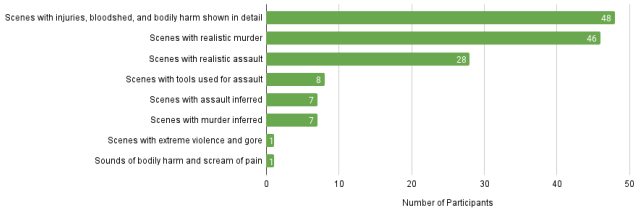


Fig. 6. The types of violent scenes that caused discomfort to the participants (N = 57).

watch or avoided the scene by covering their eyes or screen. For more details, please refer to Figure 9.

3.3.4 The Censor Application Method Should Differ Depending on the Uncomfortable Scenes. To investigate the precise preference for the censor application of each scene, we asked the participants, who had answered that they desire censors, what parts of the scene they do not wish to watch and what type of censorship they prefer. The number of participants who answered that they wish to have censors applied to unpleasant scenes can be found in Figure 2b. Moreover, to distinguish the censors' potential usefulness, we asked those who answered that they do not wish to have censors the reason why.

- **Those who found sexual scenes uncomfortable did not wish to watch a depiction of detailed sexual activities**

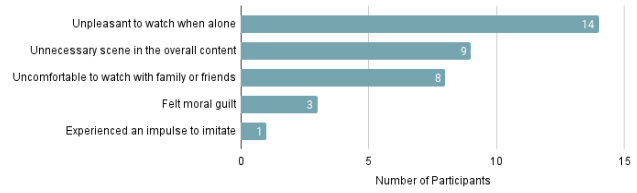


Fig. 7. Reasons for the participants to feel uncomfortable while watching drug scenes (N = 22).

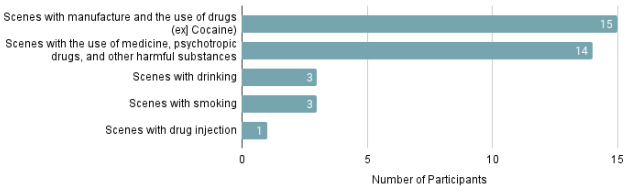


Fig. 8. The types of drug scenes that caused discomfort to the participants (N = 22).

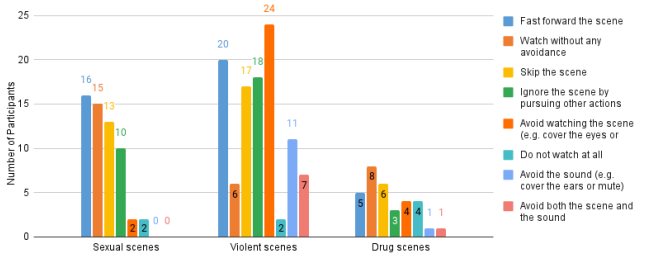


Fig. 9. The types of method people used to relieve discomfort while watching sexual (N = 34), violent (N = 57), or drug scenes (N = 22) that were uncomfortable.

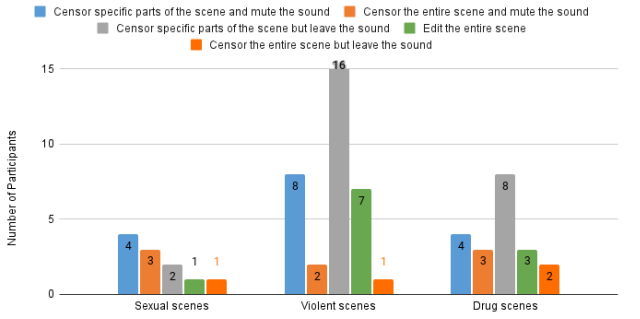


Fig. 10. The types of censors the participants wish to have applied in order to watch each sexual (N = 10), violent (N = 28), and drug scene (N = 15), without feeling any discomfort.

the most. Responses for the follow-up question asking those, who had experienced discomfort while watching sexual scenes (N = 34), about the specific types of scenes they had felt uncomfortable watching are revealed in Figure 4. The majority

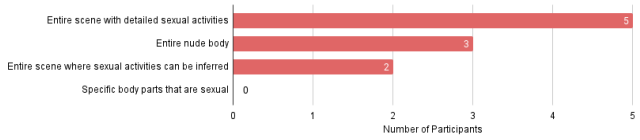


Fig. 11. The specific parts in the uncomfortable sexual scenes, which the participants wish to have censors applied (N = 10).

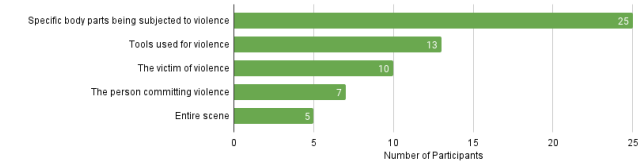


Fig. 12. The specific parts in the uncomfortable violent scenes, which the participants wish to have censors applied (N = 28).

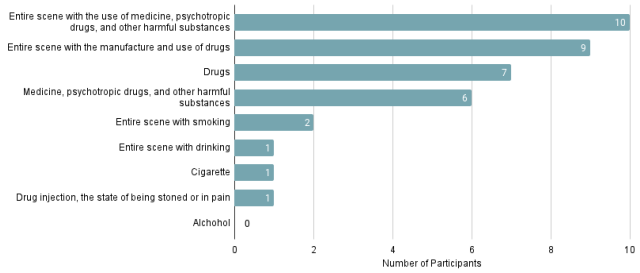


Fig. 13. The specific parts in the uncomfortable drug scenes, which the participants wish to have censors applied (N = 15).

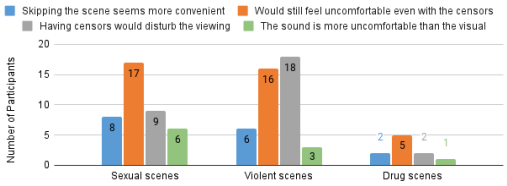


Fig. 14. The various reasons of the participants who answered that they do not feel the need for censors in each sexual (N = 24), violent (N = 29), and drug scene (N = 7).

of the participants did not favor scenes that included sexual activities shown with detail (73.5%). Moreover, half of the respondents commented that they felt uncomfortable when watching scenes that involved specific body parts emphasized in a sensual way. To further investigate the respondents' desire, we asked what specific parts in the scene they would like to have censored and the most chosen response was the entire scene where detailed sexual activities are shown (50%). The other responses can be found in Figure 11.

In addition, we asked to those who answered that they wish censors (N = 10), what type of censorship they would prefer. As depicted in Figure 10, 40% of the participants wished to

have both the sound and certain parts of bodies to be censored, 30% hoped to have the sound and the whole scene to be blurred out, and 20% was okay with the sound but wished to have certain parts of bodies to be censored.

On the other hand, according to Figure 14, those who did not have the need for censors on sexual scenes mostly reasoned because they would still feel uncomfortable even after censors have been applied (70.8%).

- **Those who found violent scenes uncomfortable did not wish to watch realistic depiction of violence the most.** The scenes that made the participants (N = 57) uncomfortable while watching violent scenes were those that showed details of injuries, bloodshed, and bodily harm (82.8%), those that included realistic murder (79.3%), and scenes where realistic assault is shown (48.3%). Further details can be found in Figure 6. For the question asking exactly what sections of the scene they would like to have censors applied, 89.3% answered specific body parts being subjected to violence, 46.4% chose tools that are used for violence, and 35.7% preferred the victim of violence. Please refer to Figure 12 for more details.

  Among those who are in need of censors (N = 28), 57.1% hoped to have specific parts of body censored without any alteration to the sound, while 28.6% desired to have the sound removed alongside with injured body parts being censored. Also, 25% chose to have the entire scene edited, as revealed in Figure 10.

  In contrast, the respondents who preferred not to have censors applied to violent scenes had various, as shown in Figure 14. The major reason was because having censors would disturb their watching (64.3%).
- **Those who found drug scenes uncomfortable did not wish to watch the manufacture and use of drugs the most.** As shown in Figure 8, the types of drug scenes that the participants (N = 22) felt uncomfortable watching, were scenes where manufacture and the use of drugs are shown (68.2%), where the use of medicine, psychotropic drugs, and other harmful substances are depicted (63.6%), and smoking and drinking scenes (13.6%). For the specific portions of the scene that need to be censored, as depicted in Figure 13, 66.7% selected scenes with the use of medicine, psychotropic drugs, and other harmful substances are shown, 60% chose the whole scene where using and manufacturing drugs are depicted, and 46.7% answered drugs itself.

  Also, among those who found drug scenes to be uncomfortable to watch (N = 22), Figure 10 reveals that 68.2% wished to have censors applied to the scene. Especially, 53.3% of them mentioned that censoring several parts of the scene without muting the sound would help them in relieving discomfort, while 26.7% answered that muting the sound and censoring parts of the scene would be nice.

  However, the respondents who answered that the application of the censors would not help them in relieving discomfort had various reasons. The most dominant reason was because having censors would have no effect on decreasing the discomfort (71.4%). Further details can be found in Figure 14.

3.4 Summary

Through the survey, we identified that people find all three scenes, especially violent scenes, uncomfortable and desire the application of censors. Among the many reasons to why people find the scenes uncomfortable, the most dominant reason for the sexual scenes was due to causing awkward situations while with others. On the other hand, people did not wish to watch violence including blood and injuries, even when alone. Apart from this, drug scenes caused disturbance among viewers. When encountered with such unpleasant scenes, people mostly chose to fast-forward sexual scenes, avoid watching violent scenes by covering their eyes or the screen, and simply watched the drug scenes without applying any personal methods to release discomfort. In addition, the most favored types of censorship people desire differed depending on the scene. For the sexual scene, people wished to have both audio and video, where sexual activities are depicted with detail, censored. In contrast, people favored to have the entire violent scene censored, while leaving the sound, for violent scenes. Lastly, also for the drug scenes, people wished to leave the sound while having the contents showing the use of drugs to be censored.

4 MAIN STUDY: A DESIGN PROBE STUDY

4.1 Participants

We recruited 18 participants (14 female and 4 male) among those who responded in the survey and had shown interest in participating in the main study. The average age was 27.8 (SD = 6.36). The participants were given a gratitude of $10 for participating in the study.

4.2 Apparatus

Starting from the above among top lifetime grossing movies listed by IMDbPro[2] and are rated R, we chose each sexual, violent, and drug related movies based on the MPAA certification in the IMDb parents guide. As a result, *Deadpool 1* (2016), *Joker* (2019), and *The Hangover Part 2* (2011) were selected for the use of sexual, violent, and drug scenes, respectively. From each movie, approximately 30 seconds of the three categories mentioned were extracted. The sexual scene consisted of contents regarding sexual interaction and strip club. The violent scene included a victim being stabbed twice by a scissor and its head constantly being beaten against the wall. For the drug scene, powder-like drug use and needle injection was depicted.

The application of the types of censors were performed through a video editing software application, Adobe Premiere Pro, and was run on a computer that has an Intel i7-9700K (3.60GHz) CPU with 32.0GB of RAM and a GeForce RTX 2070 graphics card. In the list of video effects provided by the Adobe Premiere Pro software, both pixelization and posterization features were found under 'Stylize', with a name called 'Mosaic', and 'Posterize', respectively.

4.3 Conditions

In this study, we investigated the difference in users' preferences between two types of censor technique, pixelization and posterization, and three regions of the application of each censor for each

[2]https://www.boxofficemojo.com/chart/top_lifetime_gross/?area=XWW

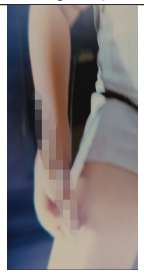
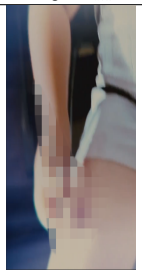
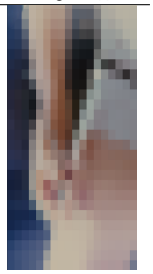
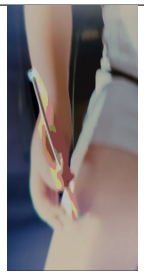
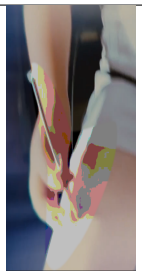
Type \ Region	$Region_S$	$Region_M$	$Region_L$
Pixelization			
Posterization			

Table 1. The sample images captured from the drug scenes, showing how each censor type was applied for each type of region.

scene. The examples are shown in Table 1. We did not revise the three types of scenes initially determined in the survey, since it was clear that people felt the need for censors for all three scenes, even though the degree of desire differed between them.

- Censor Type (2-level)
  - **Pixelization** Pixelization is also known as mosaic, and is one of the basic types of censorship. We chose this censor since it is one of the dominantly used type of censor. We used the size of 40 × 30 square pixel, to enable the preservation of the overall context of the scene.
  - **Posterization** Posterization alters the scene to have only a certain number of colors. We decided to use this censor because it is a rather unfamiliar type of censor, but may have the potential of effectively censoring the undesired parts. Depending on the brightness of the scene, we either applied level 5 or 6 posterization, because allowing diverse colors to be used did not have the effect of censoring the scene.
- Region of Censors (3-level)
  - **Small ($Region_S$)**
    - Sexual scene: Only the specific parts of a nude body.
    - Violent scene: Specific body parts that are being subjected to violence.
    - Drug scene: Drug related substances itself.
  - **Medium ($Region_M$)**
    - Sexual scene: Full nude body.
    - Violent scene: Specific body parts that are being subjected to violence and the tools used for violence.
    - Drug scene: Drug related substances and where it is used or injected.
  - **Large ($Region_L$)**
    - Sexual scene: Entire scene where sexual activities are implicit or occurring.
    - Violent scene: Whole victim of violence alongside with the tools used for violence.
    - Drug scene: The entire scene where the use or manufacturing of drug related substances are depicted.

4.4 Procedure

The study was conducted online, via Zoom, for an hour. We first had the participants sign the consent form, then started with asking their overall experience with watching movies that contained uncomfortable scenes, such as whether they had faced with uncomfortable scenes while watching it with someone else or by themselves and how they responded in each situation. Next, we explained that they would be watching three types of scene, where each scene has 6 different versions (2 types of censors x 3 regions of each censor) of censor technique applied. The videos were played to the participants in a random order. After watching each version of the video, the participants were asked to grade the amount of discomfort that was released, in a 5-point Likert scale. Also, after watching videos of all 3 regions of a censor type, they answered to the questions asking about the reason to why they perceived the release of discomfort differently depending on the applied region of the censor, and their preference towards that particular type of censor. After watching the entire 6 versions of videos of a specific scene, the participants were given the questions whether having censors applied helped them feel less uncomfortable, the reason to why they preferred different regions of censors depending on the censor type, and their preference between the two types of censors, pixelization and posterization. At the end of the user study, we asked three additional questions, asking why their desire towards the types and regions of censors differed depending on the scenes, and whether they wished to be able to use a system that enables them to customize the application of censors when watching uncomfortable scenes with others.

4.5 Findings

4.5.1 Alone vs. With Someone: Movies People Wish to Avoid When Selecting and the Personal Strategies to Avoid Selecting Movies with Uncomfortable Scenes. To identify the number of participants who feel strong discomfort for certain movies to the point where they hesitate before watching the movie, we asked the participants if they had any experience regarding this issue, both when alone and with others. Moreover, we asked the participants if they have certain strategies in avoiding the undesired movies. For the existence of strategies, all eighteen participants answered that they have personal methods to avoid watching uncomfortable scenes. Most used strategy was looking up for the synopsis or reviews of the movie (N = 11). The other responses were avoiding specific genres, such as violence or horror (N = 4), averting movies that are rated R (N = 3), and asking for companions' opinions on deciding whether to watch the movie (N = 1).

- **People tended to hesitate watching violent movies when alone.** Among the participants, 88.9% answered that they had experienced hesitation while searching for movies to watch

when alone (N = 16), due to the desire of avoiding uncomfortable scenes. Most of them were hesitant to watch movies that depicted strong violence (N = 13), and others chose horror movies or movies with sexual content. The reasons for avoidance varied as such: not wanting to see realistic depictions or the results of violence (*e.g.* blood), need someone to watch with, and wish to avoid having the scene registered in their memories. Out of those who had experienced hesitation, 75% of the participants (N = 14) did not watch or tried to avoid watching movies that contained uncomfortable contents, while others decided to watch due to the artistic value of the movies.

- **People felt hesitant in watching violent or sexual movies with others.** Similar to when being alone, 77.8% of the participants (N = 14) claimed that they had hesitated before watching movies with others, because of the possibility of encountering uncomfortable scenes. Among them, 64.3% (N = 9) did not wish to watch horror or violent movies that are too realistic or brutal to the point of disgust. Half of the participants (N = 7) did not wish to watch sexual scenes with others, because it can cause awkwardness among friends and families, and one participant mentioned movies that contain strong and detailed drug use. Most of the participants (N = 11) did not watch the movie, unless the movie was well-known for its artistic value or fame, or if the uncomfortable scenes were brief. Apart from this, 42.9% of the participants (N = 6) commented that they had watched uncomfortable movies because of their companion's strong persuasion.

4.5.2 Alone vs. With Someone: Scenes People Find Uncomfortable to Watch and the Personal Strategies to Minimize Discomfort While Watching Uncomfortable Scenes. To investigate the number of participants who had felt discomfort while watching unpleasant movies, we asked the participants if they had any experience regarding this issue, both when alone and with others. In addition, we asked the participants if they have certain strategies when encountered with uncomfortable scenes while watching the movie. Regarding the strategies, 83.3% of the participants (N = 15) answered that they have personal strategies that help them minimize the discomfort while watching uncomfortable scenes. The types of strategy varied as follows: skipped, fast-forwarded, or turned off the scene (N = 9), either closed their eyes or ears (N = 7), watched the scene until the end (N = 3), or ignored the scene by pursuing other actions, such as checking their cellphones (N = 2).

- **People mostly felt uncomfortable while watching violent scenes by themselves.** Out of the 18 participants, 83.3% of them (N = 15) had experienced discomfort while watching movies, that included uncomfortable scenes, alone. Among them, 80% (N = 12) felt discomfort while watching violent contents, such as brutal injuries that involve blood, detailed depiction of violence, and sexual violence. Moreover, 33.3% (N = 5) had faced discomfort while watching sexual contents, and one participant mentioned drug scenes. The reasons to feeling discomfort varied as such: visually sickening due to being too realistic and detailed (N = 9), seemed unnecessary in the overall content (N = 3), was not ready to face violent and horrific contents (N = 2), and did not wish to have it registered in their memories (N = 1). When the participants encountered uncomfortable scenes, 73.3% of them (N = 11) tried to ease the discomfort by skipping the scene, closing their eyes or ears, or simply turning off the movie. Others waited for the scene to end without pursuing any actions.
- **Majority of the people faced discomfort while watching sexual scenes with others.** Among the participants, all but one had faced discomfort while watching movies that included unpleasant scenes with others. Among them, majority of the participants (N = 13) answered sexual scenes and the other four participants replied violent scenes. For sexual scenes, participants mentioned that it is embarrassing to watch with their families, friends, especially if they are simple acquaintances, or partners. However, for violent scenes, regardless of whom the participants were watching with, the scene itself was the main cause of the unpleasantness. When the participants encountered uncomfortable scenes, the strategies of averting the situation varied depending on in which medium they were watching the movies. In movie theaters, where they are unable to alter the movies, several participants (N = 6) mentioned that they either closed their eyes or ears, or tried not to focus on the screen, while others (N = 3) simply endured until the end of the scene. However, with televisions or VOD platforms, the participants skipped or fast-forwarded the scene, changed the channel, averted their eyes by focusing on other activities, or turned off the movie.

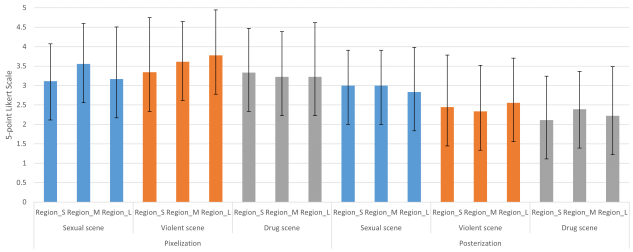


Fig. 15. The average scores participants (N = 18) gave for each region for both types of censors in all three scenes.

4.5.3 Preference in the Applied Region of Pixelization for Each Uncomfortable Scene. To understand the suitable method for applying pixelization on each type of scene, we asked the participants what region they favor the most for each three scenes. The average scores the participants gave for each region in pixelization can be found in Figure 15.

- **Censoring the the whole nude body in sexual scenes is preferred the most, using pixelization.** For the small, medium, and large region of pixelization application, the average scores given by the participants were 3.1, 3.6, and 3.2 out of 5, respectively. Moreover, 44.4% of the participants favored the medium region the most and the most dominant reason was because having the whole nude body covered allowed

them to understand the context of the scene, while not having to watch the details. Other than this, 36.1% preferred the large region the most, due to having all the sexual context covered. Those who liked the small region the most did not enjoy having their views interrupted by censors.

- **Censoring the whole victim is preferred the most in violent scenes, using pixelization.** The participants gave 3.3, 3.6, and 3.7 out of 5 for each small, medium, and large region of pixelization use. Mostly, 52.8% of the participants favored the large region the most because the censor covered most of the blood, the victim's face contorted in pain, and the tool used for violence. On the other hand, those who preferred the small region the most took up 33.3% of the participants. The ruling reason was because being able to see the tool enabled them to predict and prepare themselves for the next action. Lastly, the main reason for those to pick the medium region as the best region was simply because the region was suitable. Also, several participants commented that due to the characteristics of violent scenes, where the actions are usually big and easy to guess, having a large region of censor applied did not affect their understanding of the context.
- **Censoring only the drugs is preferred the most in drug scenes, using pixelization.** For the drug scene, the participants gave 3.3, 3.2, and 3.2 out of 5 for small, medium, and large region, respectively. Among them, 41.7% favored the small region the most because it allowed them to understand the whole context easily, without focusing on the drug. Regarding this, P8 commented:

  "These drug scenes feel distant because getting the drugs is difficult so I don't think people would imitate after watching the scene. Applying censors only to the drugs seems enough."

  Also, 41.7% preferred the large region the most since watching the process of drug injection is the main cause of discomfort. The reason for those who enjoyed the medium region the most was because covering the character's entire face affects the immersion, while censoring only the drugs is a bit anxious.

4.5.4 Preference in the Applied Region of Posterization for Each Uncomfortable Scene. To understand the suitable method for applying posterization on each type of scene, we asked the participants what region they favored the most for each three scenes. The average scores the participants gave for each region in posterization can be found in Figure 15.

- **Censoring only the specific parts of nude bodies is preferred the most in sexual scenes, using posterization.** Those who participated in the interview gave 3, 3, 2.8 out of 5 for small, medium, and large region of posterization application, each. Among them, 44.4% preferred the small region the most because since this type of censor affects the color of where it is applied, having only a small proportion of the scene censored preserved the overall beauty of the scene. For the large region, 36.1% favored it the most, since it altered the scene to be less realistic, diminishing the sensual effect. Lastly, the reason for those to perceive the medium region the most suitable is because it induces people to focus on other parts of the scene, rather than the characters' nude bodies, and also harmonizes quite well with the overall beauty of the scene.
- **Censoring the whole victim is preferred the most in violent scenes, using posterization.** For the violent scene, the participants gave 2.4, 2.3, 2.6 out of 5 for small, medium, and large region of application, respectively. Among the participants, 41.7% perceived the large region as the most suitable because since posterizing effect does not fully blur out the parts where it is applied, the larger the better. Also, 27.8% of the participants favored the small region the most because censoring only the parts where violence is the most concentrated, such as injuries, is enough. For the medium region, 13.9% favored this region because the tool was also censored, alongside with the injuries. However, 22.2% of the participants did not favor any of the regions due to disfavoring posterization. Especially, P12 commented:

  "It only changed the colors and it actually made me focus on where the censor is applied. It actually emphasizes the part."
- **Censoring the whole person using the drugs is preferred the most in drug scenes, using posterization.** The participants gave 2.1, 2.4, 2.2 out of 5 for the small, medium, and large region, each, for the drug scene. Among the participants, 27.8% selected the large region as the most suitable due to censoring the whole person using the drug. However, one particular participant mentioned that this region released all the discomfort coming from the needle injection, while it did not have the same effect on the powder-like drug inhalation. For both the small and medium region, 25% of the participants favored each region. The reason for the favor of the small region was because it reduces the white color of the drug and does not stick out from the overall scene. For the medium region, the participants commented that it is better for its larger application than the small region, but slightly has an emphasizing effect. Apart from this, 22.2% of the participants did not find any of the regions germane for posterization, due to its lack of censoring effect.

4.5.5 Pixelization vs. Posterization: Preference in Censor Type for Each Uncomfortable Scene. To investigate in detail the reasons to why people preferred a specific type of censor, we asked the participants the reason for their choice. Please check Figure 16 to find the scores the participants gave for each type of censor in all three scenes. The Wilcoxon signed rank tests revealed that the preference between the two types of censors is not significantly different for the sexual scene ($Z = 1.20$, $p = 0.23$). However, the participants generally favored pixelization over posterization for all three scenes, as revealed in Figure 17.

- **The difference in preference between the two types of censor was not significant in sexual scenes.** The participants gave 3.7 out of 5 for pixelization, and 3.4 out of 5 for posterization. Those who favored pixelization more mentioned that this type of censorship is much more familiar and has better ability to blur out the unpleasant parts. On the other hand, the participants who chose posterization over

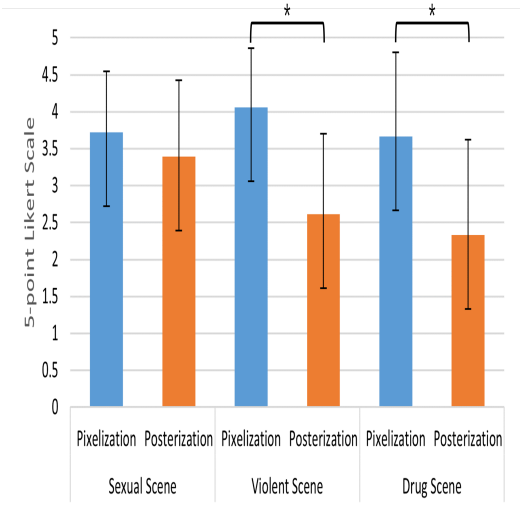


Fig. 16. The average scores participants gave for each type of censor in all three scenes. The '*' mark indicates p value under .05.

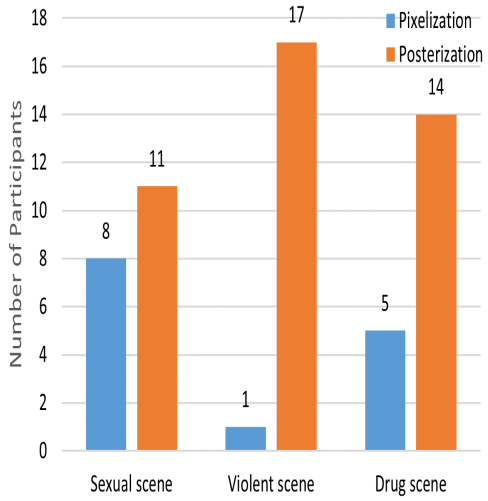


Fig. 17. The number of participants that showed favor for each type of censor. (One participant did not have a strong preference over a particular type of censor for sexual and drug scenes.)

pixelization reasoned that posterization makes the censored part less vivid, which diminishes the realistic sense, while harmonizing with the overall beauty of the scene. Apart from this, one participant (P11) did not favor a particular type of censor and commented:

"Because I don't want to see others' sexual activities and since pixelization blurs it out a lot better, I choose pixelization for the bed scene. However, for the club scene, posterization makes it less realistic while preserving the overall context, so I choose posterization for this scene."

- **Pixelization was preferred for violent scenes, because of its ability to blur out better.** The participants gave 4.1 and 2.6 out of 5 for pixelization and posterization, each. Majority of the participants chose pixelization as a more suitable type of censor and the reason was because it has a better capability of covering up the parts, while posterization has an opposite effect and emphasizes the censored parts. One participant who favored posterization reasoned that this type of censor seems to blur out the censored parts more naturally.
- **Pixelization was preferred for drug scenes, because of its ability to blur out better.** For the application of pixelization and posterization in drug scenes, the participants gave 3.7 and 2.3 out of 5, respectively. Similar to the other scenes, the reason for the participants to favor pixelization was because of its better ability to cover the censored parts, compared to posterization, and is more familiar. On the other hand, those who preferred posterization more reasoned that it alters the censored parts to be less realistic, while harmonizing well with the overall scene. Aside from this, one participant did not favor either of the censor type because the censored region did not include the characters after they used the drugs, such as going into shock or collapsing.

4.5.6 Pixelization vs. Posterization: Difference in Preference of Applied Region. To further understand the reason for the difference in preference of the applied region depending on the type of censor, we asked the participants for the reason of their choice. Those who did not have a particular region they favored for each type of censor, were either due to a strong preference for only one type of censor or region. Apart from these participants, the preference in the applied region for each type of censor differed depending on the participants, because the cause of discomfort varied between them. As an example, for sexual scenes, several participants mentioned that as the applied region gets larger with pixelization, it tends to harm the beauty of the scene, while with posterization, it becomes unidentifiable from the scene and does not have any censoring effect. On the other hand, there were those who favored a larger region for posterization compared to pixelization, since it altered the scene to be less realistic.

4.6 Summary

Similar to the survey, the interview results revealed that unlike sexual scenes, which people did not wish to watch especially when with others, people found violent scenes to be uncomfortable to watch in both situations, when alone and when with others. Only a small number of participants found drug scenes unpleasant. The application of censors would help those in avoiding awkward situations when encountered with sexual contents. For violent scenes, it would free viewers from having to watch blood or others in pain, which can cause disgust and repulsion. Moreover, they commented that the use of censors would be effective in preventing young children from learning the use of drugs.

People generally preferred pixelization over posterization for all three scenes, due to its ability to blur out the censored parts more effectively. However, the difference in the desire between the two types of censors was not significant for sexual scenes, due to an

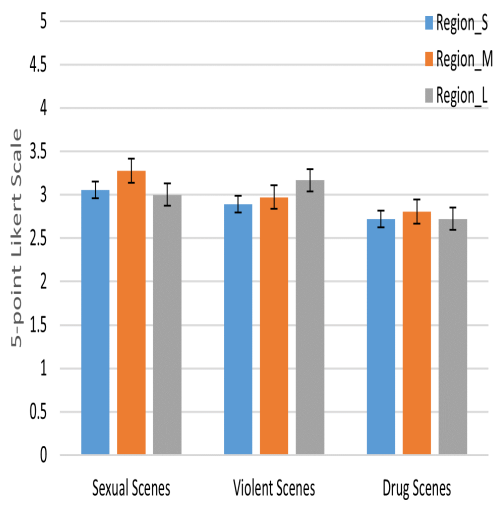


Fig. 18. The average score of both types of censor for each region in all three scenes.

unexpected ability of posterization in making the scene less realistic. Moreover, depending on the type of censor and the type of scene, the most favored region of application differed. As an example, for sexual scenes, the participants favored censoring the whole nude body the most for pixelization, while favored censoring only the specific body parts the most for posterization. For violent scenes, the large region of application was preferred the most, regardless of the type of censor. Lastly, the participants found censoring only the drugs the most pleasant with pixelization, while favoring the censoring of drugs and where it is used the most for posterization.

5 DISCUSSION

5.1 Different Censorship-related Desires for Different Scenes

The survey and the interview findings revealed that there is a desire for the application of censors in uncomfortable scenes. However, the demand differed depending on the types of scenes. Compared to sexual scenes and drug scenes, the desire was the strongest for violent scenes. First of all, the results showed that there was a higher demand for censors when watching sexual scenes with others, compared to when watching alone. However, for the violent scenes, except those who do not find violence unpleasant, most of the people simply did not wish to see others in pain regardless of whom they are watching with, if any. Lastly, due to cultural background, where drug is quite unfamiliar, not many people were uncomfortable with watching drug scenes. Overall, those who felt strong discomfort while watching unpleasant scenes expressed the need for censors for their own needs, while others who did not find the scenes significantly uncomfortable, wished to have censors when watching with others.

5.2 Different Censorship Type Preference for Different Scenes

The participants generally favored pixelization over posterization in all three scenes. However, unlike the violent and drug scene, where the majority of the participants chose pixelization, the preference for pixelization was not as strong as the other two scenes in the sexual scene. The difference in the preference of the censor type varied depending on the type of emotion the scenes raised, and the effect each censor type has. Several participants perceived pixelization to be better at blurring out the parts, making visual identifications of those parts more difficult. On the other hand, posterization affects the color of the scenes, simply making the parts less realistic. Since violent and drug scenes elicit negative emotions, such as disgust and discomfort, the participants wished to have the content completely blurred out, favoring pixelization much more. However, sexual scenes raise embarrassment and awkwardness rather than discomfort, which led to slightly less than half of the participants favoring the posterization method. Moreover, since pixelization is more prevalent in the actual practices, some of the participants mentioned that such censor type being applied in sexual scenes emphasizes the sensual sensation. It is recommended to use pixelization regardless of scene types, but posterization can also be a solution for sexual scenes, depending on the viewers.

5.3 The Application Region Should Differ Depending on the Type of Scene

As revealed in Figure 18, the application of region should differ depending on the type of scene, regardless of the censor type. The reason for such variance is because the cause of discomfort differed depending on the type of scene. As an example, as mentioned in Section 5.1, sexual scenes generally provide awkwardness and embarrassment due to watching nude bodies and sexual activities. Due to this, censors applied to the whole scene are not required and covering the whole body was enough. On the other hand, violent scenes can raise disgust and repulsion for viewers, which require censors to cover as much region as it can. Moreover, since not many participants find drug scenes to be highly unpleasant, large region of application was unnecessary. Although, the process of drug injection, such as powder being injected through the nose or needle puncturing the skin, caused several participants discomfort and wished this part to be censored as well.

5.4 The Application Region Should Differ Depending on the Type of Censor

First of all, for sexual scenes, applying pixelization on the whole nude body, while applying posterization to only specific parts of nude bodies is recommended. Using pixelization only on specific body parts was simply not enough, while applying it on the whole scene inhibited users from understanding the overall context of the scene. On the other hand, since posterization only affects the color of the censored parts, large region of application did not successfully blur out the origin of discomfort, especially when it was applied to only the whole nude body. Using posterization to cover the entire scene had an unexpected effect of altering the scene to be less realistic, eliminating the sensual chemistry. For violent scene, regardless

of the type of censors, covering the whole victim and the tool used for violence is recommended. The cause of discomfort was mostly due to visibly shown blood and the victim's face crumpled in pain. Some even wished to have all the splattered blood covered. Lastly, the small region and the medium region are recommended for the application of pixelization and posterization in drug scenes, each. Compared to sexual and violent scenes, not many participants found drug scenes strongly uncomfortable, leading to a lesser necessity of censors. As such, since pixelization effectively blurs out the parts, the small region is favored. However, posterization had an adverse effect of emphasizing the censored parts, if applied to only a small region.

5.5 Different Desires for Different Gender

Interestingly, there was a difference between gender regarding the need for censors. Through the survey, a higher percentage of female respondents reported that they have experienced discomfort while watching unpleasant scenes than male participants. This result correlates with the prior studies [4, 10, 19], where they discovered that unlike men, women did not favor scenes that contained sex and violence, and their predilection towards such contents moderated as the depiction was more realistic. This reveals that the need for censors is higher among women than men, and the application of censorship should differ depending on the viewer's gender.

6 LIMITATIONS

There are certain limitations to our study. First of all, the ratio between men and women was not proportionate for the survey, which led to having the problem continue to the interview. Due to this, we were not able to fully identify whether the result differs between two genders. Moreover, we conducted the interview with only two types of censors. We initially planned on investigating four types of censors, pixelization, blurring, posterization, and paint brush effect. However, pixelization and blurring was quite similar in its censoring effect and the interview duration far exceeded an hour, which can cause fatigue for the participants. Due to this, we determined to focus our study on identifying the varying degree of desires for censors depending on the scene, and whether the most suitable censor application method differs for each scene. Based on this, we investigated only on the effects of two types of censors, as pixelization is one of the most dominantly used censor and posterization is rather unfamiliar but its potential is yet unidentified and its censoring effect quite distant from pixelization.

7 CONCLUSION & FUTURE WORK

In this paper, we focused on investigating the specific reasons for those to feel uncomfortable while watching sexual, violent, and drug scenes, and what type of censoring method for each scene would release the most discomfort for them. We first conducted an online survey and discovered that there are those who feel discomfort and have the desire for censors for all three scenes, but especially violent scenes. Moreover, the content of the scene people did not wish to watch and the desired censorship method differed depending on the type of scene. Based on the survey findings, we conducted an online in-depth interview and specified the reasons to why people wished to avoid the uncomfortable scenes differed. In addition, between two types of censor, pixelization and posterization, the former was generally favored for all three scenes, while the preferred regions of application differed depending on the type of scene and the type of censor. One thing to note is that unlike violent and drug scenes, the preference for pixelization was not significantly stronger from posterization in sexual scenes. With the findings we have revealed, we plan to implement a customizable video censoring system using AR glasses. This will allow people to apply censors in any way they desire, while watching the same movie with other people. Also, we intend to adopt a deep learning model [9] that can detect the unpleasant parts of scenes in real-time. After the implementation, we plan on conducting a evaluation study to identify if such system can help users in effectively releasing discomfort, especially while watching uncomfortable scenes with others.

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