

Streaming Now:

The Effect of Live Streaming and Temporal Distance on Emotions and Closeness

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### Abstract

Live streaming has recently gained considerable popularity. The purpose of the present study is to empirically establish the downstream effect of live streaming on positive attitude and emotion and to assess whether closeness is mediating the effect. The hypothesis is that when watching a live video, positive attitude, positive emotion, and closeness will be higher compared to when watching a video recorded in the recent or distant past. The present study failed to find an effect on positive attitude and emotion, but found a significant effect on closeness for the live and seven years ago conditions, and the one month ago and seven years ago conditions. These results suggest that while there may not be an effect of live streaming on attitudes, emotions, and closeness, there is potentially a more general effect of temporal distance on closeness: when watching a video recorded in the recent past, individuals should feel closer to the subject of the video compared to when watching a video recorded in the distant past.

Keywords: live streaming, temporal distance, emotions, closeness

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## 1. Introduction

On January 6, 2019, Twitch began live streaming its semiannual Games Done Quick fundraiser. Games Done Quick is a week-long video game speedrun marathon where gamers will compete to beat video games in the quickest amount of time. The entire event is broadcast live on Twitch.tv, a popular live streaming website. Viewers who are watching the event are incentivized to donate money for the chance to name a character during a speedrun, enforce a difficult rule to challenge the gamer, or win other special prizes. After the fundraiser completed on January 13, 2019, it raised \$2.4 million in donations for the Prevent Cancer Foundation (“Games Done Quick,” n.d.). Games Done Quick has raised \$19.3 million across all 22 previous speedrun marathons (“Games Done Quick,” n.d.). Similarly, Extra Life is a fundraiser where gamers will live stream a 24-hour video game marathon on Twitch. In 2017, 50,000 gamers raised \$11.1 million in donations for Children’s Miracle Network Hospitals (“Extra Life,” n.d.). The enormous success of Games Done Quick and Extra Life is unprecedented and deserves further exploration. One common denominator shared between both fundraisers is the platform they use to operate—Twitch live streams.

The popularity of live streaming has increased considerably in the past few years. For example, 80% of internet and mobile audiences watched more live video in 2016 than in 2015 (Golum, n.d.). In 2017, streaming video accounted for more than 2/3rds of internet traffic and is expected to increase to 82% by 2020 (“The State of Live Streaming,” 2017). There are several popular live streaming services, including Twitch, Facebook Live, Instagram Live, Youtube Live, Twitter’s Periscope, and more. On average, Twitch has 1.2 million active viewers and 54 thousand live channels every week (“Twitch Tracker,” n.d.). In January 2019, viewers watched

949 million hours of live video from 4.6 million streamers (“Twitch Tracker,” n.d.). Similarly, 78% of Facebook users are already watching live video using Facebook Live (Golum, n.d.). Moreover, Facebook Live videos are watched three times longer and receive six times more interaction than traditional videos (“The Top 16 Facebook Live Statistics,” 2018). This data tells a compelling story about the power of live streaming.

The increase in live streaming has important implications for consumer behavior. The live streaming industry is expected to grow from \$30.29 billion in 2016 to \$70.05 billion in 2021 (“Video Streaming Market Worth,” 2016). 67% of individuals who watch live videos are more likely to buy event tickets after watching a live video of that or a similar event (Golum, n.d.). Moreover, 45% of individuals who watch live videos are willing to pay for live videos from their favorite team, speaker, or performer (Golum, n.d.). This effect is already well documented on Twitch, where viewers will often pay for exclusive live content from their favorite video game streamers. Similarly, individuals will even pay to watch live performances of the Metropolitan Opera streamed at their local theaters. Interestingly, live streams are rarely reposted for viewers to watch later. For example, popular Twitch streamers do not also have Youtube accounts to repost their live streamed gaming videos, and the Met Opera does not repost full-length versions of their live streamed performances. This demand for live streams suggests that there are downstream benefits when watching them. Specifically, individuals likely feel more positive attitude and emotion:

**H1:** When watching a live video, positive attitude and emotion will be higher compared to when watching a video recorded in the recent or distant past.<sup>1</sup>

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<sup>1</sup> This research makes no theoretical distinction between attitude and emotion. Both positive attitude and emotion are considered downstream benefits of live streaming.

**H2:** When watching a live video, negative emotion will be lower compared to when watching a video recorded in the recent or distant past.<sup>2, 3</sup>

## 1.2 Literature Review

The purpose of this research is to understand the phenomena of live streaming by not only establishing an effect of live streaming on positive attitude and emotion, but also assessing why this effect might exist. The following literature review is divided into three underlying mechanisms that can potentially explain the popularity of live streaming: uncertainty, indeterminacy, and closeness. The present study directly investigates closeness.

### 1.2.1 Uncertainty

One definition for uncertainty is the psychological state where individuals lack information about whether, where, when, how, or why an event has occurred or will occur (Knight, 1921). This lack of information is traditionally considered aversive because it is subjectively experienced as anxiety and worry (Hirsh, Mar, & Peterson, 2012; Dugas, Freeston, & Ladouceur, 1997). There are, however, both negative (e.g., flight delays and exam grades) and positive (e.g., gift-receiving and gender reveals) forms of uncertainty (Faraji-Rad & Pham, 2017). Watching a positively-valenced live video is a positive form of uncertainty because individuals feel both positive affect and uncertainty about what will occur.<sup>4</sup>

Previous research has demonstrated that uncertainty intensifies affective reactions. If an individual is experiencing a positive form of uncertainty, then their positive affect will

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<sup>2</sup> This research considers both possible directions for the effect of live streaming on emotion because live videos could either increase positive emotion (H1) or decrease negative emotion (H2). H2 is secondary to H1 because it is possible that participants will already have low negative emotion at baseline and there will be a floor effect.

<sup>3</sup> Note that H1 and H2 only apply to positively valenced live videos. This research does not consider negatively valenced live videos, where positive emotion would likely be lower, and negative emotion would likely be higher.

<sup>4</sup> This research uses affect and emotion interchangeably, but they have slightly different connotations in the broader literature.

intensify. For example, Wilson, Centerbar, Kermer, and Gilbert (2005) find that uncertainty following a positive event prolongs the pleasure derived from that event. Participants either received an unexpected gift with or without an explanation to manipulate uncertainty. Those in the uncertainty condition who were not provided an explanation maintained their positive emotion for longer than those in the certainty condition who were provided an explanation. Similarly, Bar-Anan, Wilson, and Gilbert (2009) find that after watching positive film clips, participants in the uncertainty condition felt more positive than those in the certainty condition. Thus, uncertainty can make pleasant events more pleasant by intensifying affective reactions. If an individual is watching a positively valenced live video, then their uncertainty will intensify their positive affect, thereby making the live video more pleasurable to watch.

Beyond intensifying affective reactions, uncertainty also increases the reliance on current affect for subsequent judgement and decision-making. For example, Faraji-Rad and Pham (2017) find that participants who are primed with uncertainty and incidental disgust are less willing to pay for an exotic fruit drink compared to participants who are primed with certainty and disgust. Thus, consumer behavior is influenced by an individual's affect when they feel uncertain. If an individual is watching a positively valenced live video, then their uncertainty will increase the reliance on their positive affect, which will thereby influence their subsequent behavior. Perhaps the individual will be more willing to continue watching live videos or pay for exclusive live content. Thus, the pleasures of uncertainty can potentially explain the effect of live streaming on positive attitude and emotion.

### **1.2.2 Indeterminacy**

Although uncertainty can potentially explain the effect of live streaming on positive attitude and emotion, it cannot explain why this effect is unique to live video. Specifically, uncertainty should not differ when watching a live video compared to when watching a video recorded in the recent or distant past because individuals should feel uncertain about what will occur in either case. Since uncertainty cannot differentiate between live and recorded videos, Vosgerau, Wertenbroch, and Carmon (2006) propose a new mechanism to explain the effect—indeterminacy.

Vosgerau et al. (2006) define indeterminacy as what happens next not being decided *ex ante* (i.e., before the event). Live videos are indeterminate experiences because how they will unfold is not decided in advance, whereas recorded videos are determinate experiences because how they unfold has already been decided. For example, when watching a Twitch video game live stream, it has not yet been decided whether the gamer will advance to the next level because the event is still unfolding in real time. By contrast, when watching a previously recorded Youtube gaming video, it has already been decided whether the gamer will advance to the next level because the event unfolded in the past. In both cases, a viewer could watch the video with no information about what will happen (uncertainty), but in the former case, what will happen is not decided in advance (indeterminacy). Thus, indeterminacy can differ even when uncertainty remains constant.

The folk notion of indeterminacy stems from causal determinism in philosophy, where specific antecedents result in specific consequences, so what happens next is always decided *ex ante* (Vosgerau et al., 2006). Vosgerau et al., (2006) suggest that indeterminacy can explain why individuals prefer watching live videos compared to watching videos recorded in the recent or

distant past. The authors propose that indeterminacy is associated with excitement because if what will happen is not already decided in advance, then it is evolutionarily adaptive to respond to threats and opportunities in the immediate environment appropriately. This adaptive response requires action readiness, the ability to engage or disengage in interaction with the environment, which involves increased excitement (Frijda, Kuipers, & ter Schure, 1989). Thus, indeterminate events where it is important to be aware of threats and opportunities in the environment cue action readiness that is experienced as excitement. By contrast, determinate events where what will happen is already decided in advance do not require action readiness and will not increase excitement. Since excitement is a positive emotion, it makes sense that watching an indeterminate live video may increase positive attitude and emotion.

Through a series of five studies, Vosgerau et al., (2006) demonstrate that indeterminacy can explain why individuals prefer watching live video more than previously recorded video. In Study 1, participants were told they would watch a soccer match either live or previously recorded and either alone or with others. Participants who would watch the match live anticipated higher excitement and were more likely to watch it compared to those who would watch a previously recorded video of the match. Similarly, participants who would watch the match with others were more likely to watch it compared to those who would watch the match alone. These results are independent; there was no interaction between broadcast format (live vs. previously recorded) and sharing of experience (alone vs. with others). This finding is important because it rules out the social sharing hypothesis. Prior research has suggested that sharing experiences with others amplifies those experiences, especially when also sharing congruent

social information (Boothby, Clark, & Bargh, 2014; Raghunathan & Corfman, 2006). Social sharing cannot, however, explain the effect of live streaming on positive attitude and emotion.

Study 1 established that individuals prefer watching live video, and Study 2 assessed whether perceived indeterminacy is the underlying mechanism. In Study 2, participants were told they would watch *The Bachelorette* either live or previously recorded, but indeterminacy was manipulated in both conditions. Recall that indeterminacy is about what happens next not being decided *ex ante*. In the live and indeterminate condition, participants would watch the *Bachelorette* expecting that the show will unfold as they watch. In the live and determinate condition, participants are told that the lines and final outcome are all scripted in advance. The result is an interaction between broadcast format (live vs. previously recorded) and perceived indeterminacy (indeterminate vs. determinate). Participants anticipated higher excitement and were more likely to watch the show live rather than previously recorded when the show was indeterminate. Thus, Study 2 suggests that perceived indeterminacy underlies the preference for watching live video.

Studies 3–5 rule out three alternative hypotheses: (1) impatience, (2) the illusion of control, and (3) beyond control. The impatience account suggests that individuals have a positive discount rate and will prefer watching live video because it is the first possible opportunity to watch the event (Frederick, Loewenstein, & O'Donoghue, 2002). In Study 3, participants were asked whether they would prefer watching a previously recorded match that would be showed before an otherwise equivalent live match. Participants still preferred watching the live match showed later compared to the previously recorded match shown earlier. This result is contrary to

the impatience account because participants did not have a preference for watching whichever match was showed earlier.

Similarly, the illusion of control account suggests that individuals feel like they have a stake in the outcome, so they will prefer watching an event live in order to positively influence that outcome (Langer, 1975). In Study 4, participants were asked to imagine watching an upcoming soccer match either live or previously recorded and report how likely their favored team was to win. Participants who would watch the match live thought their team was more likely to win *and* more likely to lose than those who would watch a previously recorded video of the match. This result is contrary to the illusion of control account because participants who would watch the match live did not think they could positively influence the match such that their favored team was less likely to lose.

Finally, the beyond control account suggests that individuals will equally prefer watching a previously recorded video if they freely chose to not watch the live video, rather than not watching it for reasons beyond their control. In Study 5, participants were told they could either watch a live match (live condition), watch a previously recorded video of the match because of a conflict with broadcasting rights (beyond control condition), or watch a previously recorded video of the match because they wanted to attend a party during the broadcast (free choice condition). Participants were more likely to watch the match live, and there was no difference between the two previously recorded beyond control or free choice conditions. This result is contrary to the beyond control account because participants still preferred to watch the match live, and whether participants freely chose to not watch the match live did not change this preference.

In sum, Vosgerau et al. (2006) demonstrate that indeterminacy can explain why individuals prefer watching live video more than previously recorded video. Moreover, the authors rule out the social sharing, impatience, illusion of control, and beyond control alternate hypotheses.

### **1.2.3 Closeness**

Although there is compelling evidence supporting the indeterminacy account, this research proposes a new underlying mechanism that Vosgerau et al. (2006) did not rule out—closeness. This research predicts that closeness can potentially explain the effect of live streaming on positive attitude and emotion through two related theories: (1) narrative transportation and (2) shared reality.

Narrative transportation is defined as complete absorption into a story (Green & Brock, 2000). Stories are any sequence of thematically and temporally related events with a beginning, middle, and end (Adavel & Wyer, 1998). Narrative transportation is subjectively experienced as immersing oneself into a text and becoming lost in the story, and theoretically conceptualized as a mental process that combines cognitive attention, affective feelings, and imagery (Nell, 1988; Green & Brock, 2000). This theoretical conceptualization is modeled after a physical conceptualization. Specifically, Gerrig (2018) describes transportation as akin to a traveler being transported away from their original world, then eventually returning and being changed by the journey. Similarly, narrative transportation involves being transported away from the world and into a story. Importantly, this transportation can occur through any medium, including books, films, and television shows (Green, Brock, & Kaufman, 2004).

Transportation theory suggests that when individuals transport into a story, their subsequent attitudes and intentions will reflect that story (Green, 2008). Thus, narrative transportation can be used effectively for persuasion (Green, 2008). For example, luxury brands that incorporate narrative transportation storylines into their advertising have increased brand-consumer engagement (Kim, Lloyd, & Cervellon, 2016). Narrative persuasion is often contrasted with dual-processes models of persuasion like the Elaboration Likelihood Model (ELM) (Green & Brock, 2002). According to the ELM, persuasion is the result of evaluating arguments with analytical, logical, and rational elaboration (Petty & Cacioppo, 1986). By contrast, narrative persuasion is mediated by emotional, empathic responses (Mazzocco, Green, Sasota, & Jones, 2010). Narrative persuasion increases the enjoyment of media entertainment by transporting individuals into a narrative story where they can connect with its characters (Green, Brock, & Kaufman, 2004). Thus, narrative transportation can explain why individuals enjoy consuming media. This research proposes the novel claim that live streaming effectively facilitates narrative transportation. Specifically, when watching a live video, individuals will more readily transport into the story of the live video compared to when watching a video recorded in the recent or distant past.

The next step after narrative transportation is experiencing a shared reality. Individuals are generally motivated to have stable conceptions of themselves (Swann, 1983). Thus, they will ensure that their social environments and the way others view them are both consistent with their self-conceptions (Swann, 1983). This process of social verification turns an individual's subjective experience into an objective reality because it is shared with others (Harden & Higgins, 1996). Individuals will continue to maintain their experience of reality by sharing it

with others (Harden & Higgins, 1996). Sharing realities through experiencing a commonality of inner states with others is a fundamental need for individuals (Echterhoff, Higgins, & Levine, 2009).

One specific form of sharing realities is I-sharing. To share realities through I-sharing, individuals must share phenomenological experiences with others in real time (Pinel, Long, Landau, & Pyszczynski, 2004). I-sharing distinguishes between William James' conception of the self as the epistemological "Me" and the ontological "I" (James, 2013). The epistemological self is the part of the self that can be talked about and described as an individual's nature, abilities, and characteristics (Funder, 2015). By contrast, the ontological self is an individual's true inner essence, being, and soul (Funder, 2015). When the ontological self shares an identical subjective experience with another ontological self, both individuals are I-sharing with each other (Pinel, Bernecker, & Rampo, 2015). I-sharing has several implications for interpersonal and intergroup relationships (Pinel, 2018; Pinel, Long, Johnson, & Yawger, 2018). For example, I-sharing can decrease conformity, overcome outgroup bias, humanize outgroup members, foster selflessness, and increase prosocial behavior (Pinel, Long, & Crimin, 2010; Pinel & Long, 2012; Long, Pinel, & Yawger, 2017; Pinel et al., 2017; Huneke & Pinel, 2016). Importantly, I-sharing also facilitates liking and connectedness between I-sharers (Pinel, Long, Landau, Alexander, & Pyszczynski, 2016). Thus, when individuals narratively transport into a story and experience a shared reality through I-sharing, they will feel closer to its characters.

In sum, the closeness account predicts that (1) live streaming effectively facilitates narrative transportation, which (2) allows individuals to experience a shared reality with the subject of the live stream. Specifically, watching a live video will make it easier to mentally

transport into the story, imagine oneself with the subject, share realities through I-sharing, and ultimately feel closer to them:

**H3:** When watching a live video, closeness towards the subject of the video will be higher compared to when watching a video recorded in the recent or distant past.

### **1.3 The Present Study**

The purpose of the present study is twofold: (1) to establish the downstream effect of live streaming on positive attitude and emotion, and (2) to assess whether closeness is mediating the effect. If watching a live video does not increase positive attitude and emotion, then this result would suggest that there is either no effect of live streaming, or that any existing effect does not result in downstream attitude and emotion change. Alternatively, if watching a live video does increase positive attitude and emotion, but does not increase closeness, then this result would suggest that closeness is not mediating the effect of live streaming on positive attitude and emotion. In this case, future studies should explore other potential mediators.

In sum, the literature review outlined above leads to the following three hypotheses:

**H1:** When watching a live video, positive attitude and emotion will be higher compared to when watching a video recorded in the recent or distant past.

**H2:** When watching a live video, negative emotion will be lower compared to when watching a video recorded in the recent or distant past.

**H3:** When watching a live video, closeness towards the subject of the video will be higher compared to when watching a video recorded in the recent or distant past.

## **2. Study 1**

This study investigates the effect of live streaming on attitudes, emotions, and closeness. Based on H1–H3, the prediction is that when watching a live video, positive attitude, positive emotion, and closeness will be higher, and negative emotion will be lower, compared to when watching a video recorded in the recent or distant past.

## **2.1 Method**

### **2.1.1 Participants and Design**

298 participants were recruited from Amazon’s Mechanical Turk. Participants were randomly assigned to one of three conditions (live vs. one month ago vs. seven years ago) in a between-subjects design. 49 participants were excluded from the analysis for failing to correctly answer the preliminary questions screening for American participants and fluent English speakers. The purpose of this exclusion was to ensure that participants would understand the nuanced emotion terms used in the survey. The final sample included 249 participants ( $M_{age} = 37.81$ , 42.6% female), with 84 participants in the live condition, 82 participants in the one month ago condition, and 83 participants in the seven years ago condition.

### **2.1.2 Materials and Procedure**

**Screener.** To participate in this research, participants were required to live in the United States and be fluent in English. Participants were asked several multiple choice questions, including which term refers to a student in their second year of high school (*sophomore*), what food is not usually served at a Fourth of July cookout (*granola*), which phone number connects to emergency services (*911*), whether they have been bitten by an insect, dog, or great white shark, and whether they have suffered from a fatal heart attack. Participants who failed to correctly answer these screener questions were excluded from the analysis.

**Introduction.** Participants were told the purpose of this study is to examine attitudes about a video. Participants were then instructed to carefully watch the video and answer the subsequent questions in a single sitting and without distraction.

**Manipulation.**

*Live.* Participants in the live condition first read the following text: “Recently, the Toronto Zoo got a new polar bear cub. The zoo is currently conducting a special live broadcast of the cub exploring his outdoor habitat to generate excitement. Please watch the following video they are live streaming right now.” Participants then watched a 50 second video of a polar bear cub exploring his natural habitat at the Toronto Zoo (see Figure 1). This video was originally downloaded from Youtube and shortened to an appropriate length for mTurk to ensure that participants would pay attention for the duration of the video.<sup>5</sup> Before the video of the polar bear cub began, participants saw a live streaming cue to further enhance the manipulation (see Figure 2). This polar bear cub video was chosen because there is high demand for live videos of animals. For example, one of the top five most watched live streams on Youtube is a pregnant giraffe giving birth to a baby boy (Alloca, 2017). This live stream had 1.2 million viewers at its peak and 14 million total views throughout the day (Alloca, 2017).

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<sup>5</sup> Video source: <https://www.youtube.com/watch?v=tI6peWVjrpg>



*Figure 1.* The polar bear cub participants watched during the video.



*Figure 2.* The live streaming cue participants viewed before the video.

*One Month Ago.* Participants in the one month ago condition first read the following text: “Last month, the Toronto Zoo got a new polar bear cub. The zoo recorded a special broadcast of the cub exploring his outdoor habitat to generate excitement. Please watch the following video they recorded one month ago.” Participants then watched the same 50 second video of a polar bear cub exploring his natural habitat as in the live condition. Unlike the live condition, however, this video did not include the live streaming cue.

*Seven Years Ago.* Participants in the seven years ago condition first read the following text: “Seven years ago, the Toronto Zoo got a new polar bear cub. The zoo recorded a special broadcast of the cub exploring his outdoor habitat to generate excitement. Please watch the following video they recorded seven years ago.” Participants then watched the same 50 second video of a polar bear cub exploring his natural habitat as in the one month ago condition.

**Video Attitudes.** Participants were instructed to answer the following randomly presented questions about the video they watched.

*Enjoyment.* Participants were asked how enjoyable it was watching the video on a Likert scale from 1 (*not at all enjoyable*) to 7 (*extremely enjoyable*).

*Pleasure.* Participants were asked how pleasurable it was watching the video on a Likert scale from 1 (*not at all pleasurable*) to 7 (*extremely pleasurable*).

*Recommendation.* Participants were asked how likely they would be to recommend the video to a friend on a Likert scale from 1 (*not at all likely*) to 7 (*extremely likely*).

**PANAS-SF.** The Positive and Negative Affect Schedule (PANAS) is a reliable self-report measure of current affect (Watson, Clark, & Tellegen, 1988). The original PANAS consists of 20 items, including 10 positive affect items and 10 negative affect items (Watson et

al., 1988). The PANAS was shortened into the 10-item PANAS-SF (Short Form) with five positive affect items and five negative affect items (Mackinnon, 1999). The present study chose the PANAS-SF over the PANAS to ensure that mTurk participants would pay attention and carefully answer each item.

Participants first read the following text: “The following questions consist of a number of words that describe different feelings and emotions. Read each item and then select one of the responses. **Indicate to what extent you feel this way right now, that is, at the present moment.**” Participants then rated randomly presented positive affect items (“Excited,” “Enthusiastic,” “Alert,” “Inspired,” and “Determined”) and negative affect items (“Distressed,” “Upset,” “Scared,” “Nervous,” and “Afraid”) on a Likert scale from 1 (*very slightly or not at all*) to 5 (*extremely*).

**Cub Attitudes.** Participants were instructed to answer the following randomly presented questions about the polar bear cub in the video they watched.

*Attitude.* Participants were asked how much they agree with the following randomly presented statements on a Likert scale from 1 (*not at all agree*) to 7 (*strongly agree*): “I like the polar bear cub,” “I feel positively about the polar bear cub,” and “The polar bear cub makes me feel good.”

*Emotion.* Participants were asked to what extent the polar bear cub makes them feel the following randomly presented emotions on a Likert scale from 1 (*very slightly or not at all*) to 5 (*extremely*): “Happy,” “Joyful,” “Content,” “Sad,” “Unpleasant,” and “Angry.” It is important to note that this question asks about emotion towards the subject of the live video, rather than general current affect after watching the live video like the PANAS-SF. The purpose of this

additional emotion measure was to include more relevant emotion terms (e.g., “Happy”) than the PANAS-SF affect items (e.g., “Alert”) to better capture the effect of live streaming on emotion.

*Closeness.* Participants were asked how close they feel to the polar bear cub on a continuous sliding scale from 0 (*not at all close*) to 100 (*extremely close*) (see Figure 3). The concentric circle diagrams are modeled after Bartels and Urminsky (2011) to visually represent closeness between the participant and the polar bear cub.

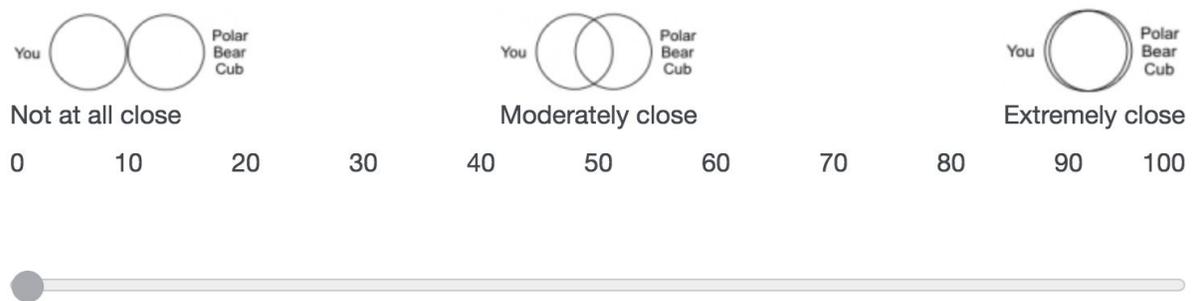


Figure 3. Continuous measure of closeness.

**Demographics.** Participants were instructed to answer several randomly presented demographic questions about their age, race, gender, family income, educational background, and political orientation.

## 2.2 Results

### Attitude.

*Video Attitude.* The three video attitude items (“How enjoyable was watching this video?,” “How pleasurable was watching this video?,” and “How likely would you be to recommend this video to a friend?”) were averaged to create an index for positive attitude towards the video ( $\alpha = .87$ ). A one-way analysis of variance (ANOVA) was conducted to assess whether there is an effect of live streaming on video attitude such that when watching a live

video, video attitude is more positive than when watching a video recorded in the recent or distant past. The analysis revealed there was no significant difference in video attitude for the live ( $M = 5.46$ ,  $SD = 1.48$ ), one month ago ( $M = 5.78$ ,  $SD = 1.08$ ), and seven years ago ( $M = 5.41$ ,  $SD = 1.33$ ) conditions,  $F(2, 246) = 1.97$ ,  $p = .142$ . Contrary to H1, this result suggests that video attitude when watching a live video is not different compared to when watching a video recorded in the recent or distant past. Moreover, the means are not in the expected direction; participants in the one month ago condition had more positive video attitude than those in the live and seven years ago conditions (see Figure 4).<sup>6</sup>

*Cub Attitude.* The three cub attitude items (“I like the polar bear cub,” “I feel positively about the polar bear cub,” and “The polar bear cub makes me feel good”) were averaged to create an index for positive attitude towards the polar bear cub ( $\alpha = .89$ ). A one-way ANOVA was conducted to assess whether there is an effect of live streaming on cub attitude such that when watching a live video, cub attitude is more positive than when watching a video recorded in the recent or distant past. The analysis revealed there was no significant difference in cub attitude for the live ( $M = 6.11$ ,  $SD = 1.25$ ), one month ago ( $M = 6.37$ ,  $SD = 0.84$ ), and seven years ago ( $M = 6.01$ ,  $SD = 1.05$ ) conditions,  $F(2, 246) = 2.57$ ,  $p = .079$ .<sup>7</sup> Contrary to H1, this result suggests that cub attitude when watching a live video is not different compared to when watching a video recorded in the recent or distant past. Moreover, the means are not in the expected direction; participants in the one month ago condition had more positive cub attitude than those in the live and seven years ago conditions (see Figure 4).

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<sup>6</sup> Note that when discussing the means throughout the results section, there were often no significant differences. Thus, the direction of the means is only stated to guide future research, rather than imply any significant effect.

<sup>7</sup> It is worthwhile to note that this result is approaching significance. Moreover, a post-hoc independent-samples t-test using a Bonferroni correction for multiple comparisons ( $p < .017$ ) revealed there was a significant difference in cub attitude for the one month ago and seven years ago conditions,  $t(163) = 2.45$ ,  $p = .016$ .

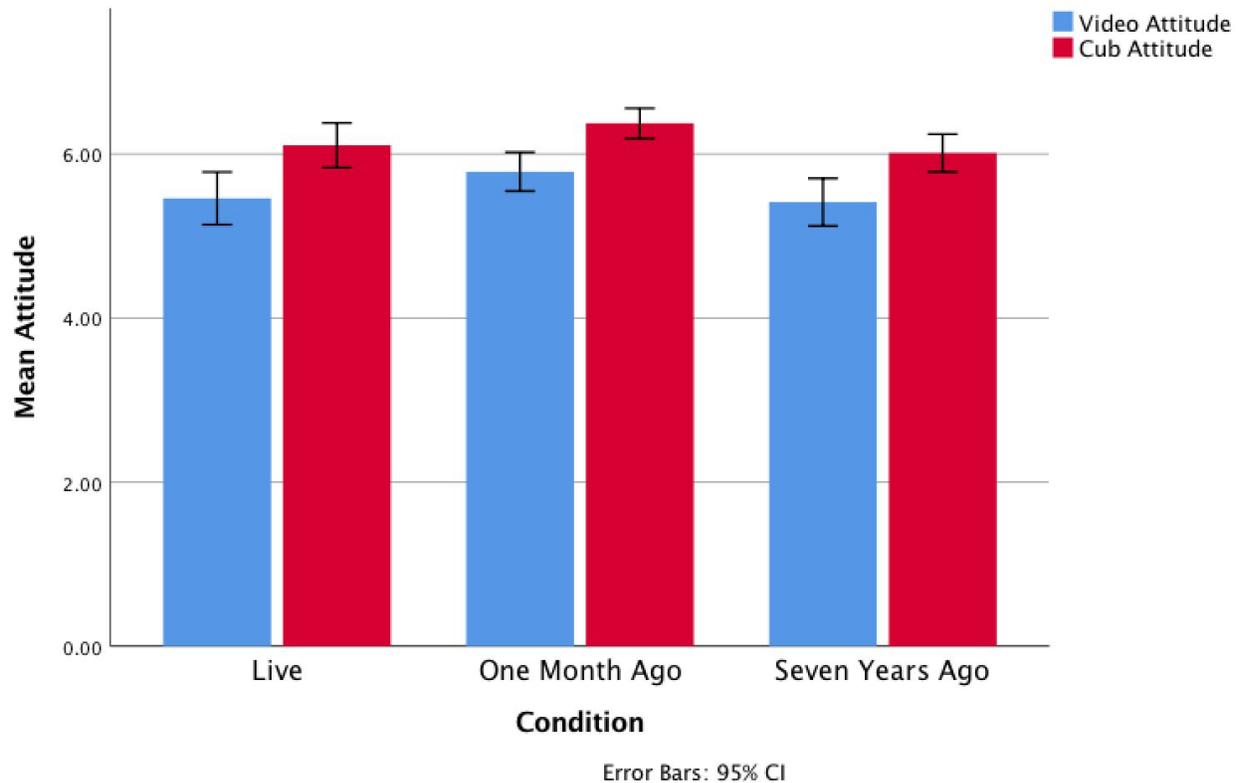


Figure 4. Mean video and cub attitude ratings for the live, one month ago, and seven years ago conditions.

### Panas-SF.

*Positive Affect.* Following standard PANAS scoring procedure, the five positive PANAS-SF items (“Excited,” “Enthusiastic,” “Alert,” “Inspired,” and “Determined”) were summed to create a positive affect score (“PANAS-GEN,” n.d.). A one-way ANOVA was conducted to assess whether there is an effect of live streaming on positive affect such that when watching a live video, positive affect is higher than when watching a video recorded in the recent or distant past. The analysis revealed there was no significant difference in positive affect for the live ( $M = 15.00$ ,  $SD = 4.12$ ), one month ago ( $M = 15.74$ ,  $SD = 4.15$ ), and seven years ago ( $M = 14.76$ ,  $SD = 4.39$ ) conditions,  $F(2, 246) = 1.22$ ,  $p = .298$ . Contrary to H1, this result suggests that

positive affect when watching a live video is not different compared to when watching a video recorded in the recent or distant past. Moreover, the means are not in the expected direction; participants in the one month ago condition had higher positive affect than those in the live and seven years ago conditions (see Figure 5).

*Negative Affect.* The five negative PANAS-SF items (“Distressed,” “Upset,” “Scared,” “Nervous,” and “Afraid”) were summed to create a negative affect score. A one-way ANOVA was conducted to assess whether there is an effect of live streaming on negative affect such that when watching a live video, negative affect is lower than when watching a video recorded in the recent or distant past. The analysis revealed there was no significant difference in negative affect for the live ( $M = 5.68$ ,  $SD = 1.52$ ), one month ago ( $M = 6.11$ ,  $SD = 2.52$ ), and seven years ago ( $M = 6.31$ ,  $SD = 3.27$ ) conditions,  $F(2, 246) = 1.37$ ,  $p = .257$ . Contrary to H2, this result suggests that negative affect when watching a live video is not different compared to when watching a video recorded in the recent or distant past. The means, however, are in the expected direction; participants in the live condition had lower negative affect than those in the one month ago and seven years ago conditions (see Figure 5).

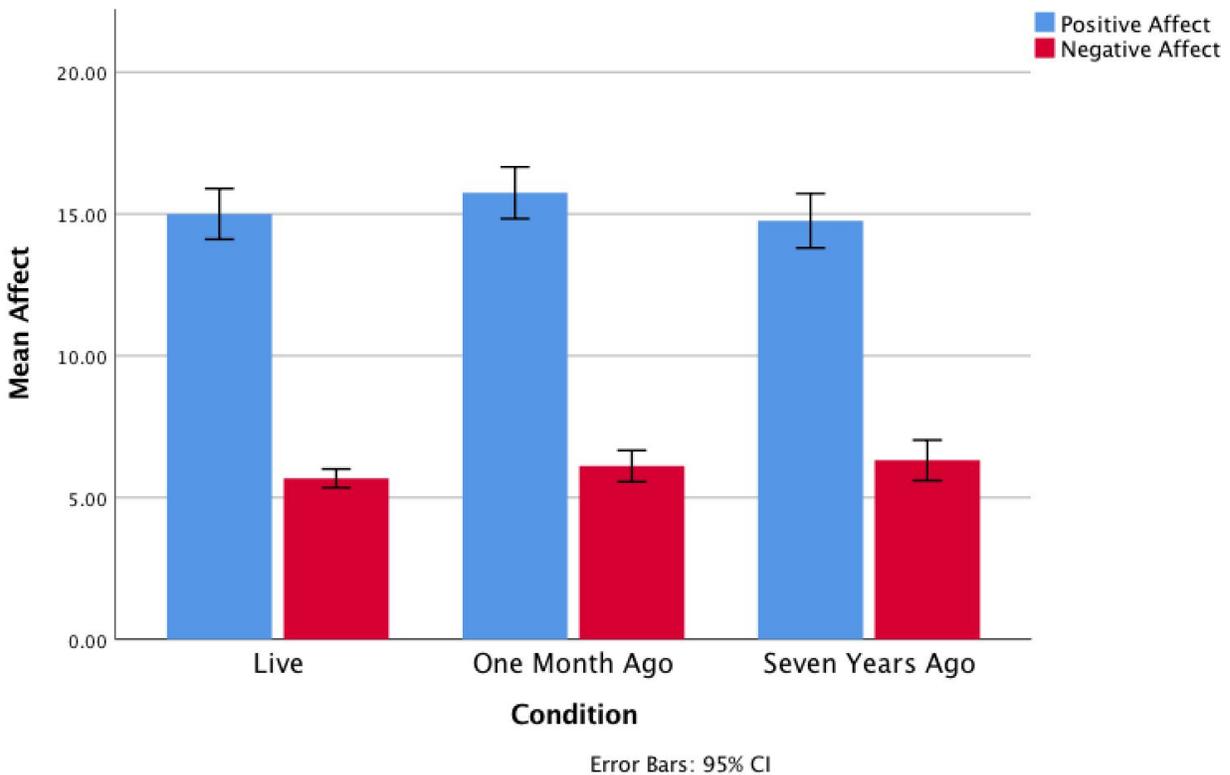


Figure 5. Mean positive and negative affect ratings for the live, one month ago, and seven years ago conditions.

### Emotion.

*Positive Emotion.* Following the methodology for the PANAS-SF, the three positive emotion items (“Happy,” “Joyful,” and “Content”) were summed to create a positive emotion score. A one-way ANOVA was conducted to assess whether there is an effect of live streaming on positive emotion such that when watching a live video, positive emotion is higher than when watching a video recorded in the recent or distant past. The analysis revealed there was no significant difference in positive emotion for the live ( $M = 11.06$ ,  $SD = 3.31$ ), one month ago ( $M = 11.26$ ,  $SD = 2.87$ ), and seven years ago ( $M = 10.48$ ,  $SD = 2.81$ ) conditions,  $F(2, 246) = 1.48$ ,  $p = .229$ . Contrary to H1, this result suggests that positive emotion when watching a live video is

not different compared to when watching a video recorded in the recent or distant past.

Moreover, the means are not in the expected direction; participants in the one month ago condition had higher positive emotion than those in the live and seven years ago conditions (see Figure 6).

*Negative Emotion.* The three negative emotion items (“Sad,” “Unpleasant,” and “Angry”) were summed to create a negative emotion score. A one-way ANOVA was conducted to assess whether there is an effect of live streaming on negative emotion such that when watching a live video, negative emotion is lower than when watching a video recorded in the recent or distant past. The analysis revealed there was no significant difference in negative emotion for the live ( $M = 3.54$ ,  $SD = 1.27$ ), one month ago ( $M = 3.66$ ,  $SD = 1.62$ ), and seven years ago ( $M = 3.49$ ,  $SD = 1.73$ ) conditions,  $F(2, 246) = 0.25$ ,  $p = .779$ . Contrary to H2, this result suggests that negative emotion when watching a live video is not different compared to when watching a video recorded in the recent or distant past. Moreover, the means are not in the expected direction; participants in the seven years ago condition had lower negative emotion than those in the live and one month ago conditions (see Figure 6).

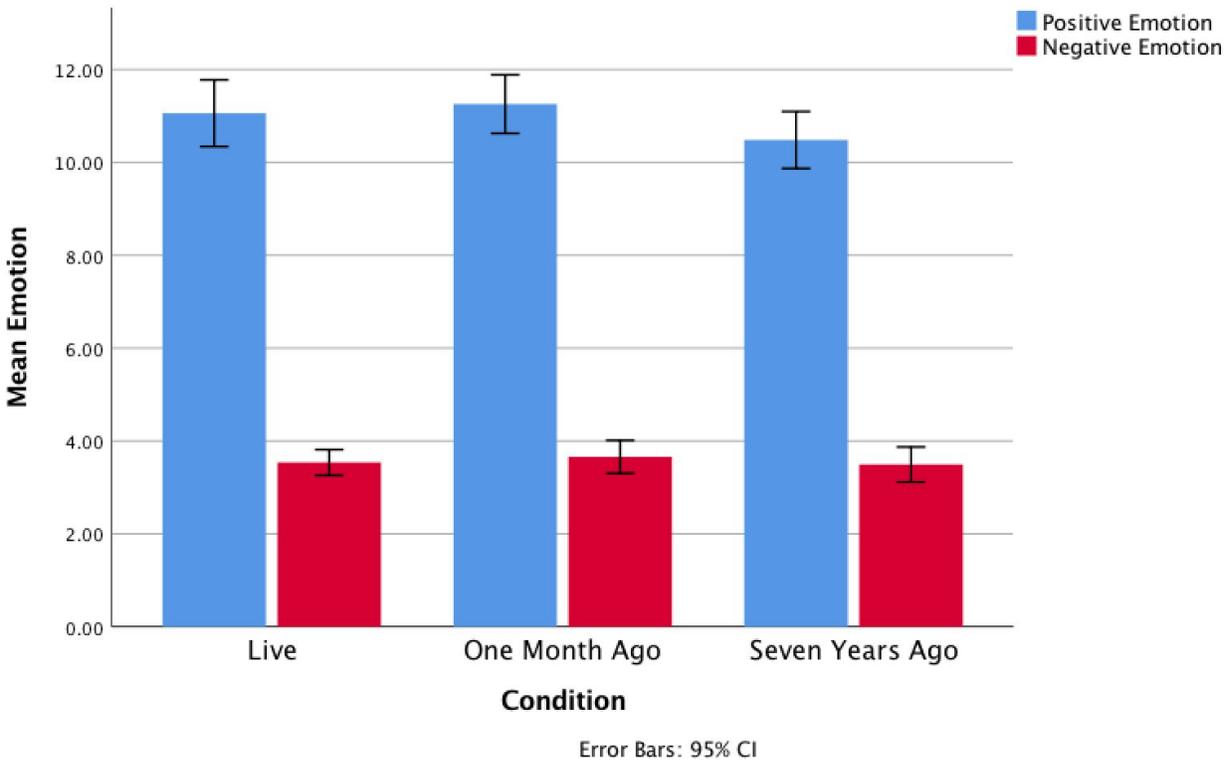


Figure 6. Mean positive and negative emotion ratings for the live, one month ago, and seven years ago conditions.

**Closeness.** A one-way ANOVA was conducted to assess whether there is an effect of live streaming on closeness such that when watching a live video, closeness is higher than when watching a video in the recent or distant past. The analysis revealed there was a significant difference in closeness for the live ( $M = 46.00$ ,  $SD = 28.65$ ), one month ago ( $M = 49.28$ ,  $SD = 27.26$ ), and seven years ago ( $M = 35.49$ ,  $SD = 24.00$ ) conditions,  $F(2, 246) = 6.02$ ,  $p = .003$ . Three post-hoc independent-samples t-tests using a Bonferroni correction were conducted to further explore the significant result. The Bonferroni correction involves dividing the original alpha value by the number of post-hoc independent-samples t-tests in order to account for

running multiple analyses and thereby reduce the possibility for type 1 error. The Bonferroni correction provides a new threshold for statistical significance of  $.05/3 = .0167$ , or  $p < .017$ .

The first independent-samples t-test revealed there was no significant difference in closeness for the live and one month ago conditions,  $t(164) = -0.76, p = .451$ . Contrary to H4, this result suggests that closeness when watching a live video is not different compared to when watching a video recorded one month ago. Moreover, the means are not in the expected direction; participants in the one month ago condition felt closer to the polar bear cub than those in the live condition (see Figure 7).

The second independent-samples t-test revealed there was a significant difference in closeness for the live and seven years ago conditions,  $t(165) = 2.57, p = .011$ . In line with H4, this result suggests that closeness when watching a live video is different compared to when watching a video recorded seven years ago. Moreover, the means are in the expected direction; participants in the live condition felt closer to the polar bear club than those in the seven years ago condition (see Figure 7).

The third independent-samples t-test revealed there was a significant difference in closeness for the one month ago and seven years ago conditions,  $t(163) = 3.45, p = .001$ . In line with H4, this result suggests that closeness when watching a video recorded one month ago is different compared to when watching a video recorded seven years ago. Moreover, the means are in the expected direction; participants in the one month ago condition felt closer to the polar bear club than those in the seven years ago condition (see Figure 7).

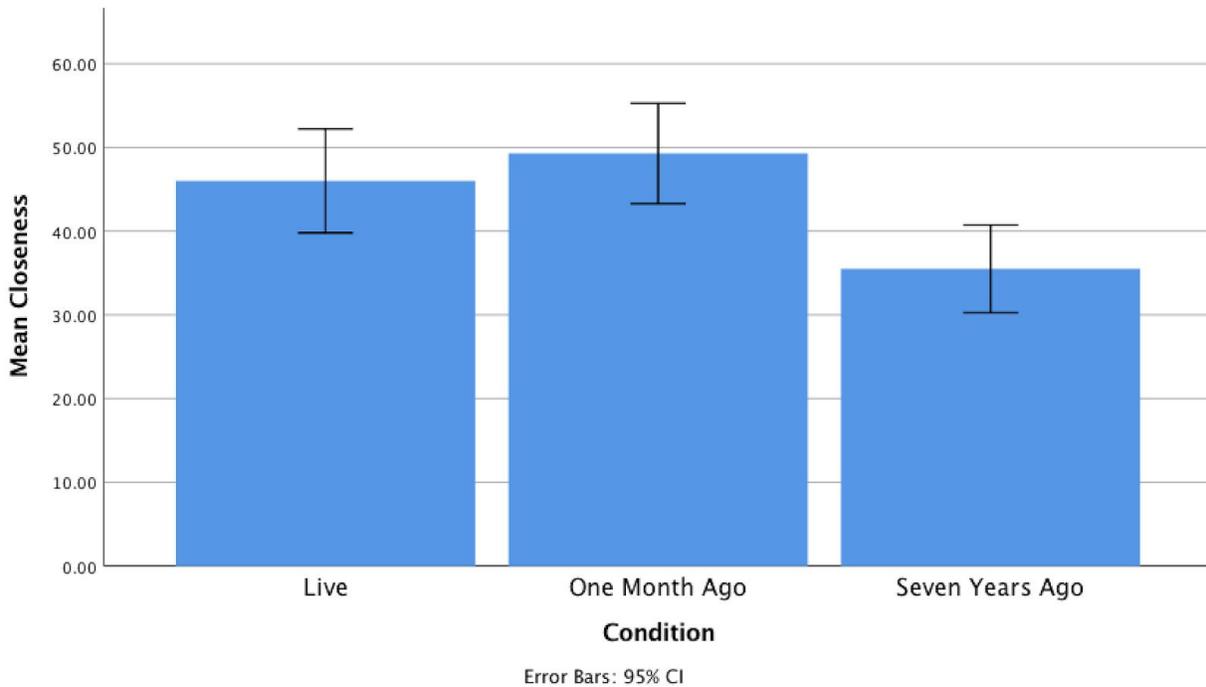


Figure 7. Mean closeness ratings for the live, one month ago, and seven years ago conditions.

### 2.3 Discussion

The results suggest that there is no effect of live streaming on video attitude, cub attitude, positive affect, negative affect, positive emotion, and negative emotion. Contrary to H1 and H2, these measures were not different for participants in the live condition compared to those in the one month ago and seven years ago conditions. Moreover, the means were often in unexpected directions; participants in the live condition did not have more positive attitude and emotion than those in the one month ago or seven years ago conditions. The results also suggest that there is no effect on closeness for the live and one month ago conditions, but there is an effect on closeness for the live and seven years ago conditions, and for the one month ago and seven years ago conditions. Specifically, closeness is not different for participants in the live condition compared to those in the one month ago condition, but it is different for participants in the live

condition compared to those in the seven years ago condition, and for participants in the one month ago condition compared to those in the seven years ago condition. Moreover, the means are in a somewhat unexpected direction; participants in the one month ago condition felt closer to the polar bear cub than participants in the live condition (unexpected) and seven years ago condition (expected).

### **3. General Discussion**

The purpose of the present study was to establish the downstream effect of live streaming on positive attitude and emotion and to assess whether this effect is mediated by closeness. Overall, the present study failed to find an effect of live streaming on positive attitude and emotion. When watching a live video, these measures were not significantly different compared to when watching a video recorded in the recent or distant past. Moreover, when watching a live video, closeness was not significantly different compared to when watching a video recorded in the recent past. This result suggests that there is no effect of live streaming even on closeness because the live and recent past conditions did not differ. There was, however, an effect on closeness for the live and distant past conditions, and the recent past and distant past conditions. When watching a live video, participants felt closer to the subject than when watching a video recorded in the distant past. Similarly, when watching a video recorded in the recent past, participants felt closer to the subject than when watching a video recorded in the distant past. These results suggest that there is potentially an effect of temporal distance on closeness, rather than an effect of live streaming on closeness.

If there is an effect of temporal distance on closeness, then when watching a video recorded closer in time, individuals should feel closer to the subject compared to when watching

a video recorded further in time. The results for closeness in the present study are in line with this hypothesis. Although there were no significant differences for positive attitude and emotion, the means are in the expected direction for this hypothesis. Participants in the one month ago condition felt more positive attitude and emotion than those in the live and seven years ago conditions. Moreover, as noted above, there was a significant difference in cub attitude for the one month ago and seven years ago conditions despite the non-significant ANOVA. Participants in the one month ago condition felt more positive cub attitude than those in the seven years ago condition.

Overall, the results of the present study suggest that while there may not be an effect of live streaming on attitudes, emotions, and closeness, there may be a more general effect of temporal distance on these measures instead. It is important to note, however, that the present study only weakly establishes an effect of temporal distance on closeness, and merely suggests an effect of temporal distance on positive attitude and emotion. Moreover, the means are not in the expected direction for negative emotion, where participants in the seven years ago condition felt less negative emotion than those in the live and one month ago conditions. Thus, future studies would benefit from exploring this hypothesis further in order to robustly confirm the effect of temporal distance on closeness, and establish the effect of temporal distance on attitude and emotion.

### **3.1 Limitations and Future Directions**

The present study did not find the downstream effect of live streaming on positive attitude and emotion, potentially mediated closeness. This result suggests that either (1) no effect exists, (2) the emotion measures were not sensitive enough to detect it, or (3) the live

manipulation was not strong enough to capture it. The first limitation with the emotion measures is that they rely on self-report. Emotion is challenging to measure because participants are often unaware or unable to accurately describe how they are feeling (Mauss & Robinson, 2009). Moreover, self-report measures are at high risk for demand effects, so it is unclear whether participants are responding with how they truly feel or how they expect they should feel (Mauss & Robinson, 2009). The second limitation with the emotion measures is that they occur after the relevant manipulation. Emotions are different from mood states because of their length; emotions are often short-lived, whereas moods are long-lasting (Beedie, Terry, & Lane, 2005). Thus, it is possible that there is a downstream effect of live streaming on emotion, but the effect already faded by the time participants completed the emotion measure.

The live manipulation is another notable limitation of the present study. Since the experiment was conducted on Qualtrics, most participants likely have prior experience watching pre-recorded videos for research. Thus, it is unclear whether the live cues in the text and the live video were convincing. Moreover, the present study only tested a positive stimulus that may elicit the same amount of positive attitude and emotion regardless of whether or not it is live streamed. The stimulus also lacked practical importance, perhaps contributing to the lack of an effect because participants were not emotionally invested in the subject. Finally, the present study did not include a manipulation check to ensure that participants were paying attention to whether the video was live streamed or pre-recorded in the recent or distant past. Overall, these limitations were potentially strong enough to hinder finding an effect of live streaming on attitudes, emotions, and closeness.

There are several future directions that could meaningfully drive this research forward through (1) more sensitive emotion measures, (2) stronger live manipulations, or (3) exploring temporal distance. To address the limitations of the emotion measures, future replications of this study should combine self-report and physiological measures. For example, autonomic nervous system (ANS) measures can detect valence and arousal without demand effects (Mauss & Robinson, 2009). Thus, ANS measures can verify whether participants are accurately reporting their emotions. Moreover, future replications should measure self-report during the relevant manipulation, rather than afterwards. When participants are watching the video, they can simultaneously report their emotions using the online affect scale (Andrade & Cohen, 2007). The online affect scale is a continuous rating dial or sliding scale that allows participants to report their emotions in real time (Andrade & Cohen, 2007). By combining simultaneous self-report measures with physiological measures, future studies will have more sensitive emotion detection.

To address the limitations of the live manipulation, future replications of this study should assess whether participants in the live condition genuinely believed they were watching a live video. Future studies might also test different stimuli, including negatively valenced, practically important, or neutral live videos. For example, there may only be an effect of live streaming on attitude and emotion for negatively valenced videos, rather than positively valenced ones. Perhaps watching a video of a polar bear cub's habitat being destroyed will elicit more negative attitude and emotion and less positive attitude and emotion compared to watching the same video in the recent or distant past. Participants may also feel more emotionally invested in this video because it has practical importance in an age of climate change. Alternatively, watching a neutral video of individuals waiting in line at the DMV will remove any valence

concerns, thereby only assessing whether live streaming has an effect on closeness. Watching this video may also be a more convincing live video than watching a polar bear cub exploring his natural habitat. Regardless of the exact manipulation, future studies should include a manipulation check to ensure that participants are paying attention.

To explore the potential effect of temporal distance on attitudes, emotions, and closeness, future studies should run a true replication of the present study without the live condition in order to isolate temporal distance. This study could confirm whether there is an effect of temporal distance on closeness, and whether this effect extends to positive attitude and emotion. An alternative method to explore the effect of temporal distance on closeness is to reverse or turn off the effect. To reverse the effect, future studies might ask participants how long ago they think the video was recorded to assess whether there is an association between thinking the video was recorded in the more recent past and feeling closer towards the subject. To turn off the effect, future studies might impose a cognitive load (e.g., time limit) or a distraction (e.g., filler task) to hinder participants from transporting to a shared reality with the subject. This study would also explore whether narrative transportation can explain why participants felt closer to the polar bear cub in the one month ago condition than in the seven years ago condition.

### **3.2 Implications**

If future studies establish an effect of live streaming on positive attitude and emotion, potentially mediated by closeness, there are several practical implications for marketing and charitable giving. First, marketers should invest in live video because it is more appealing to brand audiences. For example, 82% of consumers prefer live video more than social posts, and 80% would rather watch a live video than read a blog article (Golum, n.d.). Second, marketers

should allocate their ad dollars effectively because social video ad spending will reach \$14.89 billion by 2021 (Droesch, 2019). For example, marketers should purchase ad spots during popular live streams and for high-profile live events like the Pepsi Super Bowl Halftime Show. Finally, journalists should use live broadcasts to report important news because viewers may feel closer to the subjects of the coverage, which may have downstream benefits on charitable giving. For example, individuals watching a live video of a natural disaster may feel closer to the victims of the disaster and donate more money to aid their cause. It is important to note, however, that these implications are only meaningful if there is an effect of live streaming on positive attitude and emotion. Since the present study failed to find this effect, future exploration is still necessary.

#### **4. Conclusion**

The present study explored the phenomena of live streaming and its potential downstream benefits. Specifically, does live streaming have an effect on positive attitude and emotion, and is this effect mediated by closeness? The present study failed to find an effect of live streaming on positive attitude and emotion, but found a significant effect on closeness for the live and seven years ago conditions, and the one month ago and seven years ago conditions. One possibility is that there is an effect of live streaming on positive attitude and emotion, but perhaps the emotion measures were not sensitive enough to detect it, or the live manipulation was not strong enough to capture it. Another possibility is that there is no effect of live streaming on positive attitude and emotion, but perhaps there is a more general effect of temporal distance on closeness: when watching a video recorded in the recent past, individuals should feel closer to the subject of the

video compared to when watching a video recorded in the distant past. Given the several practical implications of this research, future studies would benefit from exploring it further.

### **Author Contributions**

Saini and Newman developed and designed the study. With the guidance of Newman, Saini collected and analyzed the data. Saini wrote the first draft, received feedback from Newman and three anonymous peer reviewers, then incorporated the feedback into the final draft.

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