Cognitive and Emotional Processes Involved in Co-viewing: A Naturalistic Comparison With Solo Viewers

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Statements and Declarations

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Abstract

Video co-viewing is a central part of everyday media use, yet little is known about the cognitive and emotional processes involved in co-viewing. To facilitate theoretical development in understanding message processing in social contexts, this study theorizes four interpersonal factors that shape co-viewers' psychological processes. As a first step toward this broader theoretical goal, we focused on interaction-free moments (i.e., silent with eyes fixed on the television) during co-viewing and investigated co-viewers' cognitive and emotional processes by comparing them with solo viewers, within a naturalistic context where conversation is allowed. Compared to solo viewers, co-viewers exhibited (1) more positive and less negative emotions, (2) heightened physiological arousal though not significantly so, and (3) higher levels of respiratory sinus arrhythmia (RSA). Co-viewers' higher RSA support the proposed social vigilance effect where the presence of a viewing partner triggers self-regulation processes as co-viewers monitor and anticipate potential interactions during naturalistic co-viewing.

(word limit: 150)

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A Naturalistic Comparison With Solo Viewers

For decades, researchers have investigated cognition, emotion, and behavior by isolating individuals from their natural environments. However, because human interaction is the essence of people's social experience, human communication and cognition should not be viewed as isolated processes, but rather as ones that continuously respond to and are shaped by the social and environmental context in which they occur. A growing body of research now reflects this shift from a single-brain approach to a multi-brain framework, emphasizing the importance of the embedded social interaction in understanding cognition, emotion, communication, and human behavior (Bolis et al., 2023; Hasson et al., 2012; Hari & Kujala, 2009).

This is particularly true for media studies. In our daily life, television viewing frequently occurs in a social context. We watch presidential debates with others at home and in public spaces and watch sports in bars and movies in theaters. Overall, co-viewing has steadily accounted for about 50% of broadcast and connected television use in the United States over the past decade (Mora, 2025). Social context complicates television viewing from a simple human-television interaction into a complex interaction between a mediated message and a group of co-interacting individuals. The co-interaction between co-viewers (i.e., interpersonal and group communication) undoubtedly influences the human-message interaction (i.e., mediated message processing) and viewing outcomes (Banjo, 2013; Tal-Or, 2021). To understand how this social context alters individuals' message processing, this

study focuses on a social viewing context called *television co-viewing* where co-viewers watch the same television content together, and takes a naturalistic approach that allows spontaneous verbal and nonverbal interactions during the viewing process.

As a first step toward understanding co-viewers' cognitive and emotional processes in naturalistic co-viewing, this study compares these processes with solo viewing, which has been the primary focus of message processing research. To enable a direct comparison with solo viewers, we focus on the co-viewing segments where no explicit interpersonal interactions occurred (i.e., no talking and with eye gaze fixed on the television, hereafter referred to as *interaction-free co-viewing*). These co-viewing moments provide the closest behavioral equivalent to solo viewing. At the same time, although no overt interpersonal interactions occurred during the analyzed moments, co-viewers remained embedded within a naturalistic social context in which the interaction could occur at any time, making their viewing experiences fundamentally different from solo viewers. The goal of this study is to explore how interaction-free moments during naturalistic co-viewing would alter one's psychophysiological and behavioral patterns and the extent to which these patterns are influenced by the emotional characteristics of the videos. In doing so, this study extends message processing theories to social viewing contexts and advances the co-viewing literature by revealing the dynamic processes that underlie viewing outcomes.

Emotional and Cognitive Processing in Television Co-viewing

Co-viewing has been defined as watching television with others, originally in the same physical space. More recently, its definition has been extended to virtual, connected,

or mediated environments where viewers are not physically together but connected through social media, social television, or videoconferencing platforms (e.g., Dor & Zimmermann, 2020; Holt & Sanson, 2013; Nee & Barker, 2020; Thorson et al., 2015). Traditionally, co-viewing as a concept was limited to viewing television together without engaging in discussion and was considered as one type of parental mediation (Valkenburg et al., 1999). This definition largely reflects the early focus of co-viewing literature on parent–child co-viewing. As the literature expanded to adult audience and media contexts such as sports broadcasts and television dramas (Chaney et al., 2014), researchers increasingly recognized social interaction as a defining characteristic of co-viewing (e.g., Bellman et al., 2012).

Most studies examined co-viewing and the possible influence of social interaction through survey and electronic People Meter data (e.g., Chaney et al., 2014; Lee & Choi, 2026; Pal et al., 2026), treating co-viewing as a collective variable in which all factors related to co-viewers are subsumed under the broad term of co-viewing. This body of research produced important insights into co-viewing patterns and outcomes (Cohen & Lancaster, 2014; Dorr et al., 1989; Mora et al., 2011; Yang et al., 2010), but left the specific co-viewing components and their interactions that produce these effects underexamined.

Addressing such questions requires experimental research capable of manipulating promising causal factors. Most experimental co-viewing research investigated the effects of demographic, psychographic, and emotional response variables of the viewing partner on co-viewing outcomes such as enjoyment and attitudes toward media (e.g., Banjo et al.,

2015, 2016; Tal-Or, 2016; Wilson & Weiss, 1993; Zillmann et al., 1986). Despite the long history of co-viewing research, only a few studies examined how co-viewing influences viewers' message processing (Banjo et al., 2017; Rasmussen et al., 2017).

Studying psychological processes during co-viewing is important for two reasons. First, it can shed light on the co-viewing experiences and outcomes and helps to reconcile conflicting findings in the literature of co-viewing. This is particularly salient with the rise of virtual co-viewing. The evolving media technologies complicate theoretical development of co-viewing (Tal-Or, 2021) and therefore examining the involved psychological processes is essential for understanding not only in-person co-viewing but also the extent to which these technologies shape co-viewing experiences and outcomes. Second, although co-viewing constitutes a significant part of human's media experiences, we know relatively little about how messages are processed under such settings. Most existing knowledge of information processing is derived from lab settings where viewers consume media alone. Nevertheless, co-viewing introduces more complex processing dynamics, as it is jointly shaped by human-human and human-television interactions. As such, understanding psychological processes during co-viewing is critical for advancing our broader understanding of message processing.

Toward A Theoretical Understanding of Co-viewing Processes

Early co-viewing experiments, including those cited above, largely prohibited spontaneous interactions in research design and therefore primarily examined the effects of co-viewer presence and individual trait related characteristics on viewing experiences and

outcomes. While such research design provides great experimental control, it creates a non-naturalistic viewing environment that limits our understanding of co-viewing in real life. This study takes a naturalistic approach by allowing participants to freely interact with each other and thus increases the understanding of psychological processes involved in co-viewing.

To facilitate theoretical development in naturalistic co-viewing, this study identifies four factors that should be unfolded for a comprehensive understanding of cognitive and emotional processing during co-viewing: the influence of 1) the mere presence of a co-viewer, 2) co-viewers' visual and vocal information, where visual information includes facial expressions, eye gaze and contact, postures, and body movements, and vocal information includes non-linguistic (e.g., laughter, sighs, gasps) and paralinguistic information (e.g., vocal prosody), 3) co-viewer's conversations, and 4) co-viewers' individual characteristics and their specific combination as a group.

Factor 1: The Mere Presence Effect. The mere presence effect is the idea that the physical presence of another human can influence one's emotion, behavior, and task performance (Guerin, 2010), also known as social facilitation. Decades of research in social psychology showed that the mere presence effect operates through several psychological mechanisms, primarily concerning whether the other person is perceived as an observer and thereby as evaluative. In other words, the mere presence effect is likely to occur if the presence of another person creates expectations of conformity or normative behavior for the sake of social approval, triggering participants' evaluation apprehension, self-attention, and self-presentation (Guerin, 1986). Together, these mechanisms contribute to heightened

arousal and changes in task performance (Zajonc, 1965). It is worth noting that the mere presence effect typically refers to the influence of another person's presence in triggering evaluative processes in participants, rather than to any effect simply caused by the presence of another person.

Factor 2: Co-viewers' Visual and Vocal Information. Co-viewers' visual and vocal information can influence one's message processing in three ways. First, such information can trigger emotional mimicry and contagion, a rapid and automatic process through which a person's emotions and behaviors are influenced by others (Emotional Contagion Effect, Hatfield et al., 1993). For example, seeing and hearing another person laugh often leads to automatic preparation for and initiation of facial expression, increasing the frequency and duration of one's own laughter (Smyth & Fuller, 1972) and their positive feelings (Weber & Quiring, 2017). Second, visual and vocal information shapes the evaluation of watched content (Feelings-as-Information Effect, Schwarz, 2012). Hearing others laugh provides social and environmental cues when evaluating humorous material (Lawson et al., 1998). Notably, while seeing or hearing laughter from in-group members may induce positive emotion, laughter from out-group members is either not perceived as meaningful for content evaluation (Platow et al., 2005) or may even elicit a sense of threat (Banjo et al., 2015). Overall, the above two processes can account for the enhanced enjoyment of co-viewing over solo viewing that is frequently found in the previous literature.

The third pathway through which visual and vocal information influences message processing, as we propose here, is by signaling for conversations and thus may add cognitive

effort as viewers simultaneously process television content. Nonverbal behaviors, such as facial expressions and eye gaze, serve as social signals that communicate attention, emotion, and intention, and thus motivate verbal communication (Provine, 1996). The idea of nonverbal information as social signals has deep roots in evolutionary biology and psychology (Darwin, 1872). In the context of co-viewing, the physical presence of another person creates an affordance for interaction, prompting viewers to monitor and initiate these social signals. As a result, viewers may allocate cognitive resources for monitoring possible interpersonal interactions, even when their eyes remain fixed on the screen. This anticipation of social engagement and its corresponding self-regulatory processes either to initiate or prohibit conversations may add cognitive load as viewers process video content. Here we refer to this impact as the *Social Vigilance Effect*.

Factor 3: Conversations. Conversations between co-viewers can influence message processing in more obvious ways. On one hand, such interactions can serve as a source of distraction, shifting attention away from the television and impairing memory of the watched content (Tal-Or, 2021). On the other hand, verbal instructions and explanations by parents when they watch television together with children can facilitate learning and comprehension (Bryce & Leichter, 1983; Strouse et al., 2013) and help mitigate negative effects of television content on children (Cantor & Wilson, 1984). Additionally, co-viewing conversations can also shape attitudes toward political candidates and influence political participation both online and offline (Groshek & Krongard, 2016; Vaccari et al., 2015).

Factor 4: Individual Traits and Their Group Composition. Finally, as co-viewing

involves interactions of both human-television and human-human, individual characteristics such as gender (Zillmann et al., 1986), age, personality (Wilson & Weiss, 1993), racial identity (Banjo et al. 2015, 2016), and their group composition such as co-viewers' psychographic similarities (Mora et al., 2011) play an important role in the process and outcomes of co-viewing. For example, while co-viewing in general tends to enhance perceived enjoyment, viewing with someone else does not necessarily lead to higher enjoyment. For example, while viewing sexual content might elicit high arousal and positive emotion when an adult watches it alone, watching it with a young kid or a parent might lead to uncomfortableness (Harris & Cook, 2011). Zillmann et al. (1986) also found that men most enjoyed watching horror movies with a distressed woman and enjoyed horror movies least when watching with a woman who was able to master her fear. Hence the characteristics of the viewing partner, the message content, and their interpersonal interactions all influence one's information processing in co-viewing.

Notably, although we discussed how the above factors influence co-viewers' message processing, we have no intention of suggesting that these factors have to be tested in isolation. Rather, they often interact in ways that jointly shape co-viewing processes, in accordance with the complex dynamic systems perspective, which emphasizes that social and psychological phenomena emerge from the nonlinear interaction of multiple components over time (Thelen & Smith, 1994; Favela, 2004). Thus, these four factors are discussed as a framework for advancing theories of message processing in co-viewing. Finally, identifying these factors does not mean that each of them, particularly Factor 3 conversations, is required

in co-viewing practices.

The LC4MP: A Primarily Solo-Viewer-Based Message Processing Theory

As noted earlier, much of what we know about message processing comes from lab-based studies where a single participant watches television content. This controlled and isolated experimental paradigm allows researchers to manipulate structural and content features of messages and precisely measure how they influence an individual's cognitive and emotional responses. This research line has produced influential theories such as the Limited Capacity Model of Motivated Mediated Message Processing (LC4MP) proposed by Dr. Annie Lang (2006, 2017). However, this solo-viewer-based paradigm does not account for the social dynamics present in co-viewing situations. Thus, in theorizing how co-viewing influences message processing, scholars should address one key question: how do the four previously discussed factors interact with message features and shape message processing for co-viewers. Before addressing this question, we first review the LC4MP, which sets the foundation for understanding how co-viewing alters message processing.

The LC4MP is based upon a series of theoretical assumptions. First, human's cognitive resources are limited. Second, humans allocate these resources to tasks, either automatically or by control. Third, message processing requires a certain number of cognitive resources. How well a message is processed depends on the resources allocated to it, the resources it requires, and the resources available at the time. With these assumptions, the LC4MP developed many propositions explaining how humans process messages emotionally and cognitively. Here we highlight those most relevant to this present study.

The LC4MP incorporates the dual motivational systems model (Cacioppo & Berntson, 1994; Bradley et al., 2001) to explain and predict how emotional content influences messages processing. The dual motivational systems model argues that human emotion is organized by two independent motivational systems: the appetitive (or approach) and aversive (or defensive) system. These two systems evolved to help humans seek survival opportunities such as seeking mates and food and avoid dangers. Increasing the arousal level enhances activation in both systems but with two distinct trajectories. Specifically, at low levels of arousal, the appetitive system is more active than the aversive system, supporting approach behaviors for opportunities (known as *positivity offset*). As the arousing level increases, identifying potential dangers becomes more critical for survival than seeking opportunities, leading to a steeper activation of the aversive system than the appetitive system, a pattern known as *negativity bias*.

The LC4MP argues that these activation patterns therefore imply different resource allocation patterns when it comes to message processing. Greater activation in the appetitive system results in more resources allocated to positive messages; increased activation in the aversive system leads to more resources allocated to negative messages but only up to the level of moderately arousal. When negative content becomes extremely arousing, the increased activation of the aversive system withdraws resource allocation from encoding and prepares the organism for fight-or-flight actions to avoid potential harm. Therefore, the LC4MP predicts some general laws of message processing including: first, humans respond to positive messages with increased activation of the appetitive

system, and respond to negative messages with increased activation of the aversive system. Second, humans are more emotionally aroused as the message's arousing level increases as the result of motivational system activation. Third, individuals allocate more resources to positive messages than negative messages when the message arousal level is low due to the positivity offset; but when the messages are moderately arousing, they allocate more resources to negative than positive messages due to negativity bias. However, when arousal becomes extremely high and to a point that triggers a fight-or-flight response, cognitive resources withdraw from processing the negative content. In this case, more resources are allocated to positive messages than negative messages.

This Study

To explore how co-viewing alter emotional and cognitive processing of videos, the present study compares co-viewers' emotional and cognitive processing against those of solo viewers, by analyzing moments when co-viewers were silent with their gaze fixed on the television (interaction-free co-viewing) for a direct comparison between the two types of television viewing conditions. Given that the effects of co-viewing are highly sensitive to both viewing content and context, it is important to clarify the specific context involved in the present study before formulating hypotheses. This study chose a sports viewing context to test the hypotheses because sports viewing is a highly social activity and represents one of the most frequent co-viewing experiences in everyday life (Chaney et al., 2014). While other co-viewing contexts, such as viewing movies in theaters, often limit verbal interaction (but still allowed), sports co-viewing is characterized by the concurrent operation of the four factors

identified above, making it an ideal context for studying co-viewing and facilitating relevant theoretical development. Additionally, the data used in this study comes from an experiment in which close friends watched televised basketball games together. The participants were American college students and most of them rooted for their home university team across the eight games they watched during the experiment. Hence, this study examines a sports viewing context where it is overall positive and exciting.

Within this context, the first question we explore is whether co-viewing enhances enjoyment compared to solo viewing. In sports viewing, emotional contagion plays a critical role in shaping one's emotions as it is easily facilitated by shared fandom and group identity (Behrens & Uhrich, 2022). Thus, watching a basketball game with close friends is likely to intensify positive emotional experiences and increase overall enjoyment than viewing alone (H1). To capture viewers' dynamic changes in emotional responses during co-viewing, we used two facial EMG signals including orbicularis oculi (OO, one of the smiling muscles) and corrugator supercilii (CORR, the frowning muscle) muscle group activations to test this hypothesis. Because increased activation of OO and CORR indicates higher levels of positive and negative emotion, respectively (Potter & Bolls, 2012), we propose that:

> **H1a (Co-viewing Effect on Positive Emotion):** Co-viewers would exhibit a higher level of positive emotion than solo viewers, indicated by co-viewers' increased OO activation.
>
> **H1b (Co-viewing Effect on Negative Emotion):** Co-viewers would exhibit a lower level of negative emotion than solo viewers, indicated by co-viewers' reduced activation of CORR.

The second question we explore is whether co-viewers will exhibit stronger emotional

arousal, similar to those observed in parent–child co-viewing (Rasmussen et al., 2017). Rasmussen and colleagues attributed the heightened arousal observed among children to the mere presence of a parent. However, whether this finding generalizes to co-viewing among close friends watching basketball games together remains unknown. In particular, because the mere presence effect argues that the increased arousal originates from the fact that the other person's presence triggers a feeling of being evaluated, close-friend relationships may be less likely to elicit such feelings. As a result, it is reasonable to expect that heightened arousal is less likely to arise from the mere presence of a friend.

However, in the present study, while close friends may not be perceived as an evaluator, emotion contagion and the resulting increased enjoyment might, on the other hand, alter viewers' arousal. Specifically, because increasing the appetitive system activation leads to enhanced positivity and arousal levels, the anticipated elevation of enjoyment as we discussed earlier, may in turn, suggest a stronger appetitive activation and consequently, an increase of the arousal (H2). We tested this hypothesis using a physiological measure, skin conductance level (SCL), with higher levels indicating greater physiological arousal, which is commonly used as an index of emotional arousal (Potter & Bolls, 2012). Hence, we predict that:

> **H2 (Co-viewing Effect on Emotional Arousal):** Co-viewing basketball games would result in higher levels of emotional arousal compared to solo viewing, as indicated by co-viewers' greater SCL.

The final question concerns another fundamental but underexplored question in the co-viewing literature, that is how co-viewing affects viewers' cognitive resources allocated to television content (Lee & Choi, 2026). Most existing findings to date are from parent–child

co-viewing, which showed greater attention and enhanced learning with parent co-viewing, either due to the mere presence effect or the verbal instructions during co-viewing (e.g., Rasmussen et al., 2017; Strouse et al., 2013). However, as previously discussed, co-viewing with a close friend might not elicit the mere presence effect and thus may not affect viewers' resource allocation in the same way as parental co-viewing. In addition, co-viewing with friends tends to involve more spontaneous verbal and nonverbal exchanges than parental co-viewing, especially because many parents simply sit to their children while attending to their smartphones rather than the television (Dore & Zimmermann, 2020). In this case, even during moments of silence and sustained gaze on the TV, the co-viewing friends may need to constantly monitor and prepare for potential interaction while the solo viewers would not experience such an extra layer of cognitive process.

From the LC4MP perspective, because audiences have limited resources to process information, the additional cognitive resources required to monitor and prepare for possible interactions are likely to increase co-viewers' cognitive load. When these demands exceed available resources, cognitive overload might occur, thereby impairing the processing of televised content. On the other hand, viewers' attention toward television may largely depend on their motivations for co-viewing. Lee and Choi (2026) analyzed a large-scale co-viewing data that were collected at participants' homes using sensor-based facial recognition technology and found that co-viewing increased viewers' attention toward televised programs compared to solo viewers, but decreased their attention to advertisements (attention was operationalized as the number of seconds viewers' faces were oriented towards the TV), and

this effect was even stronger when the duration of programs and ads is longer.

The social vigilance effect, as introduced earlier, may be a primary mechanism through which co-viewing influences viewers' attention to televised content. This study examines social vigilance effect using respiratory sinus arrhythmia (RSA) as its physiological indicator. RSA is the high frequency component of heart rate variability (0.12-0.40Hz, Porges, 1985) that can be calculated from electrocardiogram (ECG). It reflects the body's adaptive response to environmental demands by regulating the vagal brake, which modulates the metabolic resources needed to meet situational challenges (Beauchaine, 2001; Porges, 1995). Therefore, RSA has been used to indicate a variety of psychological processes depending on specific tasks and contexts, including mental effort, emotional regulation, stress level, and so forth (Beauchaine, 2001). RSA is particularly well suited for studying naturalistic co-viewing because it provides a physiological index of how cognitive resources are allocated to two concurrent demands: (1) processing the televised content and (2) monitoring or preparing for potential interactions with their viewing partner. Prior research suggests that these two processes are associated with opposite patterns of RSA change. Specifically, reduced RSA relative to baseline (i.e., a negative change score) indicates greater cognitive resources allocated to media content (Ravaja, 2004). In contrast, increased RSA relative to baseline (i.e., a positive change score) during periods of conversation anticipation (i.e., a silence stage immediately preceding social interaction) reflects the self-regulatory effort required to coordinate social and cognitive requirements (Stuart et al., 2025). This pattern of RSA increase was observed across three studies

involving 356 dyads and was consistent across relationship types (strangers and romantic partners), conversational topics varying in emotional valence (negative, neutral, and positive), and conversational roles (speaking and listening; see Stuart et al., 2025, for a review of relevant theoretical accounts and prior empirical findings). Therefore, RSA reflects the combined influence of these two concurrent and possibly competing processes. Hence, we propose that naturalistic co-viewing will produce the social vigilance effect among co-viewers, indicated by their higher levels of RSA than solo viewers. Thus,

> **H3 (Co-viewing Effect on Social Vigilance):** During interaction-free co-viewing moments, co-viewers would lead to elevated RSA compared to solo viewers.

On the other hand, we predict that when co-viewers are physically together but have no expectation of interacting with their viewing partner such as during a resting baseline where they were physically together but asked not to interact with each other, the social vigilance effect should be minimal. In this regard, we predict that:

> **H4 (Null Effect of Baseline on Social Vigilance)**: When co-viewers have no expectation of potential interpersonal communication (i.e., during resting baselines), their RSA levels would be similar to those of solo viewers.

Now another question is how video valence and arousal affect the social vigilance effect. We assume that videos that are more attention-grabbing for solo viewers might also be more attention-grabbing for co-viewers. These more attention-grabbing videos may provide fewer opportunities for visual, vocal, and verbal interactions for co-viewers, thereby reducing the social vigilance effect (indicated by less elevated RSA). In short, we hypothesize a negative relationship between a video's attention-grabbing feature and the social vigilance effect. Specifically, we expect that when videos are calm, negative videos will produce

stronger social vigilance effect than positive videos because positive videos are more attention-grabbing per the LC4MP; in contrast when videos are moderately arousing, negative videos will produce weaker social vigilance effect than positive videos because the negativity bias makes the negative videos more attention grabbing. Finaly when videos become highly arousing, because negative videos trigger cognitive avoidance from videos, they should make co-viewers exhibit more implicit and explicit interpersonal interactions. Thus, during interaction free moments, negative videos should produce stronger social vigilance effect (higher levels of RSA) than positive videos when the videos are highly arousing. As our basketball game videos were moderately arousing and highly arousing, suggested by both post-viewing self-reports and continuous response measures (Han, 2020), we propose that:

> **H5 (Viewing Content Effect on Social Vigilance):** Co-viewers would exhibit stronger social vigilance effects (higher levels RSA) during positive than negative videos when their arousal level is moderate (H5a), and stronger social vigilance effects (higher levels of RSA) during negative than positive videos when the videos are highly arousing (H5b).

Finally, the above reasoning implies that a stronger social vigilance effect also means that co-viewers seek more opportunities for interactions, thus videos eliciting stronger social vigilance effect should lead to more explicit interpersonal behaviors. In consistent with H5, we predict that:

> **H6 (Viewing Content on Interaction Behavior):** Co-viewers would exhibit more frequent behaviors of talking and looking at each other for positive than negative videos when the arousal level is moderate (H6a), whereas exhibit more frequent talking and looking at each other for negative than positive videos when the videos are highly arousing (H6b).

Table 1 summarizes this study's interpretations of the above physiological measures

and their related hypotheses.

Table 1

Interpretation of Physiological Measures Used in the Co-viewing Context

Variables	Physiological Measure	Interpretation of Higher Values	Related Hypotheses
Positive emotion	Orbicularis oculi (OO)	Stronger positive emotional response.	H1 (Supported)
Negative emotion	Corrugator supercilii (CORR)	Stronger negative emotional response.	H1 (Supported)
Emotional arousal	Skin conductance level (SCL)	Greater physiological (emotional) arousal.	H2 (Rejected)
Social vigilance	Respiratory sinus arrhythmia (RSA)	More self-regulation and readiness for potential social interaction in the present co-viewing context	H3-H4 supported; H5 partially supported

Note. RSA should be interpreted relative to a comparable condition rather than in absolute terms and within the specific task and viewing context. In the context of interaction-free moments during naturalistic co-viewing, RSA reflects the combined influence of cognitive engagement with the televised content and self-regulatory processes associated with potential social interaction.

Method

Experiment Design

This study used a sub-dataset from a previous experiment on television co-viewing (Han, 2020). The original design was a mixed factorial design with all stimuli-related variables as within-dyads factors and the viewing condition as a between-dyad factor. This study took two viewing conditions from the previous experiment (i.e., the solo viewing and co-viewing conditions), where participants were exposed to eight videos with a 2 (video valence: negative versus positive) × 2 (video arousal: moderately-arousing versus highly-arousing) × 2 (video repetition: two different videos for each video valence × arousal

combination) design.

Stimuli

National Collegiate Athletic Association (NCAA) men's basketball games were used as experimental stimuli. In each game, the Indiana University team was one of the two competing teams. As participants were from Indiana University who had a strong identity with their university (as verified by their self-report data), a game with the University team leading was perceived to be positive and a game with the University team trailing was perceived to be negative. Games with close scores (1–4 point difference) were classified as highly-arousing and lopsided games (with score difference ranging from 15–25 point difference) were moderately-arousing. These manipulations were validated through three checks using self-report data from a pre-test, the main experiment, and a separate experiment using the same stimuli (Han, 2020; Lee et al., 2023; see the manipulation check report in OSF Supplementary Section 1 or https://osf.io/6ejg8/overview?view_only=1dcab92e5abf48d79a17d308ec96ab02). Each clip was 3 minutes 40 seconds long and was edited from the last five minutes of each game.

Participants

The two viewing conditions provided with data of 92 participants (46 dyads, n = 48 for solo viewing and n = 44 for co-viewing). Dyads were recruited by asking participants to bring a friend to the experiment (friendship measures and related results are reported in Supplementary Section 1).

Procedures

Upon providing informed consent, dyads were randomly assigned to either separate rooms for solo viewing or to the same room for co-viewing. Once physiological and behavioral data recordings were set up, participants were instructed to proceed with the experiment. After viewing each video, participants reported their perceived positivity, negativity, arousal, and the team they rooted for. They were then asked to keep silent for ten seconds for physiological resumption before moving to the next video. After viewing the eight videos, participants answered demographics and other questions, and were thanked and received their IRB approved compensation.

Physiological Variables

The experiment recorded OO and CORR to assess positive and negative emotional responses, respectively. Electrodermal activity (EDA) was recorded to calculate skin conductance level (SCL) for physiological arousal and ECG was recorded for RSA. Physiological recording preparation and data pre-processing are detailed in Supplemental Section 1.

All data were averaged to 1Hz, and change scores were calculated by subtracting each data point from the baseline value (an averaged value from the two-minute silence phase). For the final analysis, we selected data segments where both participants were silent for at least 5 seconds and in the meantime had eye-gaze stayed on television. Sensitivity analyses were conducted to assess the robustness of this study's findings using the selected data segments (see OSF Supplementary Section 2). To further examine the extent to which the analyzed RSA segments may be confounded by carryover effects, we conducted additional

analyses that excluded the first 5 and 10 seconds of each analyzed segment (where carryover effects from interaction would most likely occur). The two sub-datasets showed no difference from the findings we reported in the manuscript (see the report in Supplementary Section 2).

Behavioral Variables

For co-viewers, the behaviors of talking and looking at partner were coded as Yes (*1*) or No (*0*) at a second-by-second basis. On average, participants spent 25.08% of time talking (*SD* = 14.42%) and 9.78% of time looking at partner (*SD* = 9.63%). More details about behavioral recording and coding can be found in Supplementary Section 1.

Data Analysis

H1-H3 and H5 focused on psychophysiological change scores during TV viewing and were examined with multilevel modeling (MLM). Guided by the hypotheses, the fixed-effects structure of the MLMs included time, viewing condition, video valence, video arousal, and all their interactions as predictors for H1-H3; and time, video valence, video arousal, and their interaction terms as predictors for H5, with separate models run for solo- and co-viewers. Video presentation order was added as a covariate. Because participants and videos were fully crossed in the design, cross-classified MLM was used, where participants and videos as random effects were specified at the same level (Judd et al., 2012). Random intercepts and random slopes of Time were added for each participant and each video stimuli. Additionally, although participants came in dyads, nesting participants within dyads did not improve model fit and introduced convergence issues. Therefore, the final models did not have random effects at the dyad level.

H4 compared baseline RSA between co-viewers and solo viewers before they watched a video. MLM was conducted, with time, viewing condition, and their interaction as fixed-effect predictors. Random intercepts and random slopes of Time were added for each participant. Random effects at the dyadic level were not included to allow model convergence. Lastly, repeated-measure ANOVA was used for H6 with behavioral variables as the outcomes and video valence, arousal, and video repetition as within-subject predictors. Additionally, covariates including friendship closeness and satisfaction, and gender were added to each tested model. Due to their nonsignificant impact on dependent variables, these covariates were removed for model simplicity and convergence. R packages used for MLM and syntax of model specification are reported in Supplementary Section 3.

Results

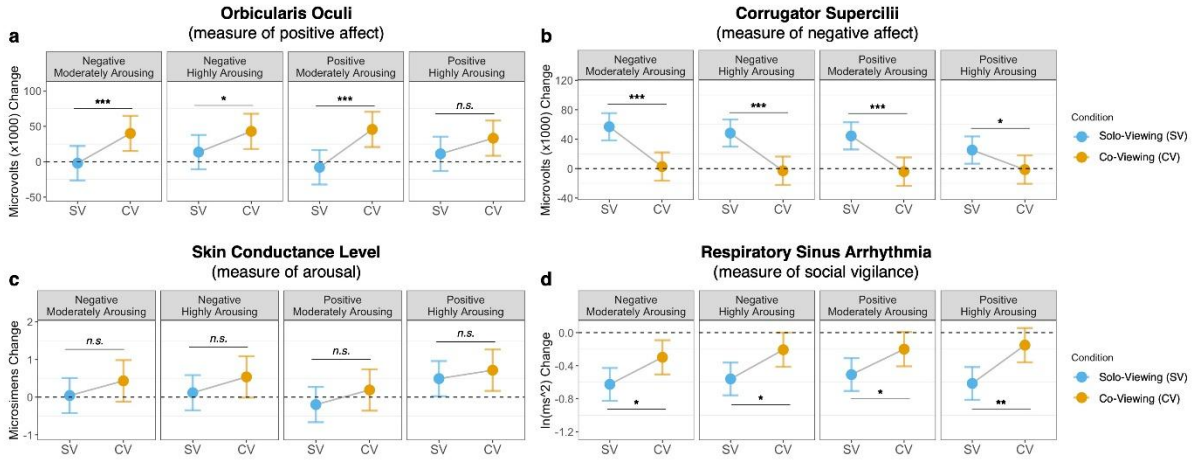
Effects of Viewing Condition

We hypothesized that, compared to solo-viewing, co-viewing would induce higher levels of positive emotion (H1a) and lower levels of negative emotion (H1b). These two hypotheses were supported. For H1a, results revealed a main effect of viewing condition such that co-viewers showed a stronger positive emotion than solo-viewers, as indicated by the OO activation muscle group. Moreover, this effect was moderated by video content, as indicated by the two significant two-way interactions and a three-way arousal-by-valence-by-condition interaction (Table 2). Pairwise contrasts revealed that the difference between co-viewing and solo-viewing conditions were observed in all the video types except for highly-arousing positive content (Figure 1a). Likewise, the CORR data suggested the same findings for H1b,

see Table 2 and Figure 1b.

Figure 1

Effects of Viewing Condition by Video Types



Note. Error bars indicate 95% confidence intervals. Interpretation of RSA is context specific. In the context of this study, we interpret higher RSA as indicative of a stronger social vigilance effect, namely more self-regulation and readiness for potential social interaction. ***$p < .001$, **$p < .01$, *$p < .05$, *n.s.* $p >= .05$.

H2 hypothesized that co-viewing would result in a higher level of arousal than solo-viewing. This hypothesis was not supported because no main effect of viewing condition was found in SCL. Rather, the results revealed significant two-way and three-way interaction effects (Table 2). Though Figure 1c showed that SCL was consistently higher among co-viewers than solo-viewers across all video types, pairwise contrasts did not reveal any significant differences between the two viewing conditions. Analyses of SCR amplitudes revealed a pattern consistent to the SCL results (see Supplementary Table S3 and Figure S4). Thus, neither the phasic (i.e., SCR) nor the tonic level (i.e., SCL) of skin conductance activity showed significant differences between the two viewing conditions.

H3 hypothesized stronger social vigilance effects, as indicated by higher levels of RSA, in co-viewing than solo-viewing, and this was supported by a significant main effect of

viewing condition. Further, this main effect was moderated by video types, as shown by the two-way and three-way interaction effects reported in Table 2. Notably, these interactions indicated variations in the magnitude of the effect but did not alter its direction, see Figure 1d.

Table 2

Main and Interaction Effects for H1 to H3

	OO (H1a)		CORR (H1b)		SCL (H2)		RSA (H3)	
	Beta	*SE*	*Beta*	*SE*	*Beta*	*SE*	*Beta*	*SE*
Condition (C)	36.79**	12.20	-45.07***	12.69	0.36	0.34	0.36*	0.14
Valence (V)	-3.11	9.02	-10.20*	3.35	0.02	0.09	0.05	0.02
Arousal (A)	6.25	9.02	-7.73	3.35	0.35*	0.09	0.03	0.02
C-by-V	2.11*	0.94	15.10***	0.93	-0.10***	0.02	0.05***	0.01
C-by-A	-22.07***	0.94	12.46***	0.93	-0.07***	0.02	0.09***	0.01
V-by-A	-5.95	18.03	-1.04	6.71	0.52	0.18	-0.11	0.04
C-by-V-by-A	-18.72***	1.88	18.93***	1.86	-0.19***	0.04	0.13***	0.02

Note. Variables were effect-coded, with –0.5 assigned to one level and 0.5 to the other (co-viewing, positive, and highly arousing content). We focused on the *Condition* main effect for H1 to H3. The two-way and three-way interaction effects indicated that the magnitude of *Condition's* effect varied with video valence and arousal. Time, and its interaction terms with condition and video types were included in the model but not presented in this table. See Supplemental Material Section 2 for the time courses of physiological change scores across conditions and video types. ***$p < .001$, **$p < .01$, *$p < .05$.

H4 hypothesized that RSA would be similar between co-viewing and solo-viewing conditions during the resting baseline period because participants were explicitly instructed not to interact with each other, and therefore, the social vigilance effect should be minimal. This hypothesis was supported, as baseline RSA was not significantly different between the two viewing conditions ($p = .26$, see Table 3 and Figure S3).

Table 3

Main and Interaction Effects for H4 and H5

	Resting Baseline RSA (H4)		Solo-Viewing RSA (H5)		Co-Viewing RSA (H5)	
	Beta	*SE*	*Beta*	*SE*	*Beta*	*SE*
Condition (C)	-0.26	0.23	—	—	—	—
Valence (V)	—	—	0.03	0.03	0.08*	0.02
Arousal (A)	—	—	-0.02	0.03	0.07*	0.02
V-by-A	—	—	-0.17*	0.06	-0.04	0.04

Note. H4 focused on the resting baseline period, and therefore video valence and arousal were not applicable. When testing H5, solo- and co-viewing conditions were assessed with sperate models. Therefore, Condition-related effects were not applicable. Time, and its interaction terms with condition, video valence, and video arousal were tested in the model, but returned non-significant results. ***$p < .001$, **$p < .01$, *$p < .05$.

Effects of Video Arousal and Valence During Co-Viewing

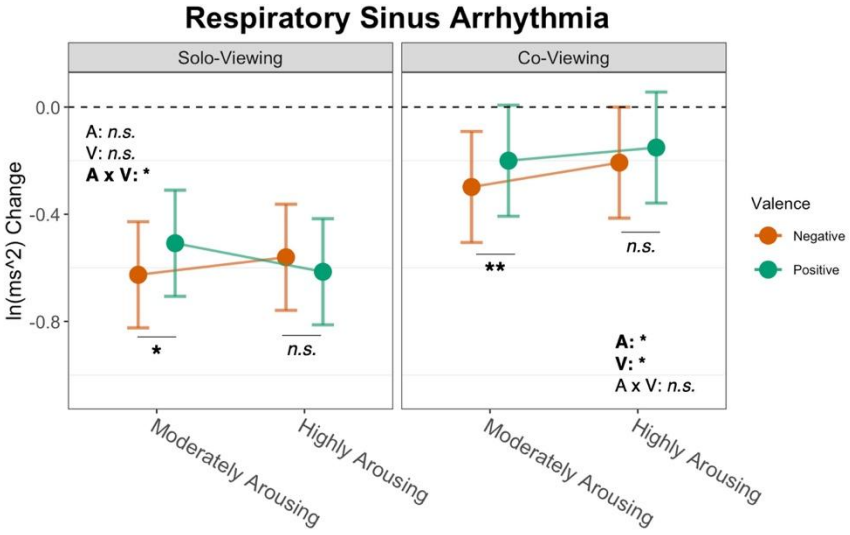
We hypothesized that co-viewers would exhibit stronger social vigilance effects (higher levels of RSA) when viewing positive compared to negative videos when their arousal was moderate (H5a) but a reversed pattern when arousal was high (H5b). Because these hypotheses were derived from the attention-grabbing properties of videos, we assumed that the mechanisms underlying attentional engagement follow the LC4MP prediction, where video valence and arousal interact to shape how viewers attend to the videos. Accordingly, we first used the solo-viewer data to test whether the selected videos produced such an interaction effect, as a validation for the underlying assumption. Note that because social vigilance is not expected in the solo-viewing condition, a higher RSA in this viewing condition was interpreted as less attention to the televised content (Ravaja, 2004). As expected, positive content elicited higher levels of RSA for moderately arousing videos, and a reversed pattern for highly arousing videos (Figure 2). Such opposite patterns resulted in a significant valence-by-arousal interaction effect (Table 3), consistent with LC4MP's

prediction.

Now with the underlying assumption confirmed, we could then test H5 on how the video valence and arousing levels impact the social vigilance effect for co-viewers. Results showed that, as expected, co-viewers exhibited stronger social vigilance effects, indicated by higher levels of RSA, when viewing positive than negative videos when the arousal level was moderate. However, for highly arousing videos, contrary to our expectation, co-viewers continued to exhibit stronger social vigilance effects (higher levels of RSA) in response to positive compared to negative content (see Figure 2). Hence for co-viewers, significant main effects of valence and arousal were found on RSA, but not valence-by-arousal interaction effect (Table 3). Thus, H5a was supported but not H5b.

Figure 2

Valence-by-Arousal and Valence-by-Condition Effects on RSA



Note. A: arousal main effect, V: valence main effect, A × V: arousal-by-valence interaction effect. For co-viewers, higher levels of RSA indicate stronger social vigilance effects (which may or may not be associated with impaired attention toward the video). For solo-viewers, because social vigilance was not expected in solo-viewing, RSA change in this viewing condition was primarily driven by viewers' engagement with the televised content. Thus, in the solo-viewing condition, lower levels of RSA were interpreted as greater attention to videos (Ravaja, 2004). Figure 2a is for H4 and Figure 2b is for H5. ***$p < .001$, **$p < .01$, *$p < .05$. Error bars indicate 95% confidence

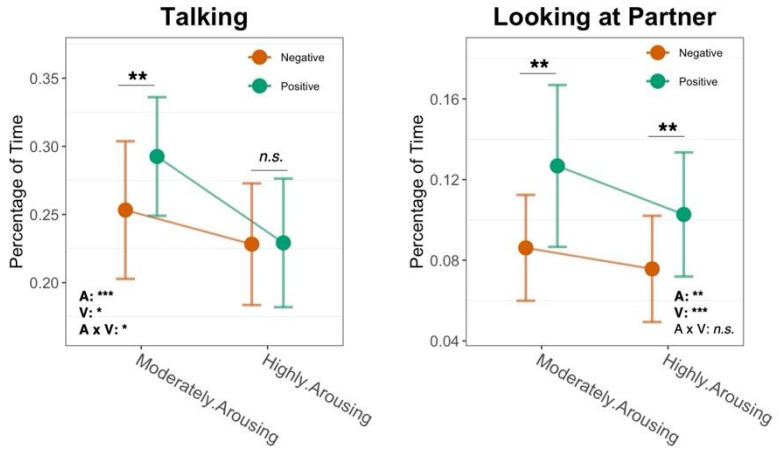
intervals.

Viewing Condition Effect on Interpersonal Behavior

Finally, we expected co-viewers to exhibit more frequent talking and looking-at-their partner behavior for positive than negative videos when videos were moderately arousing (H6a), and a reserved pattern when videos were highly arousing (H6b). Results showed that, as expected, participants spent significantly more time talking and looking at their partner during positive than negative video viewing when videos were moderately arousing. Hence, H6a was supported. When videos were highly arousing, contrary to H6b, comparable amount of talking and significantly more time looking at partner was found during positive than negative video viewing, same with the pattern for moderately arousing videos. As a result, significant main effects of valence and arousal were found on co-viewers' behaviors, such that they spent more time talking and looking at partner during less arousing videos and during positive videos (see Figure 3 and Table 4). Statistical results of all pairwise comparisons for all outcome variables are summarized in Supplementary Table S1 and Table S2.

Figure 3

Effects of Valence by Arousal on Co-Viewing Behavior



Notes. A: arousal main effect, V: valence main effect, A x V: arousal-by-valence interaction effect. Error bars indicate 95% confidence intervals. ***$p < .001$, **$p < .01$, *$p < .05$.

Table 4

Main and Interaction Effects of Co-viewing Behaviors for H6

	Talking Behavior(H6)			Looking at Partner(H6)		
	F	*df*	*p*	*F*	*df*	*p*
Arousal (A)	20.35***	(1, 43)	<.001	9.09**	(1, 43)	.004
Valence (V)	6.86*	(1, 43)	.012	25.06***	(1, 43)	<.001
V-by-A	4.41*	(1, 43)	.042	0.99	(1, 43)	.326

Note. Behaviors of talking and looking at partner were assessed within the co-viewing condition using repeated-measure ANOVA. ***$p < .001$, **$p < .01$, *$p < .05$.

Discussion

Unlike the previous experiments that restricted conversations between co-viewers, this study tested co-viewing processes and effects in a more ecologically valid setting by allowing naturally occurring interpersonal interactions. We theorized how interpersonal interactions might shape co-viewers' message processing and compared co-viewers' emotional and cognitive processing with those from solo viewers. Results showed that in an overall positive viewing experience (e.g., sports viewing), compared to solo viewers, co-viewers exhibited stronger positive emotion and weaker negative emotion, heightened (though not significantly) physiological arousal, and a social vigilance effect across all the videos. Furthermore, we found significant main effects of video valence and arousal on social vigilance and interpersonal behaviors. Interestingly, these main effects did not influence social vigilance and interpersonal behavior in the same direction as we initially predicted; rather, the patterns differed for video valence and video arousal. Specifically, the valence effect revealed a consistent pattern across social vigilance and interpersonal behaviors, such

that videos eliciting stronger social vigilance effects also produced more interpersonal behaviors (i.e., more talking and increased gaze toward one's partner). In contrast, the arousal effect showed the opposite pattern, whereby videos eliciting stronger social vigilance effects produced fewer interpersonal behaviors. Below we discuss these findings in more detail.

Understanding Co-Viewing Through Comparison with Solo Viewing

The primary goal of this study is to examine the extent to which co-viewers' emotional and cognitive processing differs from that of solo viewers. The enhanced positive experience from solo- to co-viewers was consistent with the previous literature (H1). Interestingly, the only exception is the highly-arousing positive videos, where co-viewers' positive emotion did not show a significant increase from solo viewers. We suspect that this lack of significant difference could be due to a potential ceiling effect. Figure 1 shows that, as expected, solo viewers already exhibited stronger OO activation and much weaker CORR activation during positive highly-arousing videos compared to other video types. With such a heightened positive emotional state, although co-viewers showed even stronger OO activation and weaker CORR activation when watching positive highly-arousing content, the room for further strengthening the level of positive emotion is limited. Future research should pay special attention to the positive and highly arousing video condition and test the possibility of overcoming this ceiling effect.

For the predicted enhanced physiological arousal, we found that co-viewers exhibited an increase trend from solo viewers across all video types, but not significantly so (H2). This has two implications: first, it supports our argument that in the context of peer sports viewing,

the mere presence effect might be minimal for an arousal increase, as the peer does not play an observer role that monitor or evaluate one's behavior. Second, it suggests that while co-viewing might have activated the appetitive system more than the solo-viewing, such a difference might occur at a very steep segment of the appetitive system's response curve, where a small increase in the arousal level (the non-significant SCL/SCR increase) led to significant amount of increase in the system's overall activation (the significant increase of positive emotion).

We also found that co-viewers during self-selected no-interaction periods exhibited significantly higher levels of RSA than solo viewers (H3). In contrast, no such difference was found when co-viewers' interactions were prohibited and therefore not expected (H4). These findings supported the social vigilance effect hypothesis as a distinct psychological process during naturalistic co-viewing and highlight a critical distinction between voluntary and imposed no-interaction. When participants had no expectation of interpersonal engagement, co-viewers shut down their mind for social monitoring and anticipation for conversations, resulting in RSA levels comparable to those of solo viewers. However, when non-interaction emerged voluntarily within a context that affords interactions, co-viewers' RSA patterns reflected the extra cognitive and regulatory processes. These findings underscore the importance of adopting more naturalistic approaches to studying co-viewing. While earlier co-viewing experiments imposed strict interaction constraints to enhance internal validity (Banjo et al., 2015; Keene et al., 2019; Rasmussen et al., 2017), they risk suppressing the social dynamics that give rise to co-viewing effects. Future research may compare

interaction-prohibited co-viewing with naturalistic co-viewing, and test if interaction-free moments in the naturalistic condition consistently yield higher RSA levels than the interaction-prohibited condition.

Video Valence and Arousal Effects on Social Vigilance

This study also investigated the influence of video valence and arousal levels on the social vigilance effect (H5). Using solo viewers as a reference group, the results supported our assumption underlying H5, such that there was a significant interaction between valence and arousal on attention towards the videos. However, our hypothesis that more attention-grabbing videos would produce a weaker social vigilance effect for co-viewers was only partially supported. While this held true for moderately arousing content, highly arousing videos did not follow the predicted pattern. Instead, the results revealed significant main effects for both video arousal and valence, with highly arousing or positive videos eliciting a stronger social vigilance effect (higher RSA) than moderately arousing or negative videos.

Now why did co-viewers exhibit such main effects, rather than the predicted interaction effect? Below we provide our post-hoc and data-driven interpretations for these unexpected findings. As illustrated in Figure 2, the answer might lie in the co-viewers' elevated RSA levels during highly arousing, positive videos. For solo viewers, high-arousal positive content typically demands greater resource allocation (lower RSA), but for co-viewers, this high-demanding attention did not correspondingly suppress the social vigilance effect as predicted. Rather, arousal seems to play a more critical role in modulating social vigilance within this sports co-viewing context. We suspect that during televised sports, the

inherent uncertainty of game outcomes may trigger a heightened urge for interpersonal communication and the resulting self-regulation. This tension between attending to the stimulus and attending to the partner likely intensifies during high-arousal moments, eliciting an "in-and-out" attentional state. In this state, while eye gaze remains fixed on the screen, cognitive resources can be increasingly demanded and divided, a phenomenon consistent with the Pause and Plan model (Segerstrom et al., 2012). The model posits that parasympathetic control (indexed by higher RSA) reflects active self-regulation, such as when an individual pauses to appraise a situation and plans subsequent actions. In the context of co-viewing, this elevated RSA might represent the mental processes for anticipating and initiating interpersonal interactions and the coordination of competing attention required to attend to the media stimulus and to the co-viewing partner.

The strong urge for interpersonal interactions during highly arousing videos may also be related to co-viewers' limited explicit interactions. Specifically, the main effect of video arousal operated in opposite directions for social vigilance and interpersonal behaviors, implying that co-viewers' explicit interpersonal behaviors and their psychological urge for such interactions (i.e., reflected in the social vigilance effect) may operate reciprocally as a function of video arousal. As shown in Figure 2 (co-viewing) and Figure 3 (talking), when moderately arousing videos elicited weaker social vigilance effects during interaction-free moments, they prompted more talking and more frequent eye contact throughout the co-viewing experience; in contrast, highly arousing videos elicited fewer explicit interactions but produced stronger social vigilance effects, suggesting a heightened urge for interaction. Thus,

although highly arousing content appeared to suppress overt exchanges, co-viewers may nevertheless have maintained a stronger desire to interact (i.e., stronger social vigilance effect). Additionally, the behavioral pattern found in this study is also consistent with previous sports communication research showing that viewers talk more during less arousing games (Lewis et al., 2021). Thus, it is worth noting that the main effects of video valence and arousal found in this study, rather than the expected interaction effect, may be highly related to the sports viewing context. Replication studies should be conducted in other viewing content such as television dramas, to test the generalizability of these findings.

In short, this study suggests that social vigilance is not simply an inverse function of video attractiveness; rather, it represents an emerging outcome of the interaction between engagement with the stimulus and engagement with the co-viewing partner. This result supports our argument we noted in the introduction, that the co-viewing processes emerge from the nonlinear interaction of multiple components over time. Rather than stimulus engagement simply suppressing social vigilance, processes involved in attending to the video and to the partner likely occur simultaneously and interact dynamically, creating a unique regulatory state.

Methodologically, this study conceptualized co-viewers' RSA levels as being impacted by two concurrent processes: the allocation of resources to the video (which reduces RSA from baseline) and the social vigilance effect (which potentiates RSA from baseline). Notably, our findings indicate that video viewing remained the primary task for co-viewers. Despite the general elevation in RSA compared to solo viewers, co-viewers' RSA

levels remained below their resting baselines. If the anticipation of interaction and its corresponding self-regulation (social vigilance) were the primary drivers, we would expect RSA to elevate *above* the resting baseline (Stuart et al., 2025). However, the observed "buffered" RSA withdrawal confirms that co-viewers were actively processing the stimulus while simultaneously managing the unique regulatory demands of a social environment. Moreover, additional analysis was conducted to further validate our interpretation of RSA in this viewing context. The psychophysiology literature showed that higher RSA was associated with interpersonal conversations, in addition to the silent moments preceding the conversations (i.e., anticipation of conversations, Stuart et al.,2025). Consistent with these findings, our data showed that increased RSA positively predicted the occurrence of talking and looking at co-viewing partner (Supplementary Section 3 Table S4, S5).

Embracing Naturalistic Research with the Complex Dynamical Systems Perspective

As we noted in the introduction, the interpersonal related factors are often inextricably linked to one another and shape co-viewing processes as a whole, and thus cannot be always separated in investigation. Take the previous co-viewing experiment paradigm for example, for better control for variables, early research prohibited verbal interaction, reducing the co-viewing effect to the presence of another person effect. However, even with this highly constrained setting, those studies were unable to effectively differentiate the mere presence effect and emotional contagion effect when testing the co-viewing effect on emotional experiences. These effects are inherently concurrent. Given the goal of co-viewing research and this study is to understand how co-viewing as a communication context as a whole

differs from solo viewing, the key is to well manipulate these two conditions and observe how viewers unfold their cognitive, emotional, and behavioral responses naturally.

There is a clear trade-off between well controlled experiments and ecological validity such that as ecological validity increases, the experiment becomes less controlled (Fan et al., 2021). Communication science, much like developmental psychology, often emphasizes the value of ecological validity, which is reflected in their research goals, theoretical assumptions, and research design (i.e., ecological commitment, Dahl, 2016). Naturalistic methods produce valuable findings as we understand how human communication unfolds in real life. While experiments demonstrate what *can* happen through the isolation of variables, naturalistic research captures what *does* happen by examining phenomena as they emerge in the real world. In this regard, co-viewing acts as an *order parameter* using the language of the complex dynamical systems theory, which is defined as a variable that captures the overall pattern produced by multiple underlying factors (Bailey et al., 2025; Strogatz, 1994). Accordingly, leveraging naturalistic methodologies within laboratory experiments provides more than a mere methodological advantage; it is a theoretical necessity for capturing the complexity of co-viewing and communication processes.

Limitations, Future Research, and Conclusions

The primary limitation of this study lies in its sports viewing content. While sports viewing makes a well-suited testing context for co-viewing as we argued earlier, the simultaneous influence of the sports viewing context and co-viewers in this study makes it difficult to determine whether some co-viewing effects are specific to the basketball topic, or

driven by interpersonal interactions inherent to co-viewing itself, or both. All the findings that contradicted our expectations came from the condition of highly arousing positive videos. It remains unclear whether these results are topic specific—that is, it is driven by the uncertainty brought by the basketball competition that makes co-viewers stronger eager for interpersonal interactions, or whether highly arousing content in general could elicit stronger intentions for interpersonal interaction and therefor triggers the in-and-out covert attention dynamics. This emotional video type is critical for further evaluating our proposition for how video valence and arousal influence the social vigilance effect. In addition, this study focused only on interaction-free moments to allow direct comparison with solo viewers, more analyses can be done to examine periods when co-viewers simultaneously interact with each other and watch television to capture the more complex dynamics of psychological processes involved in co-viewing.

As one of the first experiments investigating naturalistic co-viewing, we highlight several important directions for future research. First, as noted earlier, multiple studies with varied content topics and genres such as movies, television dramas, and documentaries should be conducted to help determine if the unexpected findings in this study are topic-specific or inherent to co-viewing. Replication is also needed for co-viewing involving strangers rather than friends, as well as co-viewers with varying social identities rather than shared identities. Although the present study found that friendship strength was not associated with the dependent variables examined, this null finding may be attributable to the limited variability in friendship strength among our participants, who were all close friends. In co-

viewing contexts such as watching sports in bars, movies in theaters, or live-streamed presidential election coverage, the relationship between co-viewers and their shared or conflicting identities (e.g., team fandom, political, and racial identity) might alter co-viewing processes and outcomes. Furthermore, future research should examine the boundary conditions under which social vigilance effect impairs message processing. We speculate that when cognitive engagement in video processing and interpersonal interaction triggers cognitive overload, higher RSA may indicate greater social vigilance accompanied by shallower message processing; however, if cognitive overload does not occur, higher RSA may reflect greater social vigilance while message processing may remain comparable to that of a lower-RSA viewer. Relatedly and more broadly, co-viewing outcomes resulting from its distinct processing relative to solo viewers should also be examined, such as post-viewing attitudes, memory, group identity, and sense of belonging.

Overall, this study theorizes how video content and interpersonal factors jointly shape the cognitive and emotional processes involved in co-viewing, thereby advancing a conceptual framework for understanding message processing in naturalistic co-viewing. In particular, the identification and empirical support of social vigilance introduce a novel effect in understanding how nonverbal interactions may alter viewers' cognitive process during co-viewing. By allowing for natural interpersonal interactions during co-viewing, this study provides more ecologically valid findings that, in some cases, challenge prior literature and therefore underscores the importance of leveraging naturalistic approaches in communication research.

References

Bailey, R. L., Han, J., & Read, G. L. (2025). Dynamic systems approaches to media psychology research. In R. L. Bailey & G. L. Read (Eds.). *DeGruyter handbook of media psychology* (pp.13-20). DeGruyter.

Banjo, O. O. (2013). For us only? Examining the effect of viewing context on Black audiences' perceived influence of Black entertainment. *Race and Social Problems, 5*(4), 309–322.

Banjo, O. O., Appiah, O., Wang, Z., Brown, C., & Walther, W. O. (2015). Co-viewing effects of ethnic-oriented programming. *Journalism & Mass Communication Quarterly*, *92*(3), 662–680.

Banjo, O. O., Wang, Z., Appiah, O., Brown, C., Walther-Martin, W., Tchernev, J., … Irwin, M. (2016). Experiencing racial humor with outgroups: A psychophysiological examination of Co-viewing effects. *Media Psychology*, *20*(4), 607–631.

Beauchaine, T. P. (2001). Vagal tone, development, and Gray's motivational theory: Toward an integrated model of autonomic nervous system functioning in psychopathology. *Development and Psychopathology, 13*(2), 183–214.

Behrens, A., & Uhrich, S. (2022). You'll never want to watch alone: The effect of displaying in-stadium social atmospherics on media consumers' responses to new sport leagues across different types of media. *European Sport Management Quarterly*, *22*(1), 120-138.

Bellman, S., Rossiter, J. R., Schweda, A., & Varan, D. (2012). How coviewing reduces the effectiveness of TV advertising. *Journal of Marketing Communications, 18*(5), 363–

378.

Bolis, D., Dumas, G., & Schilbach, L. (2023). Interpersonal attunement in social interactions: from collective psychophysiology to inter-personalized psychiatry and beyond. *Philosophical Transactions of the Royal Society B*, *378*(1870), 20210365.

Bradley, M. M., Codispoti, M., Cuthbert, B. N., & Lang, P. J. (2001). Emotion and motivation I: Defensive and appetitive reactions in picture processing. *Emotion, 1*(3), 276–298.

Bryce, J. W., & Leichter, H. J. (1983). The family and television. *Journal of Family Issues*, *4*(2), 309–328.

Cacioppo, J. T., & Berntson, G. G. (1994). Relationship between attitudes and evaluative space: A critical review, with emphasis on the separability of positive and negative substrates. *Psychological Bulletin, 115*(3), 401–423.

Cantor, J., & Wilson, B. J. (1984). Modifying fear responses to mass media in preschool and elementary school children. *Journal of Broadcasting*, *28*(4), 431–443.

Cohen, E. L., & Lancaster, A. L. (2014). Individual Differences in In-Person and Social Media Television Coviewing: The Role of Emotional Contagion, Need to Belong, and Coviewing Orientation. *Cyberpsychology, Behavior, and Social Networking*, *17*(8), 512–518.

Dahl, A. (2017). Ecological commitments: Why developmental science needs naturalistic methods. *Child Development Perspectives*, *11*(2), 79–84.

Darwin, C. (1872/1998). *The expression of the emotions in man and animals*. Oxford University Press.

Dore, R. A., & Zimmermann, L. (2020). Coviewing, scaffolding, and children's media comprehension. In K. Logan (Ed.), *The International Encyclopedia of Media Psychology (pp. 1-8)*. Wiley

Favela, L. H. (2024). *The ecological brain: Unifying the sciences of brain, body, and environment*. Routledge.

Groshek, J., & Krongard, S. (2016). Netflix and engage? Implications for streaming television on political participation during the 2016 US presidential campaign. *Social Sciences*, *5*(4), 65.

Guerin, B. (1986). Mere presence effects in humans: A review. *Journal of Eperimental Scial Pychology*, *22*(1), 38-77.

Guerin, B. (2010). Social facilitation. In *Corsini encyclopedia of psychology* (electronic ed.). Wiley.

Han, J. (2020). *Physiological and emotional synchrony during television viewing: A nonlinear dynamic systems approach* (Publication No. 28002093) [Doctoral dissertation, Indiana University]. ProQuest Dissertations Publishing.

Hasson, U., Ghazanfar, A. A., Galantucci, B., Garrod, S., & Keysers, C. (2012). Brain-to-brain coupling: A mechanism for creating and sharing a social world. *Trends in Cognitive Sciences*, *16*(2), 114–121.

Hari, R., & Kujala, M. V. (2009). Brain basis of human social interaction: From concepts to brain imaging. *Physiological Reviews, 89*(2), 453–479.

Harris, R. J., & Cook, L. (2011). How content and co-viewers elicit emotional discomfort

moviegoing experiences: Where does the discomfort come from and how is it handled? *Applied Cognitive Psychology*, *25*(6), 850–861.

Hatfield, E., Cacioppo, J., & Rapson, R. (1994). Emotional contagion. *Current Directions in Psychological Science*, *2*(3), 96-99.

Holt, J., & Sanson, K. (2013). *Connected Viewing*. Routledge.

Judd, C. M., Westfall, J., & Kenny, D. A. (2012). Treating stimuli as a random factor in social psychology: A new and comprehensive solution to a pervasive but largely ignored problem. *Journal of Personality and Social Psychology*, *103*(1), 54-69.

Keene, J. R., Rasmussen, E. E., Berke, C. K., Densley, R. L., Loof, T., Adams, R. B., Mumma, G. H., & Marshall, A. (2019). The effect of plot explicit, educational explicit, and implicit inference information and coviewing on children's internal and external cognitive processing. *Journal of Applied Communication Research, 47*(2), 153–174.

Lang, A. (2006). Using the limited capacity model of motivated mediated message processing to design effective cancer communication messages. *Journal of Communication*, *56*, S57-S80.

Lang, A. (2017). Limited capacity model of motivated mediated message processing (LC4MP). In P. Roessler, C. Hoffner, & L. van Zoonen (Eds.), *The international encyclopedia of media effects* (pp. 1–9). Wiley & Sons.

Lawson, T. J., Downing, B., & Cetola, H. (1998). An attributional explanation for the effect of audience laughter on perceived funniness. *Basic and Applied Social Psychology*,

20(4), 243–249.

Lee, M., Potter, R. F., & Han, J. (2023). Motivational system approach to understand ad processing following various game outcomes. *Sport Management Review*, *26*(4), 517–539.

Lewis, N., Gantz, W., & Wenner, L. A. (2021). What we do when we watch live sports: An analysis of concurrent viewing behaviors. *International Journal of Sport Communication, 14*(2), 153–167. https://doi.org/10.1123/IJSC.2020-0270

Mora, J. D., Ho, J., & Krider, R. (2011). Television Co-Viewing in Mexico: An Assessment on People Meter Data. *Journal of Broadcasting and Electronic Media*, *55*(4), 448–469.

Pal, S., DeGaris, L., & Malthouse, E. C. (2026, June). *Watching together: Uncovering the value of co-viewing in streaming*. Paper prested at the 76th Annual Conference of the International Communication Association, Cape Town, South Africa.

Porges, S. W. (1985). *U.S. Patent No. 4,510,944*. Washington, DC: U.S. Patent and Trademark Office.

Porges, S. W. (1995). Orienting in a defensive world: Mammalian modifications of our evolutionary heritage. A polyvagal theory. *Psychophysiology, 32*(4), 301–318.

Provine, R. R. (1992). Contagious laughter: Laughter is a sufficient stimulus for laughs and smiles. *Bulletin of the Psychonomic Society*, *30*(1), 1–4.

Rasmussen, E. E., Keene, J. R., Berke, C. K., Densley, R. L., & Loof, T. (2017). Explaining parental coviewing: The role of social facilitation and arousal. *Communication Monographs*, *84*(3), 365–384.

Ravaja, N. (2004). Contributions of psychophysiology to media research: Review and recommendations. *Media Psychology, 6*(2), 193–235.

Schwarz, N. (2012). Feelings-as-information theory. In P. A. M. Van Lange, A. W. Kruglanski, & E. T. Higgins (Eds.), *Handbook of theories of social psychology* (Vol. 1, pp. 289–308). SAGE Publications Ltd. https://doi.org/10.4135/9781446249215.n15

Smyth, M. M., & Fuller, R. G. (1972). Effects of group laughter on responses to humorous material. *Psychological Reports*, *30*(1), 132-134.

Strouse, G. A., O'Doherty, K., & Troseth, G. L. (2013). Effective coviewing: Preschoolers' learning from video after a dialogic questioning intervention.. *Developmental Psychology, 49(12)*, 2368-2382.

Stuart, N. C., Peters, B. J., Zoccola, P. M., Tudder, A., & Jamieson, J. P. (2025). Interpersonal conversations are characterized by increases in respiratory sinus arrhythmia. *Psychophysiology*, *62*(3), e70043.

Tal-Or, N. (2016). How co-viewing affects attitudes: The mediating roles of transportation and identification. *Media Psychology*, *19*(3), 381-405.

Tal-Or, N. (2021). The effects of Co-viewers on the viewing experience. *Communication Theory*, *31*(3), 316–335.

Thorson, E., Hawthorne, J., Swasy, A., & McKinney, M. S. (2015). Co-viewing, tweeting, and Facebooking the 2012 presidential debates. *Electronic News*, *9*(3), 195-214.

Vaccari, C., Chadwick, A., & O'Loughlin, B. (2015). Dual screening the political: Media events, social media, and citizen engagement. *Journal of Communication*, *65*(6),

1041–1061.

Valkenburg, P. M., Krcmar, M., Peeters, A. L., & Marseille, N. M. (1999). Developing a scale to assess three styles of television mediation: “Instructive mediation,” “restrictive mediation,” and “social coviewing.” *Journal of Broadcasting and Electronic Media*, *43*(1), 52–66.

Weber, M., & Quiring, O. (2019). Is It Really That Funny? Laughter, Emotional Contagion, and Heuristic Processing During Shared Media Use. *Media Psychology*, *22*(2), 173–195.

Wilson, B. J., & Weiss, A. J. (1993). The effects of sibling coviewing on preschoolers' reactions to a suspenseful movie scene. *Communication Research*, *20*(2), 214-248.

Yang, S., Zhao, Y., Erdem, T., & Zhao, Y. (2010). Modeling the intrahousehold behavioral interaction. *Journal of Marketing Research*, *47*(3), 470–484.

Zajonc, R. B. (1965). Social facilitation. *Science*, *149 (Whole No. 3681)*, 269-274.

Zillmann, D., Weaver, J. B., Mundorf, N., & Aust, C. F. (1986). Effects of an opposite-gender companion’s affect to horror on distress, delight, and attraction. *Journal of Personality and Social Psychology*, *51*(3), 586–594.