Does Pain Command Our Collective Attention and Affiliate Us Online?

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Abstract

Pain manifested in the digital age interrupts, distracts, and demands the collective attention of sometimes millions of online users. This thesis represents a novel, preliminary investigation into the effects of collectively attending to others' pain on interpersonal relations among those with whom it is attended online and the mechanisms that mediate these effects. In detail, Chapter 1 introduces this thesis with an overview of literature linking shared experiences of pain to interpersonal affiliation. The chapter includes the proposition that within online contexts, the experience of collectively attending to others' physical and social pain promotes affiliative attitudes and behaviours among individuals with whom it is attended. The chapter also explores cognitive and affective processes that likely account for these effects. Chapter 2 then contains Study 1, which was used to create a stimulus set of written- and video-vignettes depicting physically painful, socially painful, and non-painful experiences. Given the popularisation of online video sharing platforms, video-vignettes from Study 1 were used in subsequent experimental studies. Next, Chapter 3 explores the phenomenon of pain collectively attended to online. The chapter includes Study 2A, which examined usual engagement with online video. Over 70% of participants reported having engaged with online videos depicting pain, confirming the potential for collectively attended pain in contemporary culture. The chapter also includes Study 2B, which examined the collective nature of attending to others' pain online. Attending to others' pain elicited significantly stronger collective attention ratings than attending non-painful content online, corroborating the idea that pain amplifies shared experiences. Chapter 4 then explores processes associated with collectively attending to others' pain in in-person contexts, knowledge of which was used to inform subsequent online studies. The chapter includes Study 3A, which was used to develop a shared

identity prime sufficient to evoke a minimal relational connection among co-attendees in Study 3B. Study 3B, also included in the chapter, was dedicated to identifying processes associated with collectively attending to others' pain in person. Cognitive resource allocation, perceived emotional synchrony, and moral salience were identified as potential mediators of affiliation among those who collectively attend to others' pain. Chapter 5 contains a final experimental study (*manuscript* Study 2), which subsequently sought to quantify the extent to which collectively attending to others' pain promotes affiliation among co-attendees in online contexts and identify relevant mediating mechanisms. As proposed, collectively attending to others' physical and social pain indirectly promoted cohesion, interpersonal closeness, and desire to affiliate among co-attendees through perceived emotional synchrony. Yet, contrary to propositions made, collectively attending to others' physical and social pain also indirectly lessened generosity among co-attendees through moral licensing. Chapter 6 concludes this thesis with a general discussion of these seemingly contradictory findings in the context of existing literature, including reference to implications, limitations, and future directions. Given that interpersonal attachment is a fundamental human motivation, understanding how seemingly dysphoric collective experiences can be utilised to promote affiliative attitudes and behaviours has wide-ranging practical implications.

Statement of Originality

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

(Signed) (Date) 23.10.2020

Jessie Mitchell

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Publications During Candidature

Mitchell, J., Occhipinti, S., & Oaten, M. (2020). The Affiliative Power of Pain Online. *Manuscript submitted for publication.*

- This paper, reported in Chapter 5 of this thesis, contains two experimental studies. Of the two studies, one is reported elsewhere in this thesis. Specifically, Study 1 of this paper represents a brief, condensed version of a two-part study reported in its entirety as Studies 2A and 2B in Chapter 3 of this thesis.

Acknowledgement of Papers Included in this Thesis

Section 9.1 of the Griffith University Code for the Responsible Conduct of Research ("Criteria for Authorship"), in accordance with Section 5 of the Australian Code for the Responsible Conduct of Research, states:

> To be named as an author, a researcher must have made a substantial scholarly contribution to the creative or scholarly work that constitutes the research output, and be able to take public responsibility for at least that part of the work they contributed. Attribution of authorship depends to some extent on the discipline and publisher policies, but in all cases, authorship must be based on substantial contributions in a combination of one or more of:
>
> - conception and design of the research project
> - analysis and interpretation of research data
> - drafting or making significant parts of the creative or scholarly work or critically revising it so as to contribute significantly to the final output.

Section 9.3 of the Griffith University Code ("Responsibilities of Researchers"), in accordance with Section 5 of the Australian Code, states:

> Researchers are expected to:
>
> - Offer authorship to all people, including research trainees, who meet the criteria for authorship listed above, but only those people.
> - Accept or decline offers of authorship promptly in writing.
> - Include in the list of authors only those who have accepted authorship
> - Appoint one author to be the executive author to record authorship and manage correspondence about the work with the publisher and other interested parties.

- Acknowledge all those who have contributed to the research, facilities or materials but who do not qualify as authors, such as research assistants, technical staff, and advisors on cultural or community knowledge.
- Obtain written consent to name individuals.

Included in this thesis is a paper in Chapter 5 which was co-authored with other researchers. My contribution to the co-authored paper is outlined at the front of the relevant chapter. The status for this paper, including all authors, are:

- Chapter 5: Mitchell, J., Occhipinti, S., & Oaten, M. (2020). The Affiliative Power of Pain Online. *Manuscript submitted for publication.*

Appropriate acknowledgements of those who contributed to the research but did not qualify as authors are included in the paper.

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Chapter 1

Shared Pain and Interpersonal Affiliation

In 2017, a tearful Jimmy Kimmel used his television show's monologue to emotionally recount the "terrifying" experience of nearly losing his newborn son. Kimmel told the studio audience how his son's routine birth suddenly turned frightening when a test showed that he required open-heart surgery. Kimmel described the surgery as "the longest three hours of my life." The monologue was subsequently posted to the video-sharing website YouTube. It has since been viewed over 13 million times, been liked by over 300,000 people, and attracted over 18,000 comments (Jimmy Kimmel Live, 2017). As in this instance, pain is seldom endured alone but rather frequently manifested in environments where it commands our collective attention (Hadjistavropoulos et al., 2011). Moreover, pain manifested in contemporary online contexts can command the collective attention of sometimes millions of online users. Collective attention to others' pain online, in particular, its effects on interpersonal relations among co-attendees and the mechanisms that account for these effects are the subject of this thesis.

Shared experiences increase interpersonal liking (Pinel et al., 2006), social closeness (Haj-Mohamadi et al., 2018; Wolf et al., 2016; Wolf & Tomasello, 2020), and conformity (Pinel et al., 2010). However, consistent with the greater power of bad over good (Baumeister et al., 2001), shared experiences appear to be particularly powerful in facilitating interpersonal affiliation when they involve pain. Bonding and cooperation have been reported among those who share personal experiences of physical pain (e.g., Bastian, Jetten, & Ferris, 2014; Bastian et al., 2018). Cohesion, generosity, and honesty have also been reported among those who merely attend to others' physical pain during collective rituals (Mitkidis et al., 2017; Xygalatas, Mitkidis, et al., 2013). In a similar

vein, affiliative outcomes such as group-based identification and cooperation have been reported among those exposed to social pain (e.g., Ouwerkerk et al., 2005; Schmitt & Branscombe, 2002). Still, understanding of the circumstances under which shared pain influences interpersonal relations remains limited. As a result, understanding of how collectively attending to others' pain influences relations among those with whom it is attended is missing from current discourse. During the collective attention state, individuals who attend to a common manifestation of pain perceive themselves and co-attending others as a unified agent with a singular attentional focus (Shteynberg, 2015). As presented in this thesis, one possibility is that collectively attending to others' pain is a unique form of shared experience that promotes affiliative attitudes and behaviours among co-attendees, bonding them together across a range of contexts. The construct of affiliation being used to refer to processes by which individuals involve themselves in interpersonal bonds (Feldman, 2012; Merriam-Webster, n.d.). In online contexts, where manifestations of pain are attended to collectively by countless online users, such an effect has the potential to facilitate large-scale bonding. To this end, the primary aim of this thesis is to explore the extent to which collectively attending to others' pain, both physical and social, promotes affiliative attitudes and behaviours among those with whom it is attended in online contexts.

There are a number of possible accounts of why collectively attending to others' pain should be expected to promote interpersonal affiliation. Mechanisms relevant to this discussion include those extending from theories of shared attention (Shteynberg, 2015, 2018), differing modes of religiosity (Whitehouse, 2004), cognitive dissonance (Aronson & Mills, 1959; Festinger, 1959), costly signalling (Irons, 1996), self-categorisation (Drury & Reicher, 2005, 2009), synchronised affect (Durkheim, 1915; Fischer et al., 2014; Konvalinka et al., 2011; Xygalatas et al., 2011), and moral

cleansing (Mitkidis et al., 2017; Shariff & Norenzayan, 2007). Notably, these mechanisms are not mutually exclusive and may function differently across affiliative outcomes. As presented in this thesis, it is likely that attending to a common manifestation of pain aligns multiple cognitive and affective processes among co-attendees. Therefore, the secondary aim of this thesis is to identify mechanisms that account for the proposed effects of collectively attending to others' physical and social pain on affiliation among those with whom it is attended online.

In achieving both aims, this thesis will offer new insight into a broad range of phenomena currently under empirical investigation. For example, this thesis will offer new insight into human pain and its impact on interpersonal affiliation in the context of contemporary online culture. The desire for interpersonal attachment is a fundamental human motivation that extends across cultures and social contexts (Baumeister & Leary, 1995). Social connection is associated with improved health and well-being (Jetten et al., 2011), as well as decreased depression and distress (Brook et al., 2008; Iyer et al., 2009). As a result, understanding interpersonal affiliation and its antecedents has wide-ranging practical implications, including untapped resources for social change (Buhrmester et al., 2018; Whitehouse et al., 2013).

Pain as *Social Glue*

The International Association for the Study of Pain Task Force Taxonomy (1994) defines pain as an "unpleasant sensory and emotional experience arising from actual or potential tissue damage, or described in terms of such damage" (p. 210). This widely adopted definition is most commonly used to refer to physical pain that arises from nociception, the stimulation of nerve fibres that convey information about potential tissue damage to the brain (The International Association for the Study of Pain Task Force on Taxonomy, 1994). However, beyond a physically mediated phenomenon,

pain is a largely subjective experience that can also arise from stimuli unrelated to nociception. Socially unpleasant experiences are also termed as painful (DeWall, Webster, et al., 2010; Eisenberger & Lieberman, 2004; MacDonald & Leary, 2005; Panksepp et al., 1980) due to the importance of social connection for human survival (Baumeister & Leary, 1995). In contrast to physically mediated pain, social pain is defined as an unpleasant emotional experience arising from perceived distance from desired relationship partners or groups. As such, socially mediated pain commonly arises from exclusion or devaluation by desirable others (Eisenberger & Lieberman, 2004; MacDonald & Leary, 2005). Pain, in its various forms, has traditionally been regarded as an aversive experience to be reduced or eradicated (Global Industry Analysts, 2012). However, evidence continues to suggest that pain is, in fact, also associated with positive biological, psychological, and social outcomes (for a review see Bastian, Jetten, Hornsey, et al., 2014). Among these wide-ranging outcomes is interpersonal affiliation among those who share experiences of pain.

Physical Pain

A growing body of literature suggests that shared physical pain, in particular, acts as a social glue. Numerous accounts exist of camaraderie among soldiers during war (Elder & Clipp, 1989; Whitehouse, 2012; Whitehouse et al., 2017) and athletes bonded within painful sporting contexts (Downey, 2007; Turner & Wainwright, 2003; Whitehouse et al., 2017). Many accounts also exist of survivors fused together following large-scale destruction, including natural disasters (Rodríguez et al., 2006; Vezzali et al., 2016) and terrorist attacks (Drury et al., 2009; Jong et al., 2015). Corroborating empirical research suggests that sharing physically painful experiences (i.e., cold pressor task, leg squats, eating chilli) as compared to functionally similar non-painful experiences leads to increased bonding and cooperation among strangers

(Bastian, Jetten, & Ferris, 2014). Additional empirical research shows that sharing physically painful experiences (i.e., eating chilli) as compared to non-painful experiences increases eye contact, talking, comfort, cohesion, helping, encouragement, contribution, and cooperation in novel teams (Bastian et al., 2018). These affiliative responses operate in contexts where no prior group memberships or identities are salient. As a result, they emerge directly from the experience of pain rather than from alternate group processes such as pain for the group (Aronson & Mills, 1959; Olivola & Shafir, 2013) or perceptions of common fate (Brewer & Kramer, 1986; Campbell, 1958). In sum, the act of sharing physical pain appears to foster a supportive environment in which individuals are motivated to affiliate. Notably, pain does not necessarily need to be experienced personally to bond people together.

Behavioural manifestations of pain alert nearby others to potential proximal threats to physical safety (Craig, 2009; Craig et al., 2010; Eccleston & Crombez, 1999; Hadjistavropoulos et al., 2011; Yamada & Decety, 2009) and social connection (Eisenberger, 2011; MacDonald & Leary, 2005). Consequently, pain interrupts, distracts, and demands the individual attention of the sufferer as well as the collective attention of other social agents (Crombez et al., 1997; Eccleston & Crombez, 1999). According to anthropological research, the collective experience of attending to others' pain is sufficient to motivate co-attendees to affiliate. For over 150,000 years, collective rituals have included the performance of causally opaque, socially stimulated, and painful practices in the presence of interested attendees (Legare & Souza, 2012; Watson-Jones & Legare, 2016; Wen et al., 2016; White et al., 2003). For example, in the Hindu ritual festival of Thaipusam, thousands gather to witness a myriad of metal spikes thrust into the skin and organs of ritual performers (Kirby, 1997). Although painful practices such as these appear to entail excessive costs without benefit,

anthropologists have speculated that they serve the evolutionary purpose of extending mutually enhancing cooperative commitments among related partners (Durkheim, 1915; Fischer & Xygalatas, 2014; Henrich, 2009; Irons, 1996; Morinis, 1985; Norenzayan & Shariff, 2008; Sosis & Bressler, 2003; van Gennep, 1960).

Field studies more specifically report that performers and attendees of high-intensity rituals (i.e., extensive body piercing, carrying, dragging heavy structures) express significantly more inclusive social identities and donate significantly more to collective causes than performers of low-intensity rituals (i.e., collective prayer), with perceived pain positively related to donation among performers and attendees of high-intensity rituals (Xygalatas, Mitkidis, et al., 2013). These affiliative responses are notably directed towards co-attendees and, therefore, appear to be more generalised than empathy evoked altruism, which is aimed specifically at reducing the suffering of those in pain (Batson et al., 1987; Craig, 2009; Williams et al., 2002). Field studies also report that physically painful rituals (i.e., extensive body piercing, carrying heavy structures, sword walking) promote honesty among ritual attendees but not among ritual performers (Mitkidis et al., 2017). As a result, affiliation expressed by attendees appears to be separate from interpersonal bonding felt by individuals who share first-hand experiences of pain. Rather, together these findings suggest that merely attending to others' physical pain without experiencing it personally is sufficient to promote affiliation among those with whom it is attended. However, collective rituals exist within a cultural context and bring to mind long-standing aspects of group life. As a consequence, the study of pre-existing collective rituals has limited the extent to which causal claims can be made about the interpersonal effects of collectively attending to others' pain (Hobson et al., 2017). Still, it is plausible that collectively attending to

others' physical pain promotes interpersonal affiliation among those with whom it is attended in non-ritualised contexts, as does sharing personal, first-hand experiences.

Social Pain

Evidence further exists for interpersonal affiliation among those exposed to social pain. Many classic accounts exist of fusion among individuals who are embarrassed during trials of initiation (Aronson & Mills, 1959; Gerard & Mathewson, 1966; Keating et al., 2005; Whitehouse et al., 2017). Several accounts also exist of camaraderie among soldiers who share not only physical hardship but also emotional trauma during war (Elder & Clipp, 1989; Whitehouse, 2012; Whitehouse et al., 2017). Compelling evidence further extends from empirical studies showing that individuals who experience social exclusion feel greater group-based identification (Schmitt & Branscombe, 2002), have increased sensitivity to social information (Gardner et al., 2000), conform more to others' opinions (Williams et al., 2002), cooperate more with others (Ouwerkerk et al., 2005), work harder in group settings (Williams & Sommer, 1997), allocate higher cash awards to others (Maner et al., 2007), and exhibit more mimicry (Lakin & Chartrand, 2003) in comparison to individuals who are included. In a similar vein, exposure to socially induced stress has been shown to increase trust, trustworthiness, and sharing behaviour in social interactions (Tomova et al., 2017; von Dawans et al., 2012). Together, these findings indicate that exposure to social pain is sufficient to motivate individuals to recruit affiliative strategies. However, some researchers have reported that only when an opportunity is available to repair existing relationships or make new social connections do individuals respond affiliatively to social pain (Chester et al., 2016; Cuadrado et al., 2015; DeWall & Richman, 2011; Smart Richman & Leary, 2009). For example, in the aftermath of rejection, individuals are thought to experience a heightened desire for social connection that motivates them

to use affiliative strategies to connect with others they perceive as likely to offer acceptance and support (Smart Richman & Leary, 2009). It follows that individuals who collectively attend to others' social pain may also experience a heightened desire for social connection. Further, that individuals who collectively attend to others' social pain perceive greater opportunity for connection given their knowledge of co-attendees and are, therefore, similarly motivated to use affiliative strategies to connect with one another.

Online Contexts

In sum, evidence from a diverse range of literature points to the social-glue-like effects of both physical and social pain. Of note, the majority of literature available is premised on the physical co-presence of those who personally experience and attend to pain. Yet, there is an increasing trend for fewer in-person interactions and more technology-mediated online interactions (Lieberman & Schroeder, 2020). The last several decades have seen the development of new technologies for social connection, including mobile phone calls, video calls, messaging, email, social media, video sharing, and multiplayer gaming (Baym, 2010). Although similarities have been reported between face-to-face and technology-mediated communication (Derks et al., 2007), the transition to technology-mediated interaction has fundamentally changed the way humans affiliate (Lieberman & Schroeder, 2020). Online technologies allow people to communicate more frequently without being physically proximate to what was previously prohibitively large groups. In doing so, online technologies blur the boundaries between interpersonal and mass communication (Baym, 2010). Pain that was once shared only with nearby others is now also shared publicly online and commands the collective attention of numerous online users (Chou et al., 2011; Egan & Moreno, 2011; Egnoto et al., 2014; Heaivilin et al., 2011; Jashinsky et al., 2014;

Moreno et al., 2011). Online technologies also increase accessibility to curated content (Lieberman & Schroeder, 2020). Television shows and movies, many of which normalise trauma (Rothe, 2011), can be streamed on-demand and are increasingly binge-watched (Flayelle et al., 2019; Steiner & Xu, 2018). Similarly, digital news media has joined traditional print and television news (Shearer, 2018), saturating viewers with suffering from across the globe (Chouliaraki, 2010; Moeller). Arguably, immersed in social media, streaming services, and breaking news, we collectively attend to others' pain to an unprecedented degree. Building upon established links between shared experiences of pain and interpersonal affiliation, the primary aim of this thesis is to explore the effects of attending to others' pain on affiliation among those with whom it is attended online. I propose an as yet unexplored effect in which collectively attending to others' physical and social pain is sufficient to promote affiliative attitudes and behaviours among co-attendees to a greater extent than collectively attending to similar non-painful content in online contexts. In comparison to pain attended to in-person, pain attended to online has the potential to bond together people more frequently and on larger scales than ever before.

Explanatory Accounts

There are various mechanisms through which the experience of pain is known to motivate individuals to affiliate. In reviewing mechanisms from shared attention, anthropological, and wider social psychological literature, several explain why collectively attending to others' pain should promote affiliative attitudes and behaviours among those with whom it is attended.

Shared Attention

To begin, empirical studies consistently demonstrate that individuals' devote more cognitive resources to stimuli that is the subject of collective attention than to

stimuli attended to alone (Eskenazi et al., 2013; He et al., 2011; Shteynberg, 2010; Shteynberg et al., 2013). When attendees prioritise co-attended stimuli, they create mutual knowledge, which enhances their ability to understand one another in the moment (Clark, 1985; Krauss & Fussell, 1990; Mead, 1934) and allows for the emergence of shared attitudes and beliefs (Echterhoff et al., 2009). Perceptions of collective attention also result in greater cognitive processing via simulation of co-attendees' perspectives (Boothby et al., 2014; Clark et al., 2017; Nahleen et al., 2019; Smith & Mackie, 2016). In these ways, prioritisation of collectively attended experiences is thought to establish a basis for future social interaction among co-attendees. Yet, considered alone, this line of reasoning offers limited insight into the predicted effects of collectively attending to painful stimuli as compared to non-painful stimuli. One possibility is that shared pain is a particularly powerful form of shared experience because of its capacity to command attention (Crombez et al., 1997; Eccleston & Crombez, 1999).

Imagistic Rituals

This interpretation aligns with the concept of imagistic rituals, which are classified as infrequent but highly arousing. According to the modes of religiosity theory, imagistic rituals prompt considerable personal reflection and evoke strong emotions to be stored in episodic memory. When imagistic rituals elicit high dysphoric arousal, such as when pain is involved, reflection is extensive and resulting memories are particularly vivid. Moreover, memories are thought to involve who was present during the ritual, establishing a basis for interpersonal bonds among attendees (Atkinson & Whitehouse, 2011; Whitehouse, 2004, 2005; Whitehouse & Lanman, 2014).

To illustrate, experimental studies have shown that ritual performers with strong emotional reactions exhibit greater and deeper reflection on their ritual experiences

compared to performers who experience little emotional arousal. Further, personal reflection has been shown to be greatest when rituals are classified as dysphoric (Richert et al., 2005; Russell et al., 2016; Xygalatas, Schjoedt, et al., 2013). The act of attending to others' pain has been similarly linked to the formation of enduring episodic memories across various non-ritualised contexts (Christiansen & Nilsson, 1989; Conway, 1995; Gold, 1992; LeDoux, 1992; Mishkin & Appenzeller, 1987; Yuille & Cutshall, 1986). In addition, reflection upon dysphoric experiences has been linked to identity fusion among those with whom the experience is shared. For example, Northern Irish Republicans and Unionists who endured greater suffering as a member of their group (e.g., bodily assault, verbal attacks, public humiliation) were reported to reflect more about their experiences and, in turn, feel more fused with their group (Jong et al., 2015). Further, experimental manipulation of the salience of the 2013 Boston Marathon Bombings was reported to increase state levels of identity fusion among Bostonians who experienced the bombings negatively (Jong et al., 2015). Similar effects have been reported even in instances where dysphoric stimuli are attended to online by geographically dispersed individuals and have no measurable material impact on attendees' lives (i.e., death of a lion; Buhrmester et al., 2018). There is, therefore, considerable evidence to suggest that dysphoric collective experiences lead to interpersonal bonding among co-attendees via extensive self-reflection. Although this evidence is largely correlational, greater cognitive processing of dysphorically arousing experiences offers one promising explanation for why greater affiliation should be expected among those who collectively attend to others' pain as compared to less arousing stimuli.

Cognitive Dissonance

A widely accepted explanation for why individuals respond positively to groups for who they engage in painful practices is cognitive dissonance (Aronson & Mills, 1959; Cialdini, 2001; Festinger, 1959). From this view, painful initiation rituals arouse dissonance in individuals who participate in activities that violate their self-conceptions (Aronson & Mills, 1959). Dissonance is subsequently mitigated by either cognitively diminishing the negative aspects of initiation practices, overvaluing the group, or both (Aronson & Mills, 1959). In this way, attempted dissonance reduction accounts for the liking of groups who impose painful initiation practices. Laboratory studies show that both physically painful and socially discomforting initiation practices increase the perceived attractiveness and liking of group members (Gerard & Mathewson, 1966), as well as increase social dependence on group opinion (Keating et al., 2005). Thus, dissonance reduction offers a credible explanation of why paying a more severe cost to join a group should increase affiliation towards members of that group. However, it makes less sense in the context of affiliation expressed among individuals who merely attend to others' pain in novel social contexts.

Costly Signalling

An alternate explanation of the evolution of painful ritual practices is costly signalling. According to theories of costly signalling, ritual performance serves as outward evidence of commitment to shared beliefs and signals future cooperation. In doing so, ritual performance reinforces cooperative norms and promotes trust among ritual attendees (Henrich, 2009; Irons, 1996; Norenzayan & Shariff, 2008; Sosis, 2003; Sosis & Alcorta, 2003; Sosis & Bressler, 2003). Signals are considered reliable to the extent that they are difficult to fake by potential freeloaders (Norenzayan & Shariff, 2008), making painful ritual practices particularly effectual. In this vein, empirical

research shows that costly signals (e.g., fire-walking, seclusion, celibacy) are associated with favourable perceptions of group members (Hall et al., 2015; Power, 2017), cooperation within groups (Soler, 2012; Sosis & Alcorta, 2003), and group longevity (Sosis & Bressler, 2003). However, the usefulness of costly signalling as an explanation for affiliation among those who attend to others' pain appears to be limited to religious contexts. To date, many studies conducted either neglect or fail to find support for the role of costly signalling in secular groups (Sosis & Bressler, 2003). One explanation offered for this discrepancy is that religious rituals internalise ideologies that promote affiliation and support beliefs in supernatural punishment for deviating from community norms in a way that secular rituals do not (Sosis & Ruffle, 2004). Still, field observations suggest that numerous secular groups (Cialdini, 2001) and even some animal species (Watanabe & Smuts, 1999) benefit from costly practices. As a result, though a mechanism through which the experience of pain motivates individuals to seek affiliation, costly signalling offers an incomplete explanation for affiliation among those who attend to others' pain in secular contexts.

Self-Categorisation

Another account of affiliation motivated by shared painful experiences centres on self-categorisation. Self-Categorisation Theory (Turner et al., 1987) describes processes in which individuals define themselves in terms of shared social category membership, leading to an accentuation of intragroup similarities and intergroup differences. The Elaborated Social Identity Model of crowd behaviour (ESIM; Drury & Reicher, 2005, 2009) further posits that feeling and acting as part of a crowd operates through self-categorisation. Specifically, individuals participating in collective experiences categorise themselves with the other attendees in terms of context-relevant features, perceptions of common fate, or awareness of shared external threat (i.e., in

contrast to a passive audience or an out-group). This change in self-categorisation accounts for the transformation of an aggregate of individuals into a psychologically unified and socially cohesive crowd. However, self-categorisation has attracted little favour as an explanation for affiliation following shared painful experiences. Some research has suggested that the relational shift associated with self-categorisation may, in turn, lead to an emotional transformation (Neville & Reicher, 2011; Reicher, 2012). On this basis, a convincing argument can be made that the process of shared emotions explains the reinforcement of social identity and cohesion above self-categorisation, particularly in instances where shared experiences are painful (Páez et al., 2015).

Interpersonal Synchrony

In this connection, Durkheim (1915) famously proposed that collective experiences create an emotional state of *collective effervescence* that minimises individual distinctions and emphasises unity. It has since been theorised that attending to the focal event of a ritual synchronises attendees' relevant cognitive, emotional, or physiological states and in doing so generates a sense of unity among them (Fischer et al., 2014; Konvalinka et al., 2011; Xygalatas et al., 2011). Field studies support the presence of synchronous emotional arousal, in particular, among attendees of painful collective rituals. Data from collective fire-walking rituals suggests that attendees experience increased fatigue (Fischer et al., 2014) and fine-grained commonalities in heart-rate dynamics with related performers (Konvalinka et al., 2011; Xygalatas et al., 2011). These changes indicate an associated empathic response to pain endured by ritual performers that operates irrespectively of personal activity. Further, attendance at negatively valenced collective gatherings (e.g., socio-political protest demonstrations, anti-racism campaigns) has been found to strengthen collective identity, identity fusion, and social integration via the perception of emotional synchrony (Páez et al., 2007; Páez

et al., 2015). Notably, collective attention to intense negative emotional stimuli strengthens social ties independently of actively sharing one's experiences or disclosing one's feelings to others (Rennung & Göritz, 2015). Evidence suggests that people are likely to assume the alignment of their own affective reaction with the affective reaction of those around them (Ross et al., 1977). In this way, emotional states are automatically spread from person to person, creating the perception of consensus in the absence of physical proximity. In this connection, a growing body of literature supports the occurrence of digital emotion contagion, in which a perceiver's emotions become more similar to others' emotions as a result of exposure to those emotions online (for a review see Goldenberg & Gross, 2020). As a result, perceived emotional synchrony arising from negatively valenced experiences also offers a promising explanation for why affiliation should be expected among those who collectively attend to others' pain.

Moral Cleansing

A final explanation for the affiliative effects of attending to others' pain is moral cleansing. According to the concept of moral cleansing, attending to others' pain serves as a moral reminder that makes moral concepts more salient (Bastian et al., 2011; Shariff & Norenzayan, 2007; Shu et al., 2012). By extension, the activation of moral concepts is argued to prompt attendees to act prosocially to achieve moral purification (Hwang, 2015; Shariff & Norenzayan, 2007; van Bunderen & Bastian, 2014). For example, Mitkidis et al. (2017) reported that attendees of painful ritual practices act more honestly by reporting lower outcomes in die-roll tasks and, therefore, collecting lower economic payoffs after as compared to before rituals. The authors subsequently concluded that observing painful rituals works as a moral reminder that motivates individuals to cleanse themselves by acting morally. Indeed, numerous links have been made between the experience of pain and the perception of morality (Bastian et al.,

2011; Inbar et al., 2013; Nelissen, 2011; Nelissen & Zeelenberg, 2009; Rothschild et al., 2015). However, although the embodiment of morality has attracted considerable empirical attention (see also Brandt & Reyna, 2011; Liljenquist et al., 2010; Schnall et al., 2008; Zhong & Liljenquist, 2006), the mediating role of moral cleansing has been less well explored. Still, moral cleansing offers another theoretically plausible explanation for why affiliative responses should be expected among those who collectively attend to others' pain.

Parallel Mediators

In sum, several accounts offer promising explanations for why merely collectively attending to others' pain should be expected to promote affiliation among those with whom it is attended, including those extending from theories of differing modes of religiosity, synchronised affect, and moral cleansing. Notably, these accounts are not mutually exclusive. Further, it is unlikely that any single mechanism accounts for affiliation among those who collectively attend to others' pain. To this end, it is the secondary aim of this thesis to identify mechanisms that account for the proposed effects of collectively attending to others' physical and social pain on affiliation among those with whom it is attended online. In this connection, I propose several cognitive and affective processes described in the reviewed accounts likely offers the most complete explanation for predicted effects. To date, little effort has been made to directly compare mechanisms through which the experience of pain motivates individuals to affiliate.

Thesis Overview

Facilitated by online technologies, pain continues to interrupt, distract, and demand our collective attention. As such, this thesis began with an overview of the interpersonal effects of shared pain and the mechanisms that serve to promote them. As

presented in this chapter, the primary aim of this thesis is to explore the extent to which attending to others' pain promotes affiliation among those with whom it is attended in online contexts. I propose that the experience of merely attending to others' physical and social pain online promotes affiliative attitudes and behaviours among individuals with whom it is attended to a greater extent than shared non-painful online experiences. The secondary aim of this thesis, also presented in this chapter, is to identify the mechanisms that account for these predicted effects. In this connection, I suggest that affiliation expressed among those who collectively attend to others' pain is accounted for by multiple cognitive and affective processes. To achieve both aims of this thesis, test predictions outlined, and address current gaps in understanding, I conducted a series of experimental studies across both in-person and online contexts. These studies are contained in the remaining chapters of this thesis.

First, pain narratives online take both written and video forms. Study 1, which is reported in Chapter 2 of this thesis, was dedicated to creating a stimulus set of written- and video- vignettes depicting painful and non-painful real-world experiences for use in subsequent experimental studies. Second, there are few existing empirical accounts of collective attention to others' pain online. Studies 2A and 2B, which are reported in Chapter 3, were therefore dedicated to evidencing the phenomenon of pain collectively attended to online. Study 2A was specifically dedicated to participants' usual engagement with online videos. Study 2B was subsequently dedicated to comparing participant engagement with online videos depicting physically painful, socially painful, and non-painful experiences. Third, existing empirical evidence speaks most commonly to the social-glue-like effects of pain among physically proximate and often relationally connected individuals. As a consequence, Study 3B, which is reported in Chapter 4, was designed to explore cognitive and affective processes associated with collective

attention to others' pain in an in-person context. Understanding of these processes was used to develop subsequent studies dedicated to examining collective attention to others' pain in online contexts. A shared identity prime adapted from that developed in Study 3A, also reported in Chapter 4, was used to evoke a minimal relational connection among co-attendees. Finally, the interpersonal effects of collectively attending to others' pain on relations among co-attendees in online contexts remain unexplored. Consequently, Chapter 5 of this thesis contains a final study (*manuscript* Study 2) that sought to quantify the extent to which collectively attending to others' pain promotes affiliative responses among co-attendees online and identify the mechanisms that serve to promote them. To conclude this thesis, Chapter 6 contains a general discussion of reported findings in the context of existing literature, including reference to relevant implications, limitations, and future directions.

Chapter 2

Study 1: Pain Vignettes

Pain is manifested online in various forms (Chou et al., 2011; Egan & Moreno, 2011; Egnoto et al., 2014; Harrison et al., 2014; Heaivilin et al., 2011; Jashinsky et al., 2014; Moreno et al., 2011; Ressler et al., 2012). In preparation for subsequent studies conducted as part of this thesis, Study 1 was intended to create a stimulus set of online vignettes depicting pain and, in doing so, compare responses to vignette methodologies. Vignettes being short, carefully constructed descriptions of persons, objects, or experiences (Atzmüller & Steiner, 2010; Finch, 1987), comparable to pain narratives attended to in real-world online contexts.

Vignette Methodologies

To date, there has been little empirical research in the field of psychology directly comparing the reliability and validity of vignette methodologies. From an experimental perspective, written-vignettes are favoured for the high degree of experimental control they engender through precise manipulation of variables and selective representation of information (Blascovich et al., 2002; Braspenning & Sergeant, 1994; Sleed et al., 2002). However, written-vignettes are only able to convey limited information to participants, particularly with regards to contextual information (Sleed et al., 2002). Perhaps, for this reason, written-vignettes have been found to be less easily retained and remembered than observed behaviour (Kinicki et al., 1995). In comparison, video-vignettes are often less economical (e.g., time, money; Sleed et al., 2002) and are acknowledged to introduce potentially extraneous variables (Blascovich et al., 2002; Sleed et al., 2002). Yet, the audio-visual nature of video-vignettes is purported to encourage participant engagement, increase participant sensitivity to manipulations, and elicit responses more representative of real-world contexts

(Blascovich et al., 2002; Sleed et al., 2002; Stott & Reicher, 1998). In this connection, preliminary evidence suggests that in some instances, video-vignettes elicit more empathic responses to aversive experiences than written-vignettes (i.e., sexual assault; Sleed et al., 2002). On this basis, it was hypothesised that painful experiences depicted via video-vignette would elicit significantly more intense pain ratings as well as significantly more state empathy and personal distress than painful experiences depicted via written-vignette.

Method

Participants

A convenience sample of 37 undergraduate students (22 female, 15 male; M_{age} = 28.59 years, $range_{age}$ = 18–62 years) was recruited through the Griffith University Psychology Subject Pool and remunerated with course credit. As a condition of ethical approval, those who did not wish to read stories or watch videos depicting pain were advised not to participate in the study (Griffith University Human Ethics Committee Reference Number: 2012/278).

Design

Two physically painful experiences, three socially painful experiences, and two non-painful experiences were depicted via both written- and video- vignette, resulting in a 2 (vignette methodology: written, video) x 7 (experience: facial impalement, broken bone, loss of child, loss of parent, loss of parent, fishing, snowboarding) repeated measures design.

Materials and Measures

Vignettes

Video-vignettes depicting real-world experiences were sourced from the video-sharing website YouTube to create a stimulus set representative of pain attended to in

everyday life. As in previous research (Danziger et al., 2006; Westbury & Neumann, 2008), this approach to sourcing vignettes was adopted to address the threat to external validity posed by depicting artificially constructed experiences. Efforts were made to match video-vignettes as closely as possible. All video-vignettes depicted a single principal actor, who was matched on race and gender, then allocated a generic name (i.e., Caucasian male; Defrina et al., 2009). Video-vignettes depicting pain were further matched on the intentionality of pain experienced by actors (i.e., experienced as the result of some misfortune; Gray & Wegner, 2008). Once they had been sourced, video-vignettes were edited using the video-editing software iMovie. A brief description of the experience depicted was included at the beginning of each video-vignette to minimise participant confusion. Video-vignettes ranged between 1:09 and 1:14 minutes in length (M_{length} = 1:11 minutes). Two independent judges assessed video-vignettes to ensure that they were comparable in quality (e.g., audio, visual) and that painful experiences depicted were comparable in intensity. Video-vignettes were subsequently transcribed to form written-vignettes. All video-vignettes were transcribed in a descriptive but neutral linguistic style, with both behaviour and dialogue described as accurately as possible. Written-vignettes ranged between 147 and 153 words in length (M_{length} = 150 words). Again, two independent judges assessed written-vignettes to ensure that experiences were depicted with comparable detail and emotionality to corresponding video-vignettes. Brief descriptions of each vignette can be found in Table 1, while full vignettes can be found in Appendix A.

Table 1

Brief Descriptions of Written- and Video- Vignettes in Study 1

Experience	Description
Physical pain	
Facial impalement	Mike recently fell off his motorcycle. When he fell, a piece of tree branch pierced through Mike's cheek. The branch was approximately 2.5 centimetres in diameter.
Broken bone	James was practising jumps on his skateboard, when he broke his right leg. James had to be airlifted to hospital due to the severity of his injury.
Social pain	
Loss of child	Ben and his wife had a young daughter. Ben's daughter recently passed away. Following the loss of his daughter, Ben was consumed by grief.
Loss of parent	Brad's father recently had brain aneurysm and passed away. Brad and his father were very close. Losing his father was a very difficult experience for Brad.
Loss of parent	Chris's father was diagnosed with lung cancer last year and passed away. Chris and his father were very close. Chris was devastated by his father's death.
No-pain	
Fishing	Sam recently went fishing in his kayak at a lake popular for freshwater bass fishing. Sam caught two freshwater bass while he was fishing.
Snowboarding	Alex recently went on a snowboarding holiday. On the first day of the holiday, Alex and one of his friends decided to go snowboarding together.

Attention

Lack of participant diligence has been found to increase noise and decrease statistical power (Oppenheimera et al., 2009). On this basis, a question pertaining to the experience depicted in each vignette was used to monitor participant diligence. Participants were instructed: "think about the experience depicted in the (video you just watched/story you just read). Select the option below which best describes the experience." Responses were presented in multiple-choice format (e.g., fishing, snowboarding, skateboarding).

Pain Intensity

In a four-item measure of generalised pain intensity, participants rated the intensity, painfulness, unpleasantness, and enjoyableness of the experience depicted in each vignette (0 = *not at all*, 10 = *extremely*; α = .96; e.g., Bastian, Jetten, & Ferris, 2014; Bayet et al., 2014; Price et al., 1983). Pain intensity was also measured using the Faces Pain Scale - Revised (FPS-R; Hicks et al., 2001). The single-item scale contains pictorial human faces distributed across a 6-point scale, with higher ratings indicating more intense pain (0 = *no pain at all*, 5 = *extreme pain*). Participants were instructed: "think about (name) and his experience in the (story you just read/video you just watched). Select the face below which best depicts how you think he felt."

Pain Nature

Participants rated the extent to which each vignette actor felt both physical pain and emotional pain to confirm the nature of pain depicted (1 = *not at all*, 7 = *a great extent*; e.g., Bruneau et al., 2013; Bruneau et al., 2012). The term emotional pain was specifically used as it encompasses affective responses to both physical and social pain (MacDonald & Leary, 2005).

State Empathy and Personal Distress

Following previous research (Batson et al., 1997; Batson et al., 1987; Batson & Shaw, 1991), six adjectives were used to measure state empathy in response to each vignette (compassionate, moved, sympathetic, soft-hearted, tender, warm; α = .97) and eight adjectives were used to measure state personal distress in response to each vignette (alarmed, grieved, troubled, distressed, upset, disturbed, worried, perturbed; α = .97; 1 = *not at all*, 7 = *extremely*).

Disgust

As some vignettes depicted graphic physical injury, participants rated the extent to which they felt disgust in response to each vignette (1 = *not at all*, 7 = *extremely*).

Personal Experience

Participants responded to several questions about their personal experiences as they pertained to each vignette. Participants were asked whether they or someone close to them had had a similar experience to the one depicted in each vignette. Participants were also asked whether they had previously seen, read, or heard about each vignette actor or previously seen, read, or heard about each vignette. Responses were presented to participants in a multiple-choice format (e.g., yes, no, don't know).

Demographic Information

Participants were asked to provide general demographic information, including their gender, year of birth, employment status, ethnic background, religious affiliation, and religious service attendance.

Procedure

Study 1 was conducted in person at a Griffith University campus. Upon arrival to the study, each participant was seated at a computer. Participants were spaced so as to minimise distraction caused by other computer screens and persons in the room. To

begin, participants were given general study information and a pair of earphones that they were asked to use while watching video-vignettes. Subsequent study materials were presented to participants in an online questionnaire which was programmed using the survey tool Qualtrics. In the questionnaire, participants were first presented with a participant information sheet and consent form. Participants were then presented with all 14 vignettes in randomised order. Each vignette was preceded by the instruction: "please (read the story/watch the video) below of (name)." On the page following each vignette, participants were presented with an attention check as well as measures of pain intensity, pain nature, state empathy, state personal distress, disgust, and personal experience. At the end of the questionnaire, participants were asked to provide general demographic information. Upon completion of the study, participants were remunerated with course credit. Participants were also given the opportunity to keep the earphones provided to them.

Results and Discussion

Data Screening

Four participants responded incorrectly to one of the 14 attention checks. All four failed attention checks were associated with experiences depicted via written-vignette. Of participants who failed an attention check, only one was associated with influential data and subsequently excluded from analyses (ID 6). Data were subsequently screened for violations of assumptions underlying mixed-effect models. Visual inspection of the data failed to reveal other univariate outliers at any level of the grouped data (Tabachnick & Fidell, 2013). However, violations of basic normality assumptions for grouped data were identified using the Shapiro-Wilk W statistic (1965). FPS-R ratings ($p < .01$), physical pain ratings ($p \leq .001$), emotional pain ratings ($p \leq .01$), and disgust ratings ($p \leq .001$) were skewed in expected directions across all

conditions. Generalised pain intensity ratings ($p < .01$) were also skewed in expected directions across all conditions, except for the loss of parent - Brad experience depicted via video-vignette. State empathy ratings were skewed in expected directions for the facial impalement experience depicted via video-vignette ($p = .030$), the broken bone experience depicted via written-vignette ($p = .005$), and the fishing and snowboarding experiences depicted across vignette methodologies ($p < .001$). State personal distress ratings were skewed in expected directions for the broken bone experience depicted via written-vignette ($p = .035$), both loss of parent experiences depicted via video-vignette ($p < .05$), and the fishing and snowboarding experiences depicted across vignette methodologies ($p \leq .05$). However, to facilitate the interpretation of results, data were analysed in their raw state.

Mixed-Effects Models

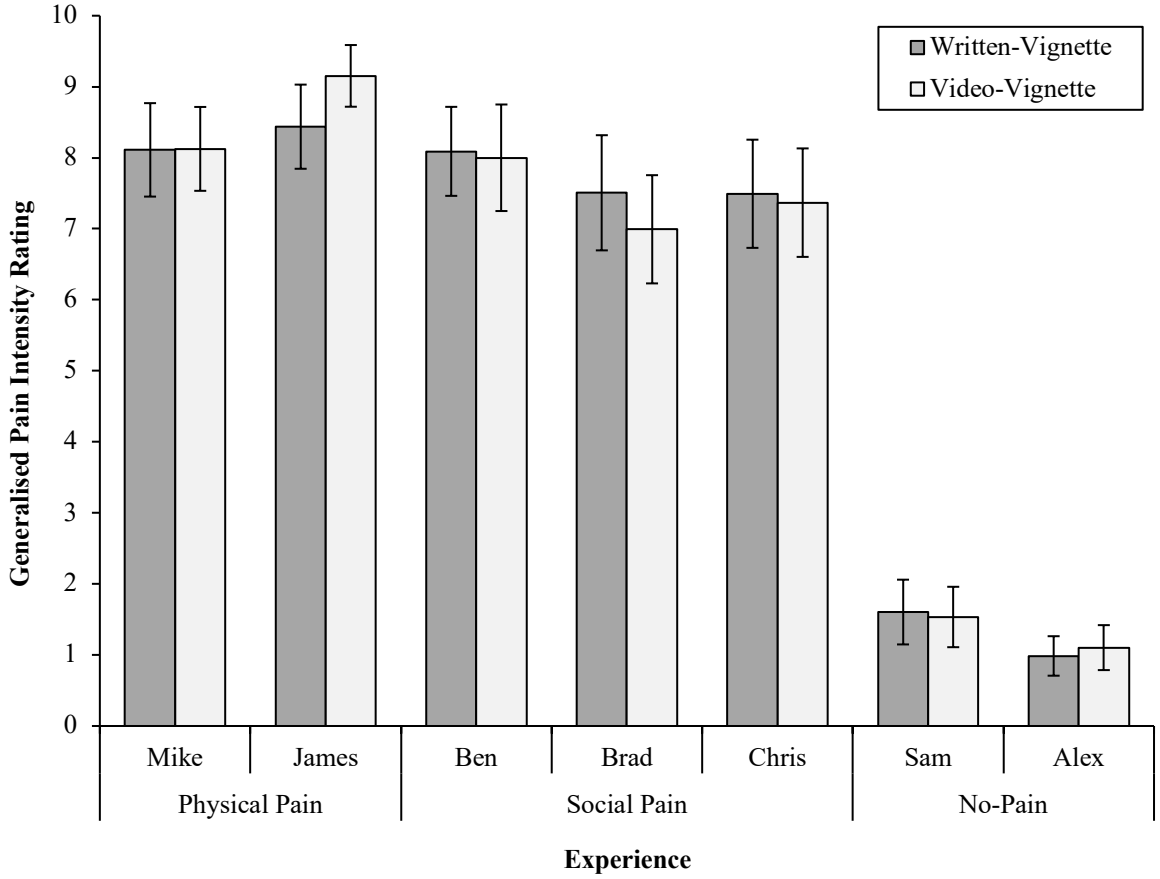
Data relevant to participants' experiences attending to vignettes were analysed using a series of 2 (vignette methodology: written, video) x 7 (experience: facial impalement, broken bone, loss of child, loss of parent, loss of parent, fishing, snowboarding) repeated measures mixed-effects models to determine differences across conditions. Mixed-effects models, characterised as containing both fixed and random effects, were fit via the restricted maximum likelihood method using an ANOVA small-sample adjustment (see Appendix B). Significant effects were followed by pairwise comparisons where appropriate. In some instances, additional pairwise comparisons were also run to assess the manipulation of pain. Data were analysed in the statistical software package Stata/IC (Version 15.1). For a detailed review of multilevel mixed-effects models in Stata, see StataCorp (2013).

Generalised Pain Intensity

With regards to generalised pain intensity ratings, the only significant effect found was that of experience, $F(6, 455) = 352.29$, $p < .001$, $\eta^2 = .82$. As shown in Figure 1 and Table 2, painful experiences were perceived to be significantly more intense than non-painful experiences across vignette methodologies, indicating the successful manipulation of pain. No main effect of vignette methodology, $F(1, 455) = 0.00$, $p = .958$, nor an interaction between vignette methodology and experience, $F(6, 455) = 1.12$, $p = .349$, $\eta^2 = .01$, was found.

Figure 1

Mean Generalised Pain Intensity Ratings in Study 1



Note. Error bars represent 95% confidence intervals. Mike = facial impalement; James = broken bone; Ben = loss of child; Brad = loss of parent; Chris = loss of parent; Sam = fishing; Alex = snowboarding.

Table 2

Pairwise Comparisons of Generalised Pain Intensity Ratings in Study 1

	Written- and Video- Vignette		
Experience	Difference	*p*	95% CI
Physical pain			
Mike vs. James	-0.68	.006	[-1.16, -0.19]
Social pain			
Ben vs. Brad	0.80	.001	[0.31, 1.28]
Ben vs. Chris	0.61	.013	[0.13, 1.10]
Brad vs. Chris	-0.18	.464	[-0.66, 0.30]
No-pain			
Sam vs. Alex	0.52	.033	[0.04, 1.01]
Physical pain vs. Social pain			
Mike vs. Ben	0.07	.767	[-0.41, 0.56]
Mike vs. Brad	0.87	< .001	[0.38, 1.35]
Mike vs. Chris	0.69	.005	[0.20, 1.17]
James vs. Ben	0.75	.002	[0.27, 1.23]
James vs. Brad	1.55	< .001	[1.06, 2.03]
James vs. Chris	1.36	< .001	[0.88, 1.85]
Physical pain vs. No-pain			
Mike vs. Sam	6.55	< .001	[6.07, 7.03]
Mike vs. Alex	7.07	< .001	[6.59, 7.56]
James vs. Sam	7.23	< .001	[6.74, 7.71]
James vs. Alex	7.75	< .001	[7.27, 8.23]
Social pain vs. No-pain			
Ben vs. Sam	6.48	< .001	[5.99, 6.96]
Ben vs. Alex	7.00	< .001	[6.52, 7.48]
Brad vs. Sam	5.68	< .001	[5.20, 6.16]
Brad vs. Alex	6.20	< .001	[5.72, 6.69]
Chris vs. Sam	5.86	< .001	[5.38, 6.34]
Chris vs. Alex	6.39	< .001	[5.90, 6.87]

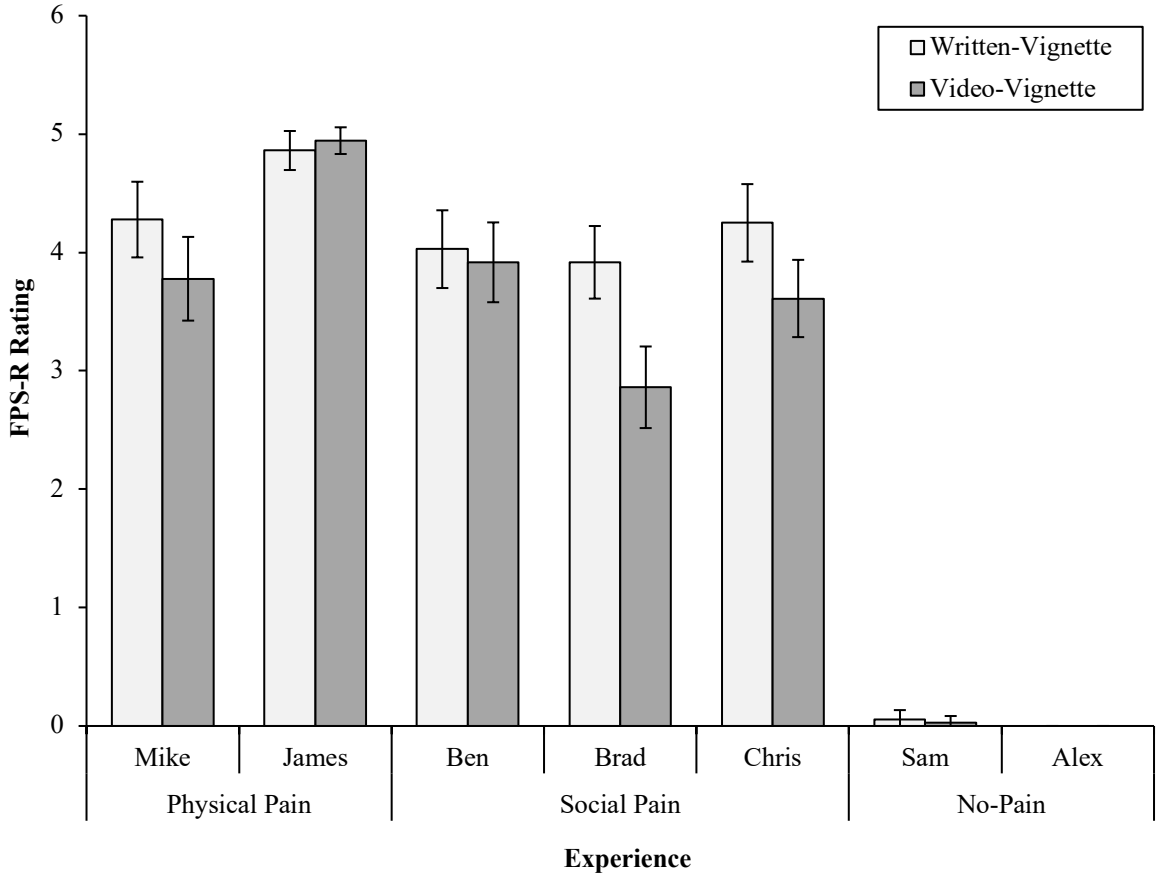
Note. CI = confidence interval. Mike = facial impalement; James = broken bone; Ben = loss of child; Brad = loss of parent; Chris = loss of parent; Sam = fishing; Alex = snowboarding.

FPS-R

With regards to FPS-R ratings, significant main effects of vignette methodology, $F(1, 455) = 26.45$, $p < .001$, $\eta^2 = .05$, and experience, $F(6, 455) = 592.80$, $p < .001$, $\eta^2 = .89$, were qualified by a two-way interaction between vignette methodology and experience, $F(6, 455) = 6.52$, $p < .001$, $\eta^2 = .08$. When depicted via written- compared to video- vignette, perceptions of pain intensity were significantly higher for the facial impalement experience, $F(1, 455) = 9.14$, $p = .003$, $\eta^2 = .02$, as well as both loss of parent experiences - Brad and Chris, $F(1, 455) = 40.75$, $p < .001$, $\eta^2 = .08$, and $F(1, 455) = 14.93$, $p < .001$, $\eta^2 = .03$, respectively. However, upon reviewing vignettes, these differences likely resulted from muted affect displayed by specific video-vignette actors rather than systematic differences between vignette methodologies. This interpretation is particularly likely as significant differences between methodologies were not found for the remaining physically painful, socially painful, or non-painful experiences ($p \geq .502$). Additional pairwise comparisons were run to assess the manipulation of pain. As shown in Figure 2 and Table 3, painful experiences were perceived to be significantly more intense than non-painful experiences across vignette methodologies, indicating the successful manipulation of pain.

Figure 2

Mean FPS-R Ratings in Study 1



Note. Error bars represent 95% confidence intervals. Mike = facial impalement; James = broken bone; Ben = loss of child; Brad = loss of parent; Chris = loss of parent; Sam = fishing; Alex = snowboarding.

Table 3

Pairwise Comparisons of FPS-R Ratings by Vignette Methodology in Study 1

	Vignette methodology					
	Written			Video		
Experience	Diff.	*p*	95% CI	Diff.	*p*	95% CI
Physical pain						
Mike vs. James	-0.58	< .001	[-0.91, -0.26]	-1.17	< .001	[-1.49, -0.84]
Social pain						
Ben vs. Brad	0.11	.502	[-0.21, 0.44]	1.06	< .001	[0.73, 1.38]
Ben vs. Chris	-0.22	.179	[-0.55, 0.10]	0.31	.065	[-0.02, 0.63]
Brad vs. Chris	-0.33	.044	[-0.66, -0.01]	-0.75	< .001	[-1.07, -0.43]
No-pain						
Sam vs. Alex	0.06	.737	[-0.27, 0.38]	0.03	.867	[-0.30, 0.35]
Physical pain vs. Social pain						
Mike vs. Ben	0.25	.131	[-0.07, 0.57]	-0.14	.401	[-0.46, 0.19]
Mike vs. Brad	0.36	.029	[0.04, 0.69]	0.92	< .001	[0.59, 1.24]
Mike vs. Chris	0.03	.867	[-0.30, 0.35]	0.17	.313	[-0.16, 0.49]
James vs. Ben	0.83	< .001	[0.51, 1.16]	1.03	< .001	[0.70, 1.35]
James vs. Brad	0.94	< .001	[0.62, 1.27]	2.08	< .001	[1.76, 2.41]
James vs. Chris	0.61	< .001	[0.29, 0.94]	1.33	< .001	[1.01, 1.66]
Physical pain vs. No-pain						
Mike vs. Sam	4.22	< .001	[3.90, 4.55]	3.75	< .001	[3.43, 4.07]
Mike vs. Alex	4.28	< .001	[3.95, 4.60]	3.78	< .001	[3.45, 4.10]
James vs. Sam	4.81	< .001	[4.48, 5.13]	4.92	< .001	[4.59, 5.24]
James vs. Alex	4.86	< .001	[4.54, 5.19]	4.94	< .001	[4.62, 5.27]
Social pain vs. No-pain						
Ben vs. Sam	3.97	< .001	[3.65, 4.30]	3.89	< .001	[3.56, 4.21]
Ben vs. Alex	4.03	< .001	[3.70, 4.35]	3.92	< .001	[3.59, 4.24]
Brad vs. Sam	3.86	< .001	[3.54, 4.19]	2.83	< .001	[2.51, 3.16]
Brad vs. Alex	3.92	< .001	[3.59, 4.24]	2.86	< .001	[2.54, 3.19]
Chris vs. Sam	4.19	< .001	[3.87, 4.52]	3.58	< .001	[3.26, 3.91]
Chris vs. Alex	4.25	< .001	[3.93, 4.57]	3.61	< .001	[3.29, 3.94]

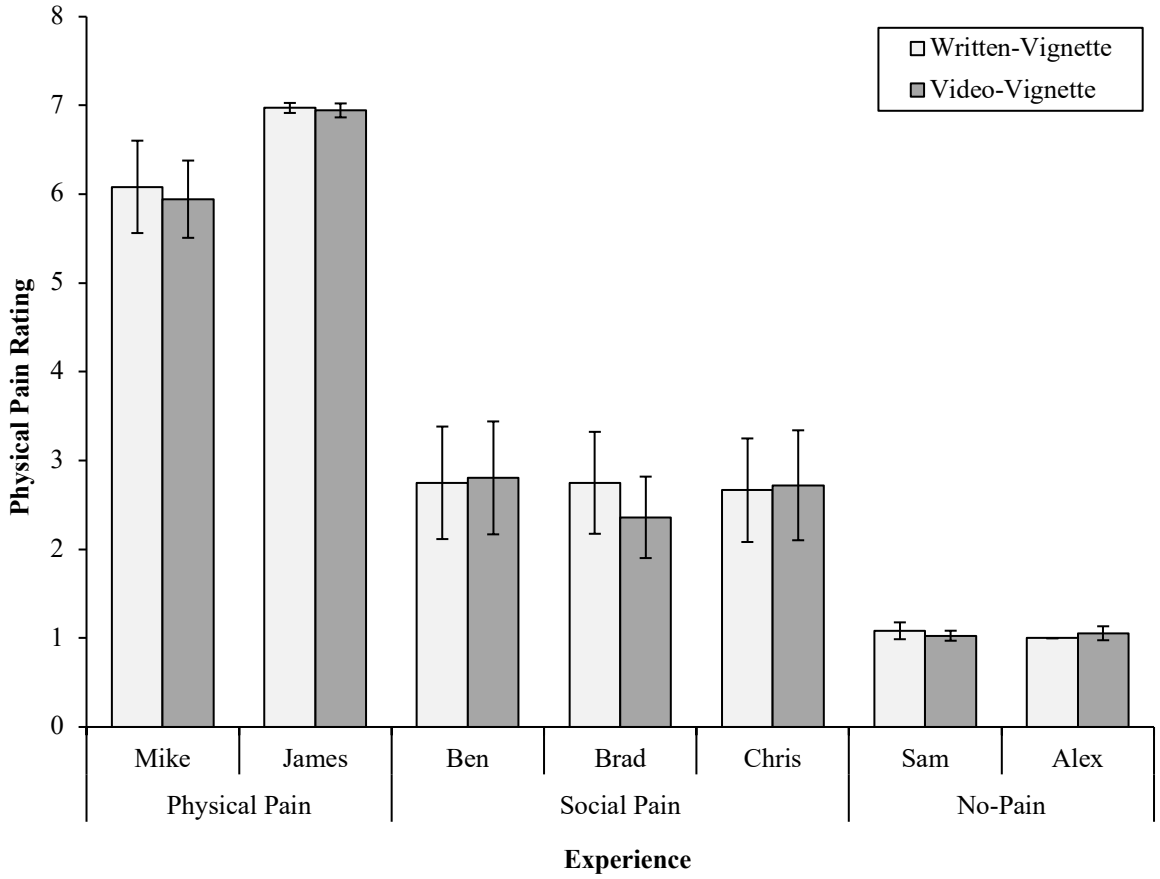
Note. Diff. = difference. CI = confidence interval. Mike = facial impalement; James = broken bone; Ben = loss of child; Brad = loss of parent; Chris = loss of parent; Sam = fishing; Alex = snowboarding.

Physical Pain

With regards to physical pain ratings, the only significant effect found was that of experience, $F(6, 455) = 288.38$, $p < .001$, $\eta^2 = .79$. As shown in Figure 3 and Table 4, physically painful experiences were perceived to be significantly more physically painful than socially painful and non-painful experiences across vignette methodologies. Socially painful experiences were also perceived to significantly more physically painful than non-painful experiences across vignette methodologies. That socially painful experiences were considered physically painful is consistent with a purported overlap in neurological, physiological, and psychological experiences of social and physical pain (DeWall, MacDonald, et al., 2010; Eisenberger, 2012a, 2012b, 2015; Eisenberger et al., 2006; Eisenberger & Lieberman, 2004; Eisenberger et al., 2003; Lieberman & Eisenberger, 2006; Panksepp et al., 1980; Riva et al., 2011). Thus, together these findings indicate the successful manipulation of pain. No main effect of vignette methodology, $F(1, 455) = 0.38$, $p = .538$, $\eta^2 = .001$, nor an interaction between vignette methodology and experience, $F(6, 455) = 0.35$, $p = .911$, $\eta^2 = .005$, was found.

Figure 3

Mean Physical Pain Ratings in Study 1



Note. Error bars represent 95% confidence intervals. Mike = facial impalement; James = broken bone; Ben = loss of child; Brad = loss of parent; Chris = loss of parent; Sam = fishing; Alex = snowboarding.

Table 4

Pairwise Comparisons of Physical Pain Ratings in Study 1

	Written- and Video- Vignette		
Experience	Difference	*p*	95% CI
Physical pain			
Mike vs. James	-0.94	< .001	[-1.32, -0.57]
Social pain			
Ben vs. Brad	0.22	.249	[-0.16, 0.60]
Ben vs. Chris	0.08	.665	[-0.29, 0.46]
Brad vs. Chris	-0.14	.471	[-0.52, 0.24]
No-pain			
Sam vs. Alex	0.03	.885	[-0.35, 0.41]
Physical pain vs. Social pain			
Mike vs. Ben	3.24	< .001	[2.86, 3.61]
Mike vs. Brad	3.46	< .001	[3.08, 3.84]
Mike vs. Chris	3.32	< .001	[2.94, 3.70]
James vs. Ben	4.18	< .001	[3.80, 4.56]
James vs. Brad	4.40	< .001	[4.02, 4.78]
James vs. Chris	4.26	< .001	[3.89, 4.64]
Physical pain vs. No-pain			
Mike vs. Sam	4.96	< .001	[4.58, 5.34]
Mike vs. Alex	4.99	< .001	[4.61, 5.36]
James vs. Sam	5.90	< .001	[5.52, 6.28]
James vs. Alex	5.93	< .001	[5.55, 6.31]
Social pain vs. No-pain			
Ben vs. Sam	1.72	< .001	[1.34, 2.10]
Ben vs. Alex	1.75	< .001	[1.37, 2.13]
Brad vs. Sam	1.50	< .001	[1.12, 1.88]
Brad vs. Alex	1.53	< .001	[1.15, 1.91]
Chris vs. Sam	1.64	< .001	[1.26, 2.02]
Chris vs. Alex	1.67	< .001	[1.29, 2.04]

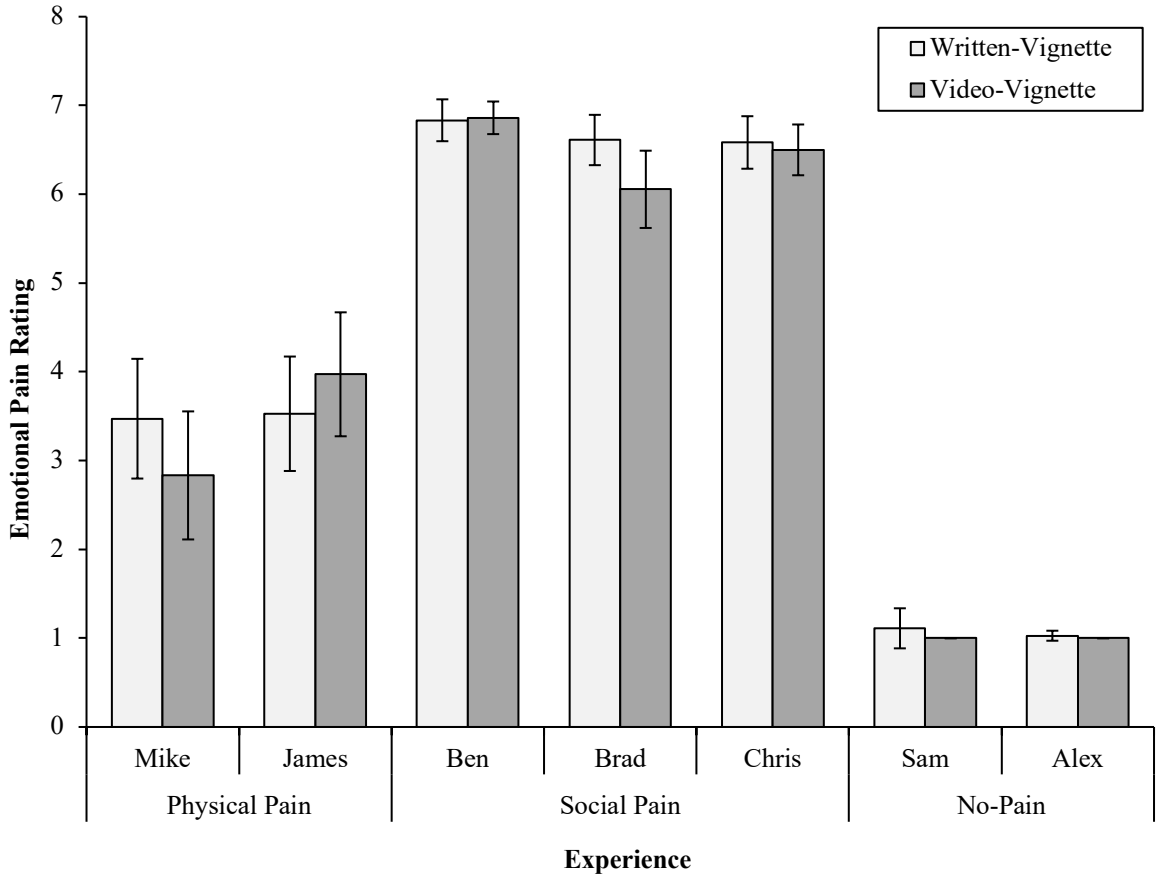
Note. CI = confidence interval. Mike = facial impalement; James = broken bone; Ben = loss of child; Brad = loss of parent; Chris = loss of parent; Sam = fishing; Alex = snowboarding.

Emotional Pain

With regards to emotional pain ratings, the only significant effect found was that of experience, $F(6, 455) = 336.41$, $p < .001$, $\eta^2 = .82$. As shown in Figure 4 and Table 5, socially painful experiences were perceived to be significantly more emotionally painful than physically painful and non-painful experiences across vignette methodologies. Physically painful experiences were also perceived as significantly more emotionally painful than non-painful experiences across vignette methodologies. Again, that physically painful experiences were considered emotionally painful is consistent with a purported overlap in experiences of physical and social pain (DeWall, MacDonald, et al., 2010; Eisenberger, 2012a, 2012b, 2015; Eisenberger et al., 2006; Eisenberger & Lieberman, 2004; Eisenberger et al., 2003; Lieberman & Eisenberger, 2006; Panksepp et al., 1980; Riva et al., 2011). Thus, these findings indicate the successful manipulation of pain. No main effect of vignette methodology, $F(1, 455) = 1.68$, $p = .196$, $\eta^2 = .004$, nor an interaction between vignette methodology and experience, $F(6, 455) = 1.77$, $p = .103$, $\eta^2 = .02$, was found.

Figure 4

Mean Emotional Pain Ratings in Study 1



Note. Error bars represent 95% confidence intervals. Mike = facial impalement; James = broken bone; Ben = loss of child; Brad = loss of parent; Chris = loss of parent; Sam = fishing; Alex = snowboarding.

Table 5

Pairwise Comparisons of Emotional Pain Ratings in Study 1

	Written- and Video- Vignette		
Experience	Difference	*p*	95% CI
Physical pain			
Mike vs. James	-0.60	.002	[-0.98, -0.22]
Social pain			
Ben vs. Brad	0.51	.008	[0.13, 0.90]
Ben vs. Chris	0.31	.117	[-0.08, 0.69]
Brad vs. Chris	-0.21	.285	[-0.59, 0.17]
No-pain			
Sam vs. Alex	0.04	.831	[-0.34, 0.42]
Physical pain vs. Social pain			
Mike vs. Ben	-3.69	< .001	[-4.08, -3.31]
Mike vs. Brad	-3.18	< .001	[-3.56, -2.80]
Mike vs. Chris	-3.39	< .001	[-3.77, -3.01]
James vs. Ben	-3.10	< .001	[-3.48, -2.72]
James vs. Brad	-2.58	< .001	[-2.97, -2.20]
James vs. Chris	-2.79	< .001	[-3.17, -2.41]
Physical pain vs. No-pain			
Mike vs. Sam	2.10	< .001	[1.72, 2.48]
Mike vs. Alex	2.14	< .001	[1.76, 2.52]
James vs. Sam	2.69	< .001	[2.31, 3.08]
James vs. Alex	2.74	< .001	[2.35, 3.12]
Social pain vs. No-pain			
Ben vs. Sam	5.79	< .001	[5.41, 6.17]
Ben vs. Alex	5.83	< .001	[5.45, 6.22]
Brad vs. Sam	5.28	< .001	[4.90, 5.66]
Brad vs. Alex	5.32	< .001	[4.94, 5.70]
Chris vs. Sam	5.49	< .001	[5.10, 5.87]
Chris vs. Alex	5.53	< .001	[5.15, 5.91]

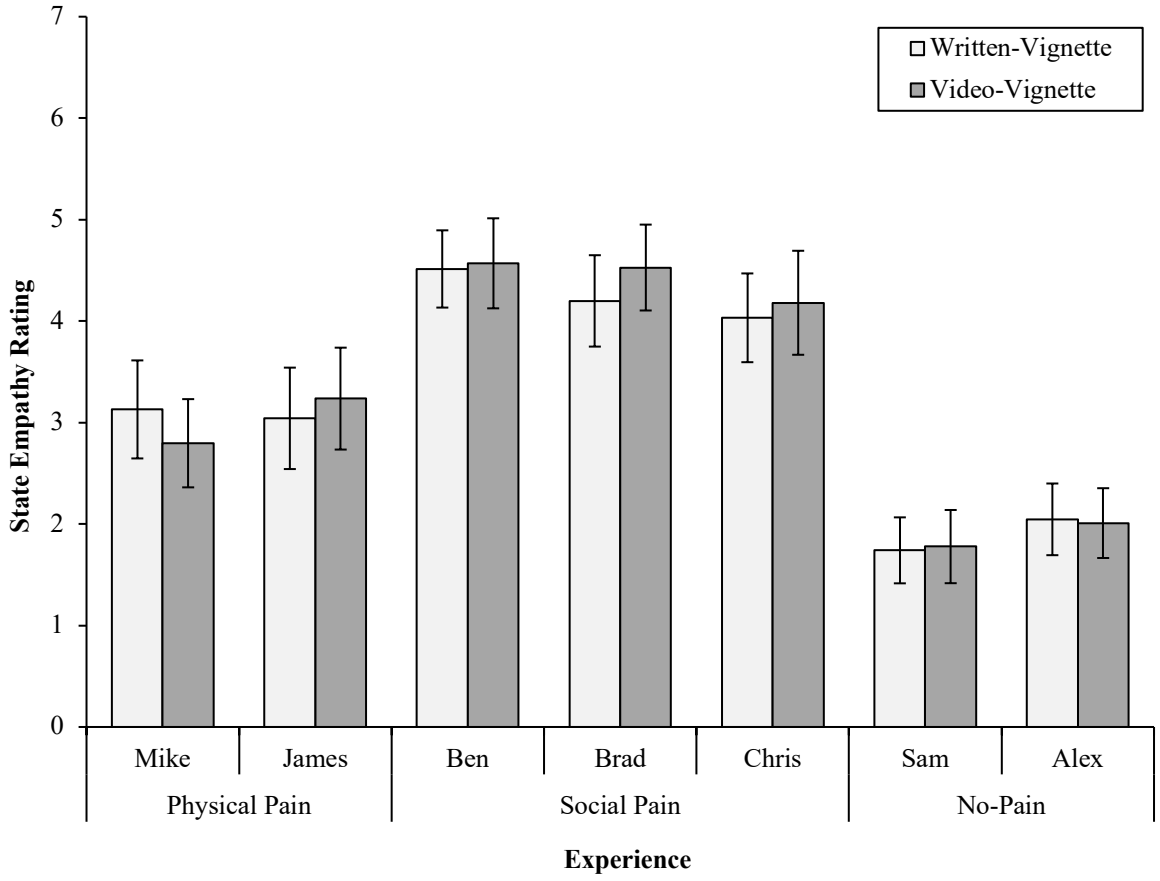
Note. CI = confidence interval. Mike = facial impalement; James = broken bone; Ben = loss of child; Brad = loss of parent; Chris = loss of parent; Sam = fishing; Alex = snowboarding.

State Empathy

With regards to state empathy ratings, the only significant effect found was that of experience, $F(6, 455) = 113.23$, $p < .001$, $\eta^2 = .60$. As shown in Figure 5 and Table 6, painful experiences elicited significantly more state empathy than non-painful experiences across vignette methodologies, suggesting the successful manipulation of pain. Of interest, socially painful experiences also elicited significantly more state empathy than physically painful experiences across vignette methodologies. Still, there are a number of antecedents of state empathy that may have influenced empathic concern for vignette actors, but that were not measured in this study, including perceiving the other as in need, adopting the other's perspective (Batson et al., 1987), and valuing the welfare of the other (Batson et al., 2007). No main effect of vignette methodology, $F(1, 455) = 0.50$, $p = .478$, $\eta^2 = .001$, nor an interaction between vignette methodology and experience, $F(6, 455) = 1.00$, $p = .426$, $\eta^2 = .01$, was found.

Figure 5

Mean State Empathy Ratings in Study 1



Note. Error bars represent 95% confidence intervals. Mike = facial impalement; James = broken bone; Ben = loss of child; Brad = loss of parent; Chris = loss of parent; Sam = fishing; Alex = snowboarding.

Table 6

Pairwise Comparisons of State Empathy Ratings in Study 1

	Written- and Video- Vignette		
Experience	Difference	*p*	95% CI
Physical pain			
Mike vs. James	-0.18	.235	[-0.47, 0.11]
Social pain			
Ben vs. Brad	0.18	.229	[-0.11, 0.47]
Ben vs. Chris	0.44	.003	[0.14, 0.73]
Brad vs. Chris	0.26	.083	[-0.03, 0.55]
No-pain			
Sam vs. Alex	-0.27	.070	[-0.56, 0.02]
Physical pain vs. Social pain			
Mike vs. Ben	-1.58	< .001	[-1.87, -1.29]
Mike vs. Brad	-1.40	< .001	[-1.69, -1.11]
Mike vs. Chris	-1.14	< .001	[-1.43, -0.85]
James vs. Ben	-1.40	< .001	[-1.69, -1.11]
James vs. Brad	-1.22	< .001	[-1.51, -0.93]
James vs. Chris	-0.97	< .001	[-1.26, -0.68]
Physical pain vs. No-pain			
Mike vs. Sam	1.20	< .001	[0.91, 1.49]
Mike vs. Alex	0.94	< .001	[0.64, 1.23]
James vs. Sam	1.38	< .001	[1.09, 1.67]
James vs. Alex	1.11	< .001	[0.82, 1.40]
Social pain vs. No-pain			
Ben vs. Sam	2.78	< .001	[2.49, 3.07]
Ben vs. Alex	2.51	< .001	[2.22, 2.80]
Brad vs. Sam	2.60	< .001	[2.31, 2.89]
Brad vs. Alex	2.34	< .001	[2.05, 2.63]
Chris vs. Sam	2.35	< .001	[2.06, 2.64]
Chris vs. Alex	2.08	< .001	[1.79, 2.37]

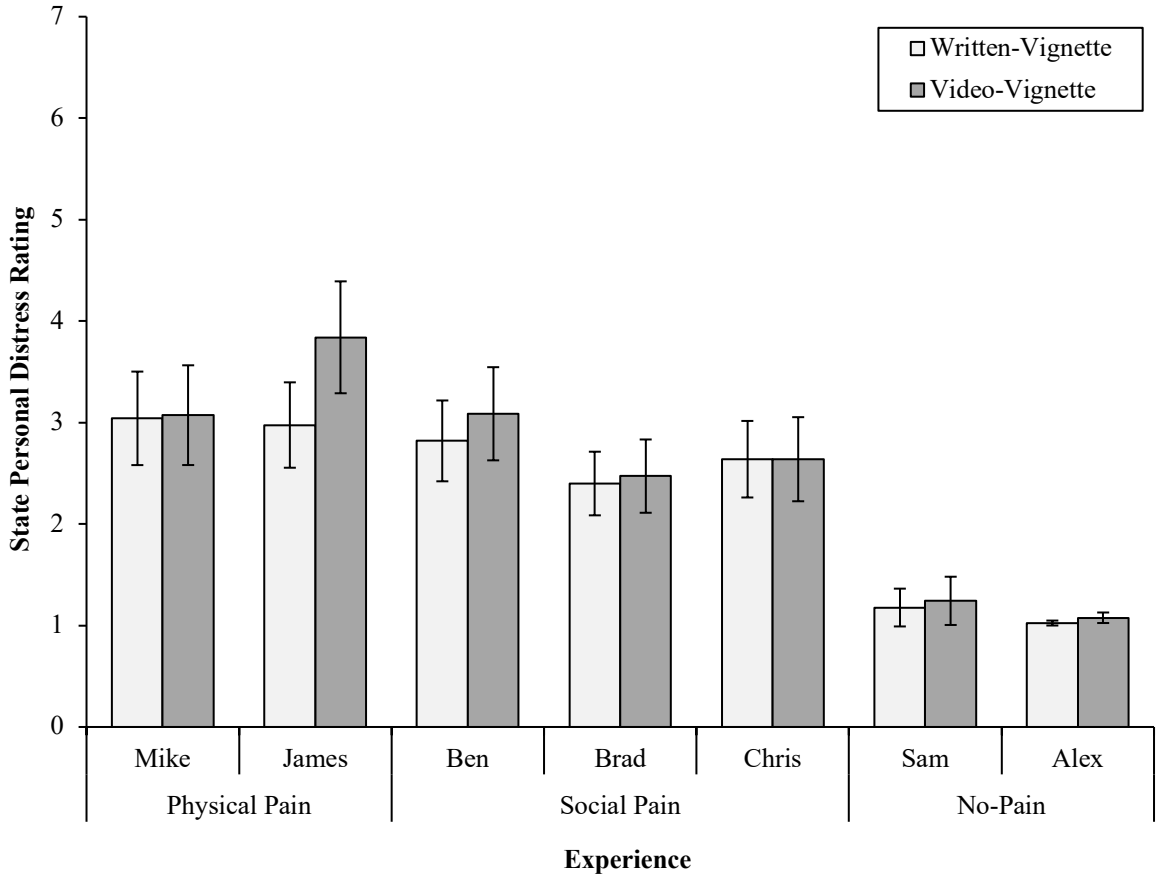
Note. CI = confidence interval. Mike = facial impalement; James = broken bone; Ben = loss of child; Brad = loss of parent; Chris = loss of parent; Sam = fishing; Alex = snowboarding.

State Personal Distress

With regards to state personal distress ratings, significant main effects of vignette methodology, $F(1, 455) = 6.50$, $p = .011$, $\eta^2 = .01$, and experience, $F(6, 455) = 83.58$, $p < .001$, $\eta^2 = .52$, were qualified by a significant two-way interaction between vignette methodology and experience, $F(6, 455) = 2.36$, $p = .030$, $\eta^2 = .03$. When depicted via video- as compared to written- vignette, state personal distress was significantly higher for the broken bone experience, $F(1, 455) = 18.56$, $p < .001$, $\eta^2 = .04$. State personal distress is characterised as a self-orientated aversive emotional response associated with feeling discomfort (Batson et al., 1997). Therefore, the difference between methodologies in state personal distress was likely reflective of the graphic nature of the imagery in the video-vignette depicting a breaking bone. This explanation is particularly likely given that significant differences between vignette methodologies were not found for the remaining physically painful, socially painful, or non-painful experiences ($p \geq .184$). Additional pairwise comparisons were run to assess the manipulation of pain. As shown in Figure 6 and Table 7, painful experiences elicited significantly more state personal distress than non-painful experiences across vignette methodologies, suggesting the successful manipulation of pain.

Figure 6

Mean State Personal Distress Ratings in Study 1



Note. Error bars represent 95% confidence intervals. Mike = facial impalement; James = broken bone; Ben = loss of child; Brad = loss of parent; Chris = loss of parent; Sam = fishing; Alex = snowboarding.

Table 7

Pairwise Comparisons of State Personal Distress Ratings by Vignette Methodology in Study 1

	Vignette methodology					
	Written			Video		
Experience	Diff.	*p*	95% CI	Diff.	*p*	95% CI
Physical pain						
Mike vs. James	0.07	.742	[-0.33, 0.46]	-0.77	< .001	[-1.16, -0.37]
Social pain						
Ben vs. Brad	0.42	.036	[0.03, 0.81]	0.61	.002	[0.22, 1.01]
Ben vs. Chris	0.18	.368	[-0.21, 0.57]	0.45	.026	[0.05, 0.84]
Brad vs. Chris	-0.24	.233	[-0.63, 0.15]	-0.17	.406	[-0.56, 0.23]
No-pain						
Sam vs. Alex	0.15	.446	[-0.24, 0.55]	0.17	.406	[-0.23, 0.56]
Physical pain vs. Social pain						
Mike vs. Ben	0.22	.268	[-0.17, 0.62]	-0.01	.945	[-0.41, 0.38]
Mike vs. Brad	0.64	.001	[0.25, 1.04]	0.60	.003	[0.21, 0.99]
Mike vs. Chris	0.40	.045	[0.01, 0.80]	0.43	.031	[0.04, 0.83]
James vs. Ben	0.16	.436	[-0.24, 0.55]	0.75	< .001	[0.36, 1.15]
James vs. Brad	0.58	.004	[0.18, 0.97]	1.37	< .001	[0.97, 1.76]
James vs. Chris	0.34	.093	[-0.06, 0.73]	1.20	< .001	[0.81, 1.59]
Physical pain vs. No-pain						
Mike vs. Sam	1.86	< .001	[1.47, 2.26]	1.83	< .001	[1.44, 2.22]
Mike vs. Alex	2.02	< .001	[1.62, 2.41]	2.00	< .001	[1.60, 2.39]
James vs. Sam	1.80	< .001	[1.41, 2.19]	2.60	< .001	[2.20, 2.99]
James vs. Alex	1.95	< .001	[1.56, 2.34]	2.76	< .001	[2.37, 3.16]
Social pain vs. No-pain						
Ben vs. Sam	1.64	< .001	[1.25, 2.04]	1.84	< .001	[1.45, 2.24]
Ben vs. Alex	1.80	< .001	[1.40, 2.19]	2.01	< .001	[1.62, 2.40]
Brad vs. Sam	1.22	< .001	[0.83, 1.62]	1.23	< .001	[0.84, 1.62]
Brad vs. Alex	1.38	< .001	[0.98, 1.77]	1.40	< .001	[1.00, 1.79]
Chris vs. Sam	1.46	< .001	[1.07, 1.86]	1.40	< .001	[1.00, 1.79]
Chris vs. Alex	1.61	< .001	[1.22, 2.01]	1.56	< .001	[1.17, 1.96]

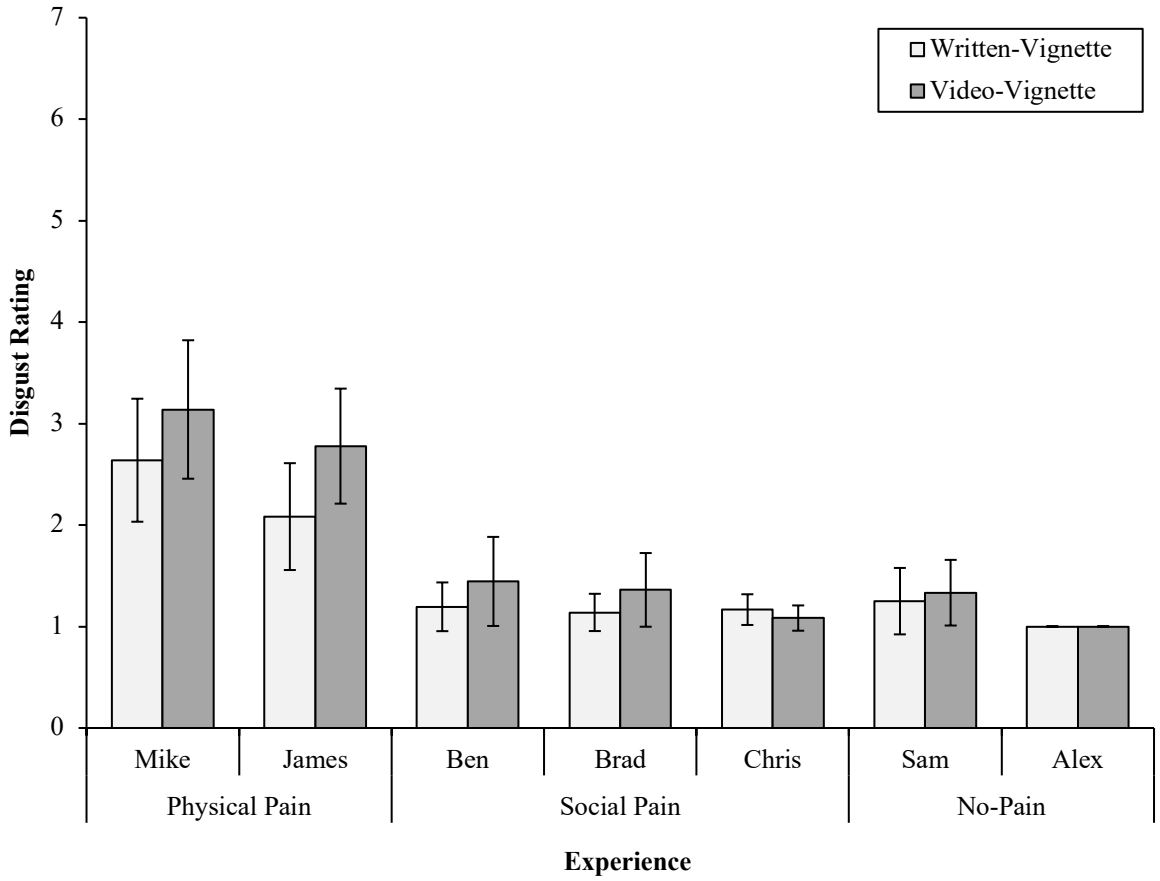
Note. Diff. = difference. CI = confidence interval. Mike = facial impalement; James = broken bone; Ben = loss of child; Brad = loss of parent; Chris = loss of parent; Sam = fishing; Alex = snowboarding.

Disgust

With regards to disgust ratings, no interaction between vignette methodology and experience was found, $F(6, 455) = 1.21$, $p = .302$, $\eta^2 = .02$. However, a significant main effect of vignette methodology was found, $F(1, 455) = 6.23$, $p = .013$, $\eta^2 = .01$. Experiences depicted via video- as compared to written- vignette elicited significantly more disgust, $M = 1.73$, 95% CI [1.55, 1.92] and $M = 1.50$, 95% CI [1.35, 1.64], respectively. A significant main effect of experience was also found, $F(6, 455) = 33.81$, $p < .001$, $\eta^2 = .31$. As shown in Figure 7 and Table 8, physically painful experiences elicited significantly more disgust than both socially painful and non-painful experiences across vignette methodologies. A significant difference was not found between the amount of disgust elicited by socially painful and non-painful experiences across vignette methodologies. Differences between methodologies in disgust are consistent with the graphic nature of the imagery in video-vignettes depicting physical pain, particularly when considered alongside state personal distress ratings in this study.

Figure 7

Mean Disgust Ratings in Study 1



Note. Error bars represent 95% confidence intervals. Mike = facial impalement; James = broken bone; Ben = loss of child; Brad = loss of parent; Chris = loss of parent; Sam = fishing; Alex = snowboarding.

Table 8

Pairwise Comparisons of Disgust Ratings in Study 1

	Written- and Video- Vignette		
Experience	Difference	*p*	95% CI
Physical pain			
Mike vs. James	0.46	.010	[0.11, 0.81]
Social pain			
Ben vs. Brad	0.07	.697	[-0.28, 0.42]
Ben vs. Chris	0.19	.276	[-0.16, 0.54]
Brad vs. Chris	0.13	.484	[-0.22, 0.47]
No-pain			
Sam vs. Alex	0.29	.102	[-0.06, 0.64]
Physical pain vs. Social pain			
Mike vs. Ben	1.57	< . 001	[1.22, 1.92]
Mike vs. Brad	1.64	< . 001	[1.29, 1.99]
Mike vs. Chris	1.76	< . 001	[1.41, 2.11]
James vs. Ben	1.11	< . 001	[0.76, 1.46]
James vs. Brad	1.18	< . 001	[0.83, 1.53]
James vs. Chris	1.31	< . 001	[0.96, 1.66]
Physical pain vs. No-pain			
Mike vs. Sam	1.60	< . 001	[1.25, 1.95]
Mike vs. Alex	1.89	< . 001	[1.54, 2.24]
James vs. Sam	1.14	< . 001	[0.79, 1.49]
James vs. Alex	1.43	< . 001	[1.08, 1.78]
Social pain vs. No-pain			
Ben vs. Sam	0.03	.876	[-0.32, 0.38]
Ben vs. Alex	0.32	.074	[-0.03, 0.67]
Brad vs. Sam	-0.04	.815	[-0.39, 0.31]
Brad vs. Alex	0.25	.161	[-0.10, 0.60]
Chris vs. Sam	-0.17	.350	[-0.52, 0.18]
Chris vs. Alex	0.13	.484	[-0.22, 0.47]

Note. CI = confidence interval. Mike = facial impalement; James = broken bone; Ben = loss of child; Brad = loss of parent; Chris = loss of parent; Sam = fishing; Alex = snowboarding.

Personal Experiences

As shown in Table 9, the majority of participants reported that they themselves or someone close to them had had a similar experience to the one depicted in each vignette (≥ 53%). The exception to this finding was facial impalement, for which still at least 30% of participants reported being exposed to a similar experience. On this basis, the stimulus set piloted in this study appears to accurately represent physically painful, socially painful, and non-painful experiences attended to in everyday life. As shown in Table 10, the large majority of participants reported that they had not previously seen, read, or heard about the actor in each vignette (≥ 86%). Similarly, as shown in Table 11, the large majority of participants reported that they had not previously seen, read, or heard about each of the stories they read or videos they watched (≥ 89%). Together, these findings suggest that reported effects were unlikely confounded by previous exposure to the specific vignette actors or experiences piloted in this study.

Table 9

Percentage of Participants Who Reported Themselves or Someone Close to Them Having a Similar Experience to Those Depicted in Study 1

	Vignette methodology					
	Written			Video		
Experience	Self	Other	Joint	Self	Other	Joint
Physical pain						
Facial impalement	25.00	16.67	41.67	13.89	16.67	30.56
Broken bone	33.33	41.67	66.67	38.89	41.67	69.44
Social pain						
Loss of child	13.89	38.89	52.78	16.67	52.78	66.67
Loss of parent - Brad	36.11	61.11	83.33	30.56	61.11	80.56
Loss of parent - Chris	36.11	58.33	83.33	41.67	52.78	83.33
No-pain						
Fishing	44.44	52.72	80.56	50.00	52.78	83.33
Snowboarding	50.00	36.11	75.00	50.00	36.11	75.00

Note. Self = reported having a similar experience themselves; Other = reported someone close to them having a similar experience; Joint = reported having a similar experience themselves or someone close to them having a similar experience.

Table 10

Percentage of Participants Who Reported Previously Seeing, Reading, or Hearing About Actors in Study 1

	Vignette methodology	
Experience	Written	Video
Physical pain		
Facial impalement	2.78	11.11
Broken bone	5.56	8.33
Social pain		
Loss of child	8.33	2.78
Loss of parent - Brad	13.89	2.78
Loss of parent - Chris	2.78	11.11
No-pain		
Fishing	5.56	8.33
Snowboarding	5.56	5.56

Table 11

Percentage of Participants Who Reported Previously Seeing, Reading, or Hearing About Each Story and Video in Study 1

	Vignette methodology	
Experience	Written	Video
Physical pain		
Facial impalement	2.78	2.78
Broken bone	8.33	0.00
Social pain		
Loss of child	8.33	0.00
Loss of parent - Brad	11.11	2.78
Loss of parent - Chris	0.00	2.78
No-pain		
Fishing	5.56	2.78
Snowboarding	2.78	0.00

General Discussion

Given the variety of pain narratives online, the purpose of Study 1 was to pilot written- and video- vignettes depicting physically painful, socially painful, and non-painful experiences for use in subsequent studies. Pain was found to be successfully manipulated across vignette methodologies. Further, the use of video-vignettes from this study is recommended for use as stimulus in subsequent studies conducted as part of this thesis.

Stimulus Set

Of importance, physical and social pain were found to be successfully manipulated across vignette methodologies. Moreover, evidence was found to support the idea that physically and socially mediated pain exist as separate but overlapping constructs. In addition, the majority of participants reported that they themselves or someone close to them had had a similar experience to those depicted in vignettes. On this basis, the stimulus piloted in this study is argued to accurately depict physically painful, socially painful, and non-painful experiences attended to in everyday life and be suitable for use in subsequent studies conducted as part of this thesis.

Online Video in Contemporary Culture

In terms of the use of written- and video- vignettes, findings from primary outcome variables in this study do little to support the use of one methodology over another. First, hypothesised differences in generalised pain intensity, pain nature, and state empathy ratings between vignette methodologies were not found. One possibility is that this pattern of non-significance was due to low statistical power associated with Study 1's modest sample size. However, this explanation is unlikely given the extremely small effect sizes observed for tests of methodology across pain nature and state empathy ratings ($\eta^2 \leq .004$). Further, appropriately specified mixed-effect models

have been found to yield major improvements in power over quasi-*F* approaches (Barr et al., 2013). In this connection, parameters from mixed-effects models in this study may be used in combination with Monte Carlo data simulation to inform sample-size planning for future work specifying complex mixed-effects models (see DeBruine & Barr, 2021). Second, although significant differences were found in FPS-R, disgust, and state personal distress ratings, these differences were likely due to the specific nature of experiences depicted in this study rather than systematic differences between vignette methodologies. Therefore, findings from Study 1 appear to suggest that there are few differences in responses to written- and video- vignettes depicting others' pain, leaving the choice between these two methodologies largely to researchers' discretion. Yet, of note, all failed attention checks in this study were associated with experiences depicted via written- as opposed to video- vignette. This specific finding lends some support to the proposition that video-vignettes should be more easily remembered than written-vignettes because they impose higher interpersonal demands reflective of real-world contexts (Blascovich et al., 2002; Hughes & Huby, 2002; Kinicki et al., 1995; Sleed et al., 2002).

Of further relevance to the use of written- and video- vignettes is the focus of this thesis on contemporary online culture. In this connection, engagement with online video has historically outpaced the adoption rate of many other online activities (Madden, 2009). In 2019 it was reported that the video-sharing site YouTube was used by 73% of U.S. adults (Perrin & Anderson, 2019). Engagement with online videos has been driven by improved Internet connectivity, popularisation of video-sharing sites, increased use of social media platforms, the proliferation of streaming services, and the general widespread embrace of video features in online contexts (Purcell, 2010). In sum, online video has become deeply integrated into contemporary culture. On this

basis, the use of video-vignettes from this study was supported in subsequent online studies conducted as part of this thesis.

Chapter 3

Studies 2A and 2B: Collective Attention to Pain Online

One billion hours of video are viewed on the video-sharing website YouTube alone every day (YouTube, n.d.). Yet, there are few existing accounts of collective attention in online contexts. To this end, the purpose of Study 2 was to evidence the phenomenon of collective attention to pain online, specifically pain depicted in online video. Study 2 is reported in two parts, Study 2A and Study 2B. Studies 2A and 2B were run simultaneously, utilising the same participant sample and a single online questionnaire. In Study 2A, participants were asked to report their usual engagement with online video. In Study 2B, participant engagement with online videos depicting physically painful, socially painful, and non-painful experiences was compared.

General Method

Participants

A convenience sample of 74 undergraduate students (49 female, 25 male; M_{age} = 25.31 years, $range_{age}$ = 19–49 years) was recruited to participate in Studies 2A and 2B. Participants were recruited through the Griffith University Psychology Subject Pool and remunerated with course credit. As a condition of ethical approval, those who did not wish to watch videos depicting pain were advised not to participate in the studies (Griffith University Human Ethics Committee Reference Number: 2017/187).

Design and Procedure

All materials from Studies 2A and 2B were presented to participants in an online questionnaire programmed using the survey tool Qualtrics. A link to the questionnaire was provided to participants at recruitment. In the questionnaire, participants were first presented with a participant information sheet and consent form. As part of Study 2A, participants were next instructed: “to begin this questionnaire, you will be asked to

answer some questions about your own experiences watching videos online. The questions relate to the videos that you would usually watch online." Following questions specifically related to usual online video engagement frequency and nature, as well as usual awareness of and interactions with co-attendees. As part of Study 2B, participants were subsequently randomly assigned to one of three independent pain conditions, physical pain (n = 25), social pain (n = 22), or no-pain (n = 27). Participants were then instructed: "next in this questionnaire, you will be asked to watch a short video and answer some questions about your experience watching the video. The questions are related to the specific video that you watch." Depending on the condition they were randomised into, participants were presented with a video depicting either a physically painful, socially painful, or non-painful experience. It was emphasised that the video was "also being watched by other Griffith University Students as part of this study." Participants were instructed to add a comment to the video, then presented with questions related to perceived reactions to videos, the nature of pain depicted in videos and perceived collective attention with co-attendees. Participants also responded to other related but unreported measures. At the end of the questionnaire, participants were asked to provide general demographic information, including their gender, year of birth, employment status, ethnic background, religious affiliation, and religious service attendance. Participants were remunerated with course credit upon their completion of the study.

Study 2A

The purpose of Study 2A was to explore usual engagement with online video, including online video depicting physical and social pain. On the basis of existing figures showing increasing adoption of online video (Perrin & Anderson, 2019; Smith & Anderson, 2018), it was expected that the large majority of participants would report

having engaged with videos online. Although, given the study's exploratory nature, no specific expectations were set about the nature of online videos usually engaged with by participants, including to what extent videos typically depict physical or social pain. Engagement with online videos is reportedly driven by not only the traditional purposes of entertainment and information seeking but also a desire to enhance one's social life (Haridakis & Hanson, 2009; Khan, 2017). Engagement with the video-sharing website YouTube is more specifically driven by a desire for something to do and talk about with friends or family and a desire to meet new people and participate in discussions (Haridakis & Hanson, 2009). There, therefore, appears to be a distinctly social aspect to online video engagement. On this basis, it was expected that when engaging with videos online, the majority of participants would report both being aware of and interacting with co-attendees.

Method

Materials and Measures

Exploratory Questions

Participants responded to four open-ended questions designed to explore their usual engagement with online videos. Questions included: "describe the kinds of videos you usually watch online," "describe the kinds of online videos you usually watch that involve physical pain," "describe the kinds of online videos you usually watch that involve social pain," and "describe why you do or don't usually react to, share, or comment on online videos."

Engagement Frequency

Participants rated how often they would usually watch videos online in a single-item measure of engagement frequency (0 = *never*, 1 = *very rarely*, 5 = *very frequently*).

Video Source

Participants rated how often they would usually watch videos from a specified set of sources. Sources included "social networking sites (e.g., Facebook, Twitter, Instagram)," "video-sharing sites (e.g., YouTube, Google Video)," "news websites," "peer-to-peer applications (e.g., Gnutella, Kazaa, Freenet)," "streaming sites (e.g., Netflix, Amazon Prime, Stan)," "blogs," and "other" (0 = *never*, 1 = *very rarely*, 5 = *very frequently*; Purcell, 2010). Participants were asked to specify "other".

Video Type

Participants also rated how often they would usually watch a specified set of video types. Video types included "comedy or funny videos," "news videos," "educational videos," "movies or TV shows," "music videos," "political videos," "animation or cartoons," "sports videos," "commercials or advertisements," and "other" (Purcell, 2010). Video types also included "videos involving physical pain" and "videos involving social pain" (0 = *never*, 1 = *very rarely*, 5 = *very frequently*). Participants were asked to specify "other".

Awareness of Co-attendees

For a collective attention state to occur, an individual must first be aware that others are co-attending to the same content (Shteynberg, 2015). On this basis, participants rated how often they would usually engage in seven behaviours designed to explore their awareness of co-attendees when watching videos online. Behaviours included "take note of how many views the video has," "take note of other peoples' reactions to the video (e.g., number of likes)," "take note of how many times the video has been shared," "read comments made by other people on the video," "think about other people who have watched the video before you," "think about other people who might be watching the video at the same time as you," and "think about other people

who might watch the video after you" (0 = *never*, 1 = *very rarely*, 5 = *very frequently;* α = .83).

Interactions with Co-attendees

Previous research has identified social motives for engaging with online video (Haridakis & Hanson, 2009). In this connection, participants rated how often they would usually engage in five behaviours designed to explore their interactions with co-attendees when watching videos online. Behaviours included "react to the video (e.g., like the video)," "think about other people who you might share the video with," "share the video with people you know (e.g., tagging someone, direct messaging)," "share the video with people you don't know (e.g., posting to a public page)," and "comment on the video yourself" (0 = *never*, 1 = *very rarely*, 5 = *very frequently;* α = .79).

Results

Thematic Analysis

Thematic analysis was used to systematically identify recurrent themes across participant responses to questions exploring usual engagement with online videos. A six-phase approach to analysis was adopted, involving familiarisation with data through reading and re-reading data; generating initial codes systematically across the data set; searching for themes within initial codes (see Appendix C, Figure C1); refining and organising themes in the context of the data set (see Appendix C, Figure C2); defining and naming themes by organising data into coherent and internally consistent accounts with accompanying narrative (see Appendix C, Figure C3); and reporting (Braun & Clarke, 2006). Initial codes were developed in line with exploratory questions asked of participants, with subsequent themes formed using an inductive approach to more directly reflect the data (Boyatzis, 1998). Final themes centred on the source of online videos watched by participants, type of online videos watched by participants, and

participants' sentiments towards interacting with co-attendees when watching videos online.

Video Source

Participants commonly reported engaging with online videos from multiple sources, including video-sharing sites (e.g., "YouTube"), social networking sites (e.g., "Instagram", "Facebook"), and streaming sites (e.g., "Netflix", "Stan", "Foxtel"). Video source appeared to be related to video type, with some participants appearing to visit specific sites to watch specific video types. As an example, "the videos that occasionally pop up on Facebook and other social media, as well as tutorials and music videos on YouTube" (ID 24).

Video Type

Participants also commonly reported engaging with a wide range of online videos, including comedy and funny videos (e.g., "fail army", "memes", "stand up"), educational videos (e.g., "documentaries", "tutorials", "TED talks"), news, TV shows and movies, sports and fitness videos, animal videos, lifestyle videos (e.g., "makeup tutorials", "clothing hauls", "cooking videos"), music videos, and vlogs. Video type was often related to the purpose of engaging with online videos. As an example, "I am required to use the internet to stream my online tutorials for my university courses and also often watch online videos to clarify on the concepts from a different perspective" (ID 55).

Of interest, participants did not appear to purposefully seek out online videos depicting pain. For example, "I don't watch any as they make me feel uncomfortable" (ID 10). However, both physical and social pain did appear to be incidental to the usual types of videos engaged with by participants. In particular, participants reported having engaged with comedy and funny videos (e.g., "fail army", "fail videos", "prank videos",

"cringe compilations"), educational videos (e.g., "documentaries", "war"), news, as well as TV shows and movies (e.g., "action", "horror", "thriller", "drama") depicting both physical and social pain. Examples include, "sometimes it's like cringe compilations and stuff like that which is pretty funny" (ID 72), "news videos about the global issues like wars, poverty and global warming" (ID 74), "I have watched online videos about war history and also true crime documentaries that involve re-enactments of physical pain" (ID 4), and "on Netflix, I watch a lot of thrillers and horror involving troubled characters" (ID 2). Participants further reported having engaged with sports and fitness videos depicting physical pain.

Co-attendees

Many participants reported socially engaging with online videos. More specifically, participants referred to "liking" videos. For example, "I'm just watching those videos for myself and if it's good, of course, I will put like but if I don't like I will just pass it and go to another one" (ID 62). Participants also made reference to sharing videos (e.g., "tag", "share", "send"), especially with close friends and family. Examples include, "I sometimes direct message relevant content to friends if we had been speaking about the topic recently" (ID 17) and "I might tag my friends or family in videos on Facebook, but never share them with everyone" (ID 52). Some participants also expressed a desire to support and communicate with online video creators. For example, "I like videos because I want the creator to know I liked it, or so they keep making similar videos, or because I agree with what they are saying" (ID 23). Of note, participants commonly, and in some cases only, expressed engaging with comedy or funny videos. As an example, "I only react to videos I think are funny or that my friends think are funny" (ID 60).

In contrast, other participants reported that they chose not to engage with online videos after watching them. For example, “I do not comment, like or share anything via social media. I just never had. I will sometimes talk of a video and then show a friend but do not like the activity of sharing, liking, commenting on social media as I prefer face to face conversations and discussions” (ID 9). In many instances, lack of engagement was driven by a desire to remain anonymous, a desire to protect privacy online, or a desire to avoid disagreement online. In terms of anonymity and privacy, participants expressed sentiments such as, “never been a person that likes to share my thoughts to people that I do not know. Think I am too private maybe” (ID 28), and “because everyone can see it and opinion can change over time” (ID 15). In terms of disagreement online, participants expressed sentiments such as, “I do not engage in controversial topics as I don’t know the reaction I will get from people I know” (ID 2).

Descriptive Statistics

Quantitative data relevant to participants’ usual engagement with online videos were analysed using a range of descriptive statistics (e.g., frequencies, means, standard deviations) to determine commonalities in participant responses. Analyses were conducted in the statistical software package Stata/IC (Version 15.1).

Engagement Frequency

All participants reported engaging with videos online, and on average, reported doing so relatively frequently (100.00% participants; $M = 4.04$, $SD = 1.09$).

Video Source

As shown in Table 12, participants most commonly and frequently reported engaging with videos from video-sharing sites, social networking sites, and streaming sites (> 94.50% participants; $M > 3.30$). Other sources specified by participants included Reddit, Pinterest, and gaming sites.

Video Type

As shown in Table 13, participants most commonly and frequently reported engaging with educational videos, comedy and funny videos, and movies and TV shows (≥ 97.30% participants; $M > 3.40$). Other types of videos specified by participants included gaming videos and podcasts. Of interest, the majority of participants reported having engaged with online videos involving physical or social pain, though on average reported engaging with them relatively infrequently (> 72.90% participants; $M < 1.70$).

Co-attendee Awareness

Almost all participants reported that they had been aware of co-attendees in some way when watching videos online, though they reported being so relatively infrequently (98.65% participants; $M = 1.60$, $SD = 0.87$). As shown in Table 14, participants most commonly reported reading comments made by other people on videos, taking note of other peoples' reactions to videos, and taking note of many views a video has (> 89.10% participants). Although, again, participants reported being aware of co-attendees in these ways relatively infrequently ($M < 2.90$).

Co-attendee Interactions

Almost all participants also reported that they had interacted with co-attendees in some way when watching videos online, though they reported doing so relatively infrequently (97.30% participants; $M = 1.61$, $SD = 0.97$). As shown in Table 15, participants most frequently reported reacting to videos themselves and sharing videos with people they know, though again reported interacting with co-attendees in these ways relatively infrequently (> 87.80% participants; $M < 2.30$).

Table 12

Frequencies, Means, and Standard Deviations for Online Video Sources in Study 2A

Online video source	% Participants	*M*	*SD*
Video-sharing sites	100.00	3.99	1.21
Social networking sites	95.95	3.34	1.46
Streaming sites	94.59	3.47	1.43
News websites	81.08	1.61	1.25
Blogs	47.30	0.95	1.32
Peer-to-peer applications	24.32	0.35	0.73
Other	16.22	0.39	1.08

Table 13

Frequencies, Means, and Standard Deviations for Online Video Types in Study 2A

Online video type	% Participants	*M*	*SD*
General video types			
Educational videos	100.00	3.47	1.18
Comedy and funny videos	98.65	3.62	1.30
Movies and TV shows	97.30	3.72	1.29
News videos	93.24	2.38	1.46
Music videos	91.89	2.77	1.60
Animation and cartoons	83.78	1.76	1.31
Political videos	77.03	1.66	1.46
Sports videos	70.27	1.73	1.67
Commercials and advertisements	64.86	1.14	1.15
Other	14.86	0.32	0.97
Videos involving pain			
Social pain	72.97	1.69	1.44
Physical pain	72.97	1.62	1.50

Table 14

Frequencies, Means, and Standard Deviations for Co-attendee Awareness Behaviours in Study 2A

Co-attendee awareness behaviour	% Participants	*M*	*SD*
Read comments made by other people on the video	94.59	2.85	1.40
Take note of other peoples' reactions to the video	93.24	2.31	1.37
Take note of how many views the video has	89.19	2.20	1.38
Take note of how many times the video has been shared	68.92	1.28	1.26
Think about other people who have watched the video before you	60.81	0.97	1.12
Think about other people who might watch the video after you	54.05	0.82	1.01
Think about other people who might be watching the video at the same time as you	45.95	0.78	1.06

Table 15

Frequencies, Means, and Standard Deviations for Co-attendee Interaction Types in Study 2A

Co-attendee interaction type	% Participants	*M*	*SD*
React to the video	90.54	2.23	1.45
Share the video with people you know	87.84	2.14	1.49
Think about other people who you might share the video with	77.03	1.84	1.43
Comment on the video yourself	63.51	1.15	1.19
Share the video with people you don't know	43.24	0.69	0.94

Discussion

The purpose of Study 2A was to explore usual engagement with online videos, including online videos depicting physical and social pain. Relatively detailed accounts were given of the sources and types of videos usually engaged with by participants online, including those depicting pain. Insight was also given into the extent to which individuals are aware of and choose to interact with others who watch the same online videos as they usually do.

Incidental Attention to Pain Online

Consistent with evidence for the popularisation of online video (Perrin & Anderson, 2019; Smith & Anderson, 2018), 100% of participants in this study reported having engaged with videos online and doing so relatively frequently. Participants generally reported engaging with multiple types of online videos from various sources for a combination of entertainment and informational purposes. Of particular interest, over 70% of participants reported having engaged with online videos depicting physical or social pain. However, rather than seeking out online videos depicting pain, both physical and social pain appeared to be incidental to the usual types of videos engaged with by participants. Accounts of pain attended to online included real-life pain depicted in user-generated videos and news videos, as well as pain portrayed by paid actors in television series and movies. As summarised by one participant, “I would rarely watch videos involving physical pain unless they are part of a narrative” (ID 50). Thus, findings from this study confirm that the act of attending to online videos depicting pain is relatively common in contemporary culture. It is expected that exposure to others’ pain will become even more prevalent as individuals continue to immerse themselves online.

Collective Attention Online

In support of social motives for engaging with online video (Haridakis & Hanson, 2009), over 90% of participants reported being aware of and interacting with co-attendees when watching videos online. However, frequency ratings for both co-attendee awareness and interaction behaviours were relatively low. Participants most commonly reported engaging in behaviours such as taking note of others' engagement with videos, "liking" videos, and sharing videos with friends or family, particularly when they found content funny. Participants' participation in these passive behaviours appeared to be driven by a desire to remain anonymous and protect their privacy online, as well as to avoid disagreement. Still, findings from this study suggest that people are aware of others attending to the videos they watch online and, therefore, that attending to videos online has the potential to elicit a collective attention state.

Study 2B

The subsequent purpose of Study 2B was to compare engagement with online videos depicting physically painful, socially painful, and non-painful experiences. Collective attention has previously been successfully instantiated when the physical presence of co-attendees was hidden from view (Shteynberg & Apfelbaum, 2013; Shteynberg et al., 2016; Shteynberg et al., 2014), as occurs in real-world online contexts. Therefore, it was expected that attending to a common online video with others would elicit a general feeling of "we are attending". It has been proposed that pain amplifies shared experiences because of its capacity to command attention (Crombez et al., 1997; Eccleston & Crombez, 1999). Consistent with this idea, it was specifically hypothesised that online videos depicting physical and social pain would elicit significantly stronger collective attention states than non-painful online content.

Method

Materials and Measures

Video

Following Study 1, videos depicted either a physically painful (i.e., facial impalement), socially painful (i.e., loss of child), or non-painful (i.e., fishing) experience. All videos were matched as closely as possible. All videos depicted a real-world experience involving a Caucasian male who was given the name Ben. Videos depicting pain were further matched on pilot pain intensity and state personal distress ratings. Videos were also equal in length (1:13 minutes). Brief descriptions of each video can be found in Table 16. Collective attention was instantiated by informing participants that videos were also being watched by other Griffith University Students as part of the study. Beneath videos, participants were instructed: "add a comment on the video of Ben. You may comment anything you like in relation to the video." Comments were collected for use in subsequent studies conducted as part of this thesis.

Table 16

Brief Descriptions of Videos in Study 2B and Study 3B

Experience	Description
Physical pain	
Facial impalement	Ben recently fell off his motorcycle. When Ben fell, a piece of wood pierced through his cheek. The wood was 2.5 centimetres in diameter.
Social pain	
Loss of child	Ben and his wife had a young daughter. Ben's daughter recently passed away. Following the loss of his daughter, Ben was consumed by grief.
No-pain	
Fishing	Ben recently went fishing in his kayak at a lake popular for freshwater bass fishing. Ben caught two freshwater bass while he was fishing.

Perceived Reactions

Participants responded to two open-ended questions designed to explore cognitive and affective processes associated with collectively attending to others' pain online. Participants were instructed: "describe your reaction to the video" and "describe how you think other students might have reacted to the video."

Pain Nature

Participants rated the extent to which each vignette actor felt both physical pain and social pain to confirm the nature of pain depicted (1 = *not at all*, 7 = *a great extent*; e.g., Bruneau et al., 2013; Bruneau et al., 2012).

Perceived Collective Attention

The collective attention state is defined as the perception of in-the-moment attention to common stimuli from a first-person-plural perspective (Shteynberg, 2015). On this basis, participants rated the degree to which they agreed with the statement "we are attending to the video" in a single-item measure of perceived collective attention (1 = *strongly disagree,* 7 = *strongly agree*).

Results

Thematic Analysis

Thematic analysis was used to systematically identify recurrent themes across participant responses to questions exploring perceived reactions to online videos attended to during the study. A six-phase approach to analysis was again adopted (see Appendix D, Figures D1–D3; Braun & Clarke, 2006). Initial codes were developed in line with experimental pain conditions, with subsequent themes formed using an inductive approach to more directly reflect the data (Boyatzis, 1998). Final themes extended from potential reactions to each video, as well as perceived synchrony between participants and co-attendees.

Physical Pain

Participants in the physical pain condition referenced potential feelings of discomfort, including feeling "uncomfortable", "disgusted", "sick", and "nauseous". Examples include, "it made me uncomfortable and disgusted and I hope he was okay" (ID 3) and "other students potentially cringed at the sight of the accident and looked away or felt sick" (ID 55). Participants also referenced "sympathy" and "empathy" for the video actor. For example, "probably similar. Most people generally feel sympathetic in situations where someone gets hurt" (ID 41). A small portion of participants referenced the video content as humorous. For example, "perhaps they laughed, called their mates in to watch it. That old shock value fascination" (ID 43).

Social Pain

Participants in the social pain condition referenced potential feelings of "sadness". Examples include, "it made me sad to think that he lost his daughter, it is the worst thing a parent could ever have to go through and I would never wish the pain of that on anyone" (ID 30) and "I think they would have been sad as well, since it is about such a private theme" (ID 52). Participants also referenced "sympathy" and "empathy" for the video actor. For example, "I think the most of the students had the same sensation of empathy" (ID 74). Some participants questioned why the video actor would share his experience, expressing sentiments such as "people nowadays tend to share everything on the internet. Feels like he should have shared this with his wife or family who are involved in this rather than a random stranger on the internet" (ID 64).

No-Pain

Participants in the no-pain condition commonly referenced feeling "bored" and "indifferent". Examples include, "I was bored, it didn't interest me and I was waiting to see if anything out of the ordinary happened" (ID 10) and "I think most students would

not watch videos like this and find it boring" (ID 73). A portion of participants in the no-pain condition expressed interest in the video. For example, "I found the video entertaining in a light-hearted way. It was interesting to see how kayak fishing is done for someone who has never participated in it" (ID 59). However, of note, some participants also referenced feelings of discomfort with the act of fishing. For example, "felt as though fishing was a bit of a pointless task. Causing trauma to the fish" (ID 25).

Synchrony

Participants across pain conditions typically inferred similar reactions among themselves and co-attendees. Given that co-attendees did not interact in any way, perceived similarities appeared to be based on preconceived expectations about appropriate reactions to videos. Examples include, "I think everyone would've been uncomfortable watching that, I don't know if many people would have liked seeing blood or a protruded object" (ID 45, physical pain), "probably very similar views to mine if they have any humanity" (ID 40, social pain), and "probably similar to me. There was nothing super exciting in the video so it probably didn't make too much of an impression on them" (ID 37, no-pain). Alternately, some participants expressed the possibility of varying reactions among co-attendees, particularly in the no-pain condition. As an example, "some other students may have enjoyed the video if either kayaking or fishing is one of their interests, or they may have really disliked the video depending on how they believe animals should be treated" (ID 54, no-pain).

Data Screening

Quantitative data were screened for violations of assumptions underlying ANOVA. Visual inspection of the data did not reveal influential univariate outliers at any level of the grouped data (Tabachnick & Fidell, 2013). However, violations of basic normality assumptions for grouped data were identified using the Shapiro-Wilk W

statistic (1965). Physical pain ratings were skewed in expected directions in the physical pain condition, $W(25) = .80$, $p < .001$, and no-pain condition, $W(27) = .79$, $p < .001$. Social pain ratings were skewed in expected directions in the physical pain condition, $W(25) = .87$, $p = .003$, social pain condition, $W(22) = .82$, $p = .001$, and no-pain condition, $W(27) = .70$, $p < .001$. Additionally, violations of homogeneity of variance assumptions were identified using Levene's test (1960). Physical pain, $F(2, 71) = 33.18$, $p < .001$, and social pain, $F(2, 71) = 6.91$, $p = .002$, ratings were heteroscedastic. Simulation studies show that ANOVA is highly robust to violations of underlying assumptions, particularly severe violations of normality (Schmider et al., 2010). Consequently, to facilitate the interpretation of results, data were analysed in their raw state.

ANOVA

Quantitative data relevant to participant engagement with online videos attended to during the study were analysed using a series of one-way ANOVA to determine differences across pain conditions. Where appropriate, significant effects were followed by simple contrasts. Analyses were conducted in the statistical software package Stata/IC (Version 15.1).

Physical Pain

A significant difference in physical pain was found between pain conditions, $F(2, 71) = 65.30$, $MSE = 2.92$, $p < .001$, $\eta^2 = .65$. Physical pain ratings were significantly higher in the physical pain condition ($M = 6.28$, $SD = 1.02$) than in the social pain condition ($M = 3.95$, $SD = 2.40$), *difference* = 2.33, $p < .001$, 95% CI [1.44, 3.21], and the no-pain condition ($M = 1.48$, $SD = 0.80$), *difference* = 4.80, $p < .001$, 95% CI [3.96, 5.64]. Physical pain ratings were also significantly higher in the social pain

condition than in the no-pain condition, *difference* = 2.47, $p < .001$, 95% CI [1.61, 3.34].

Social Pain

A significant difference in social pain was similarly found between pain conditions, $F(2, 71) = 40.19$, $MSE = 2.43$, $p < .001$, $\eta^2 = .53$. Social pain ratings were significantly higher in the social pain condition ($M = 5.45$, $SD = 1.74$) than in the physical pain condition ($M = 2.80$, $SD = 1.89$), *difference* = 2.65, $p < .001$, 95% CI [1.75, 3.56], and the no-pain condition ($M = 1.48$, $SD = 0.94$), *difference* = 3.97, $p < .001$, 95% CI [3.08, 4.86]. Social pain ratings were also significantly higher in the physical pain condition than in the no-pain condition, *difference* = 1.32, $p = .003$, 95% CI [0.46, 2.18].

Perceived Collective Attention

A significant difference in perceived collective attention was found between pain conditions, $F(2, 71) = 4.42$, $MSE = 2.01$, $p = .016$, $\eta^2 = .11$. Perceived collective attention ratings were significantly higher in both the physical pain ($M = 4.48$, $SD = 1.42$) and social pain ($M = 4.77$, $SD = 1.41$) conditions than in the no-pain condition ($M = 3.63$, $SD = 1.42$), difference = 0.85, $p = .034$, 95% CI [0.07, 1.63] and *difference* = 1.14, $p = .006$, 95% CI [0.33, 1.95], respectively. Perceived collective attention ratings were not significantly different between the physical pain and social pain conditions, *difference* = -0.29, $p = .482$, 95% CI [-1.12, 0.53].

Discussion

The purpose of Study 2B was to compare engagement with online videos depicting physically painful, socially painful, and non-painful experiences. Pain was found to be successfully manipulated. Further, hypothesised differences in collective

attention states elicited by online videos depicting painful experiences relative to non-painful experiences were supported.

Manipulation of Pain

Pain was found to be successfully manipulated across online videos. Both videos depicting pain were perceived to be significantly more physically and socially painful than the non-painful video. Participants in the physical pain condition expressed feelings of discomfort, while participants in the social pain condition expressed feelings of sadness. Both participants in the physical and social pain conditions also expressed sympathy and empathy for the video actor. Alternately, participants in the no-pain condition predominantly expressed feeling bored and indifferent.

"We Are Attending" Online, Particularly to Pain

Perceived collective attention ratings were moderate across conditions, suggesting that attending to common online videos elicited a general feeling of "we are attending" among participants. However, perceived collective attention ratings were highest in response to online videos depicting pain. As hypothesised, videos depicting both physical and social pain elicited significantly higher perceived collective attention ratings than the non-painful video. To date, there appears to have been little consideration of the extent to which individuals perceive themselves to be in a collective attention state. As such, the single-item measure of collective attention used in this study was developed to reflect the definition of collective attention as the perception of simultaneous co-attention with others (Shteynberg, 2015). Short scales are seen to reach acceptable levels of reliability if they assess homogeneous, theoretically deduced, and clearly defined concepts (Loo, 2002; Postmes et al., 2013). However, other approaches to measuring collective attention online have included the analysis of peaks in the popularity of hashtags (Lehmann et al., 2012), burst-like increases in

Tweets (Sasahara et al., 2013), and growth cycles in the popularity of news articles (Wu & Huberman, 2007).

In this connection, perceived collective attention ratings reported in Study 2B may be interpreted in several ways. First, ratings may be considered as an attention check, which confirms that participants were paying attention to the instruction that the video was "also being watched by other Griffith University Students as part of this study." Relatedly, it may be suggested that the single-item used in this study more effectively measures personal attention than collective attention. Interpreted in this way, data from this study is consistent with other evidence for the ability of pain to interrupt, distract, and demand attention beyond non-painful stimuli (Crombez et al., 1997; Eccleston & Crombez, 1999). Of note, several studies have shown that individuals devote greater cognitive resources to stimuli that are perceived to be synchronously co-attended with close others (Shteynberg, 2010; Shteynberg & Apfelbaum, 2013; Shteynberg et al., 2014). Thus, as was intended, perceived collective attention ratings from this study could also be interpreted to suggest that pain manifested online elicits stronger perceptions of in-the-moment attention from a first-person-plural perspective than non-painful online content. From this view, the experience of collectively attending to others' pain online may be seen to increase collective orientation to a greater extent than the experience of collectively attending to non-painful stimuli online. Indeed, participants inferred similar reactions among co-attendees most consistently in response to videos depicting pain. In the absence of physical co-presence, perceived similarities appeared to be based solely on preconceived expectations about appropriate reactions to videos. This finding is consistent with previous research suggesting that individuals assume affective consensus with those around them (Coleman, 2018; Ross et al., 1977).

In sum, findings from Study 2B offer at least preliminary support for the idea that pain intensifies shared experiences online.

However, it is important to note that sampling in Study 2 was constrained by resource limitations. As a result, a sensitivity power analysis was conducted to determine the minimum detectable effect of one-way ANOVA with 74 participants across three independent groups, using power of 80% and an alpha of .05. Given these parameters, $\eta^2 = 0.12$ is the smallest effect size that could have been reliably detected in Study 2B (G*Power Version 3.1.9.6; see Faul et al., 2007). A post hoc power analysis subsequently revealed that based on the effect size observed for perceived collective attention ratings in Study 2B, $\eta^2 = .11$, a minimum sample of 84 participants would be required to obtain 80% power with an alpha of .05 (G*Power Version 3.1.9.6; see Faul et al., 2007). Thus, some caution should be taken when generalising quantitative collective attention findings from Study 2B.

General Discussion

Findings from Study 2 highlight the popularisation of online video and the increasing potential for collective attention in contemporary culture. Findings from Study 2 also, more specifically, evidence the phenomenon of collectively attended pain online and provide preliminary support for the idea that it can be a particularly powerful form of shared experience.

Chapter 4

Studies 3A and 3B: Collective Attention to Pain in Person

To date, the social-glue-like effects of pain have been most commonly examined in the circumscribed context of physically proximate, relationally connected individuals. For example, direct evidence for affiliation among those who collectively attend to others' pain extends from the study of ritual activity, in which attendees physically congregate on the basis of shared ideological beliefs and social values (Sosis & Ruffle, 2003). As a consequence, Study 3B was designed to explore the cognitive and affective processes associated with collectively attending to others' pain in an in-person context, so that understanding of these processes could be used in the development of subsequent online studies conducted as part of this thesis. In preparation for Study 3B, Study 3A was conducted with the purpose of developing a shared identity prime relevant to the sample population, sufficient to evoke a relational connection.

Study 3A

The purpose of Study 3A was to develop an experimental manipulation sufficient to evoke at least a minimal relational connection. Shared identity priming is one technique used to evoke naturally occurring relational connections among participants in laboratory settings. During priming, participants are subtly reminded of their shared identity via written instruction, verbal instruction, or imagery. Studies sampling from student populations have, more specifically, evoked naturally occurring relational connections by priming participants' shared identity as students at a particular university (Abrams et al., 1990; Leach et al., 2007; Reddish et al., 2016; van Zomeren et al., 2008). For example, Reddish et al. (2016, p. 726) informed participants that experimenters were interested in comparing performance in synchrony tasks across universities and that it was therefore important "as NUS students, that you work

together to keep in time with each other." Adopting a similar technique in this study, it was hypothesised that priming participants' shared identity as Griffith University students would evoke a relational connection among them. More specifically, it was hypothesised that participants whose shared identity was primed would report significantly greater cohesion and interpersonal closeness than participants whose shared identity was not primed.

Method

Participants

A convenience sample of 27 undergraduate students (19 female, 7 male, 1 "other"; M_{age} = 22.22 years, $range_{age}$ = 17– 44 years) was recruited through the Griffith University Psychology Subject Pool and remunerated with course credit.

Design

Groups of between two and five participants (M_{size} = 3.00 participants) were randomly assigned to one of two prime conditions, shared identity (n = 10) or control (n = 17), in an independent groups design.

Materials and Measures

Pre-existing Relationships

Participants disclosed pre-existing relationships in a two-part measure. First, participants were asked: "looking around you at the other participants in this room, how many did you know before today?" Next, participants were instructed: "for each of the participants who you knew before today, rate the strength of your relationship" (1 = *very weak e.g., an acquaintance*, 5 = *very strong e.g., a close friend*; e.g., Reddish et al., 2013).

Shared Identity Prime

Following previous research (Abrams et al., 1990; Leach et al., 2007; Reddish et al., 2016; van Zomeren et al., 2008), participants assigned to the shared identity condition were given a description of the study that primed their shared identity as Griffith University students. It was considered important that the prime was not so obvious that participants determined its purpose. To this end, participants were told: "for the purposes of this study, we needed to recruit small groups of students who attend Griffith University. As we are interested in how Griffith University students, in particular, respond to other people in society. You have all therefore been recruited using the university's subject pool and share an identity as Griffith University students."

Cohesion

Participants rated 11 statements designed to measure cohesion within groups. Drawn from previous research (Bastian, Jetten, & Ferris, 2014; Ellemers et al., 1999; Leach et al., 2007), statements included "I feel a sense of solidarity with the participants in this group," "I feel connected to the participants in this group," "I feel part of this group of participants," "I feel a sense of loyalty to the participants in this group," "I feel I can trust the participants in this group," "I feel that the participants in this group have a lot in common," "I feel like there is unity between the participants in this group," "I see myself as a member of this group," "I am glad to be categorised as a member of this group," "I identify with the participants in this group," and "I feel strong ties to the participants in this group" (α = .92; 1 = *strongly disagree*, 7 = *strongly agree*).

Interpersonal Closeness

The Inclusion of Ingroup in the Self Scale (IIS Scale; Tropp & Wright, 2001) was used to measure interpersonal closeness within groups. The single-item pictorial measure comprises seven pairs of circles varying in their degree of overlap, with a high

degree of overlap representing a high degree of interpersonal closeness (1 = *no overlap*, 7 = *high degree of overlap*). Participants were instructed: "select the pair of circles below that you feel best represents your own level of identification with your group. That is, select the pair of circles below that best represents how close you feel to the other participants in your group."

Demographic Information

Participants were asked to provide general demographic information, including their gender, year of birth, employment status, ethnic background, religious affiliation, and religious service attendance.

Procedure

Study 3A was conducted in person at a Griffith University campus, under ethical approval (Griffith University Human Ethics Committee Reference Number: 2017/187). Upon arrival to the study, participants were seated together at a single table. Participants were then given an envelope containing an information sheet and consent form, as well as two questionnaires. Questionnaires were marked with unique numeric identifiers so that responses could be linked without jeopardising participant anonymity. All participants completed the first questionnaire, in which they reported pre-existing relationships. Next, participants assigned to the shared identity condition were given a verbal description of the study that primed their shared identity as Griffith University students. Alternately, participants assigned to the control condition were given no additional information about the study. All participants subsequently completed the second questionnaire, in which they rated feelings of cohesion and interpersonal closeness. At the end of the second questionnaire, participants were also asked to provide general demographic information. Of note, both questionnaires included other related but unreported measures. In instances where only one participant attended the

study due to late cancellation, they were given an alternate task to complete (n = 5). Participants were remunerated with course credit upon completion of the study.

Results

Data Screening

Data were screened for violations of assumptions underlying *t*-tests. Visual inspection of the data did not reveal influential univariate outliers at any level of the grouped data (Tabachnick & Fidell, 2013). However, violations of basic normality assumptions for grouped data were identified using the Shapiro-Wilk W statistic (1965). IIS scale ratings were skewed in an expected direction in the shared identity condition, $W(10) = .83$, $p = .030$. No violations of homogeneity of variance assumptions were identified using Levene's test (1960). Sampling studies show that *t*-tests are highly robust to violations of underlying assumptions (Boneau, 1960). Consequently, to facilitate the interpretation of results, data were analysed in their raw state.

Pre-Existing Relationships

Twelve participants reported pre-existing relationships with fellow participants. However, none reported knowing more than one other participant and the strength of reported relationships was not generally strong ($M_{strength} = 2.00$, $SD_{strength} = 1.21$). Thus, given the small sample size, pre-existing relationship strength was not controlled for in analyses.

T-tests

Data relevant to the relational connection between participants were analysed using a series of independent samples *t*-tests, assuming unequal variances, to determine differences across prime conditions (Satterthwaite, 1946). Analyses were conducted in the statistical software package Stata/IC (Version 15.1).

Cohesion

No significant difference in cohesion was found between participants in the shared identity condition (M = 3.39, SD = 1.26) and control condition (M = 2.68, SD = 0.99), t(15.54) = -1.52, 95% CI [0.28, 1.69], p = .149, d = -0.65.

Interpersonal closeness

Further, no significant difference in interpersonal closeness was found between participants in the control condition (M = 2.12, SD = 0.78) and shared identity condition (M = 2.10, SD = 0.57), t(23.69) = 0.07, 95% CI [-0.52, 0.56], p = .947, d = 0.02.

Discussion

The purpose of Study 3A was to develop a shared identity prime sufficient to evoke at least a minimal relational connection. However, the hypothesis that priming participants' shared identity as Griffith University students would evoke a relational connection among them was not supported. Although cohesion was notably higher in the shared identity condition, no significant differences were found in cohesion or interpersonal closeness between prime conditions.

Several factors may have limited the effectiveness of the shared identity prime developed in Study 3A. For example, it is possible that university identity within the sample was weak. Previous research has effectively primed the shared identity of students from universities in Europe (Abrams et al., 1990; Leach et al., 2007; van Zomeren et al., 2008) and Southeast Asia (Reddish et al., 2016). In comparison, university attendance may be less central to the identity of students from Australian universities, or indeed Griffith University specifically. In addition, it is possible that the prime used in this study was too subtle. Previous research has used more overt primes, such as strategically placed imagery in addition to verbal instruction, to evoke a relational connection (Reddish et al., 2016). On this basis, the use of an amplified

version of the shared identity prime developed in Study 3A was recommended for use in subsequent studies conducted as part of this thesis. Finally, it is possible that non-significant findings were due to low statistical power associated with Study 3A's modest sample size. Post hoc power analyses revealed that on the basis of the effect size observed for cohesion ratings in Study 3A, d = -0.65, a minimum sample of 78 participants divided equally across two independent conditions would be required to obtain 80% power with a two-tailed alpha of .05 (G*Power Version 3.1.9.6; see Faul et al., 2007). In comparison, on the basis of the extremely small effect size observed for interpersonal closeness ratings in Study 3A, d = 0.02, a minimum sample of 78492 participants divided equally across two independent conditions would be required to obtain 80% power with a two-tailed alpha of .05 (G*Power Version 3.1.9.6; see Faul et al., 2007). Thus, it is possible that non-significant cohesion findings, though not interpersonal closeness findings, in Study 3A are attributable to low statistical power.

Study 3B

Study 3B was designed to explore the cognitive and affective processes evoked when physically proximate individuals collectively attend to others' pain in person. The purpose of this exploratory analysis was to apply understanding of these processes to the development of subsequent studies conducted as part of this thesis, in which geographically dispersed individuals collectively attend to others' pain online. Though Study 3B was exploratory, a number of guiding hypotheses were developed. First, in line with the proposition that individuals who collectively attend to others' pain are motivated to affiliate with one another, it was hypothesised that collectively attending to physical and social pain would elicit a significantly stronger drive for affiliation in participant responses than collectively attending to non-painful content. Next, several hypotheses related to mechanisms theorised to mediate the interpersonal effects of

collectively attending to others' pain were made. One possibility is that collectively attending to others' pain leads to affiliation among co-attendees via extensive self-reflection (Atkinson & Whitehouse, 2011; Whitehouse, 2004, 2005; Whitehouse & Lanman, 2014). On this basis, it was hypothesised that collectively attending to physical and social pain would command significantly more of participants' cognitive resources than collectively attending to non-painful content. An alternate, though complementary, possibility is that collectively attending to the focal event of another's pain leads to affiliation among co-attendees via perceived emotional synchrony (Fischer et al., 2014; Konvalinka et al., 2011; Xygalatas et al., 2011). On this basis, it was hypothesised that collectively attending to physical and social pain would elicit significantly greater perceived emotional synchrony among participants than collectively attending to non-painful content. A less explored possibility is that attending to others' pain leads to affiliation among co-attendees by way of moral cleansing (Bastian et al., 2011; Shariff & Norenzayan, 2007; Shu et al., 2012; van Bunderen & Bastian, 2014). On this basis, it was hypothesised that collectively attending to physical and social pain would make moral concepts significantly more salient than collectively attending to non-painful content.

Method

Participants

A convenience sample of 65 undergraduate students (47 female, 17 male, 1 "other"; M_{age} = 24.09 years, $range_{age}$ = 18–52 years) was recruited from Griffith University. Participants recruited through the Griffith University Psychology Subject Pool were remunerated with course credit. Participants recruited through the Griffith University Volunteer for Important Research Projects monthly broadcast email and advertising flyers posted on Griffith University campuses were remunerated with a

coffee voucher. As a condition of ethical approval, those who did not wish to watch videos depicting pain or have their responses audio-recorded were advised not to participate in the study (Griffith University Human Ethics Committee Reference Number: 2017/187).

Design and Procedure

Study 3B was conducted in person at a Griffith University campus. Groups of between two and five participants (M_{size} = 2.83 participants) were randomly assigned to one of three pain conditions, physical pain (n = 23), social pain (n = 20), or no-pain (n = 22), in an independent groups design. Upon arrival to the study, participants were seated together at a single table. Participants were then given an envelope containing an information sheet and consent form, two paper-based questionnaires, and a pen. Questionnaires were marked with unique numeric identifiers so that responses could be linked without jeopardising participant anonymity. To begin, participants completed the first questionnaire, in which they reported pre-existing relationships. Participants were subsequently given a verbal description of the study that primed their shared identity as Griffith University students. Then, depending on the condition they were randomised into, participants were presented with a video depicting either a physically painful, socially painful, or non-painful experience. Videos were presented on a single screen measuring 47 centimetres wide by 27 centimetres high. Following the video, participants completed the second questionnaire. The second questionnaire contained an initial set of exploratory open-ended questions, as well as questions related to pain intensity, pain nature, positive and negative affect, state empathy, state personal distress, disgust, cognitive resource allocation, perceived emotional synchrony, moral salience, and personal experience. At the end of the second questionnaire, participants were also asked to provide general demographic information. Of note, both

questionnaires included other related but unreported measures. Based on their attendance at the in-person component of the study, one participant from each group was randomly selected to participate in a follow-up interview (physical pain $n = 7$, social pain $n = 7$, no-pain $n = 9$). Interviews were conducted in a semi-structured format one-on-one by researchers and recorded using a standard audio-recording device. During interviews, participants were asked additional exploratory open-ended questions. In instances where only one participant attended the study due to late cancellation, they were given an alternate task to complete ($n = 12$). Participants were remunerated with course credit upon completion of the study.

Materials and Measures

Pre-existing Relationships

Participants disclosed pre-existing relationships in a two-part measure. First, participants were asked: "looking around you at the other participants in this room, how many did you know before today?" Next, participants were instructed: "for each of the participants who you knew before today, rate the strength of your relationship" (1 = *very weak e.g., an acquaintance*, 5 = *very strong e.g., a close friend*; e.g., Reddish et al., 2013).

Shared Identity Prime

Following Study 3A, a shared identity prime was used to evoke a relational connection among co-attendees. Participants were given a verbal description of the study that emphasised their shared identity as Griffith University students. Specifically, participants were told: "for the purposes of this study, we needed to recruit small groups of students who attend Griffith University. As we are interested in how Griffith University students, in particular, respond to other people in society. You have all therefore been recruited from Griffith University, and share an identity as Griffith

University students." A point was made to tell participants that the video actor also attended Griffith University for a short period of time. To amplify the prime participants were given Griffith University branded pens to use and the researcher drank from a Griffith University branded cup.

Video

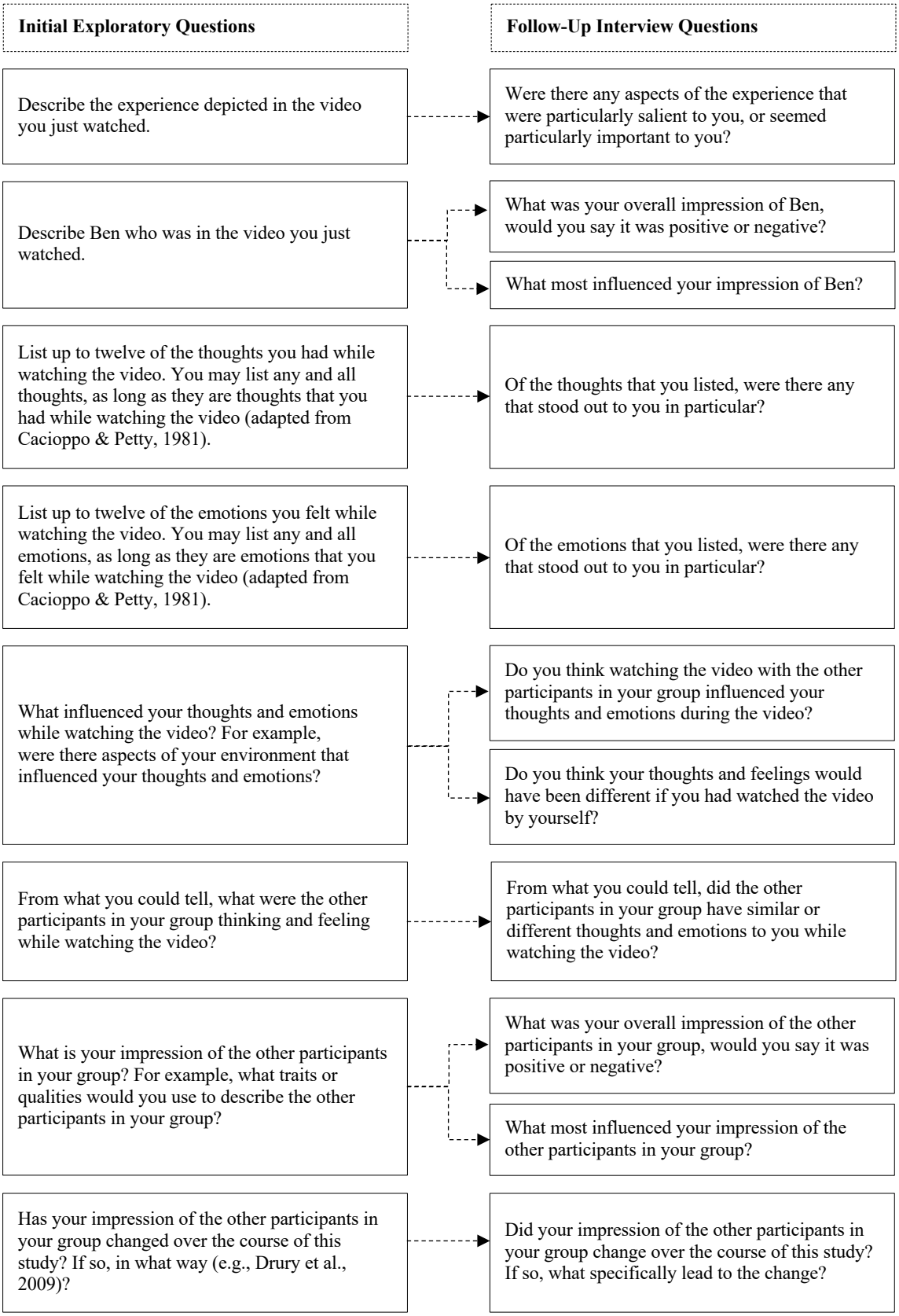
Following Study 1, videos depicted either a physically painful (i.e., facial impalement), socially painful (i.e., loss of child), or non-painful (i.e., fishing) experience. All videos were matched as closely as possible. All videos depicted a real-world experience involving a Caucasian male who was given the name Ben. Videos depicting pain were further matched on pilot pain intensity and state personal distress ratings. Videos were also equal in length (1:13 minutes). Brief descriptions of each video can be found in Table 16.

Exploratory Questions

All participants responded to eight initial open-ended questions in the second paper-based questionnaire. Selected participants also responded to a further 11 open-ended questions in follow-up interviews. Both sets of questions were designed to explore cognitive and affective processes associated with collectively attending to others' pain. Full questions can be found in Figure 8.

Figure 8

Exploratory Questions in Study 3B



Generalised Pain Intensity

In a four-item measure of generalised pain intensity, participants rated the intensity, painfulness, unpleasantness, and enjoyableness of the experience depicted in each vignette (0 = *not at all*, 10 = *extremely*; α = .90; e.g., Bastian, Jetten, & Ferris, 2014; Bayet et al., 2014; Price et al., 1983).

Pain Nature

Participants rated the extent to which each vignette actor felt both physical pain and emotional pain to confirm the nature of pain depicted *(1 = not at all, 7 = a great extent*; e.g., Bruneau et al., 2013; Bruneau et al., 2012). The term emotional pain was specifically used as it encompasses affective responses to both physical and social pain (MacDonald & Leary, 2005).

Positive and Negative Affect

The International Positive and Negative Affect Schedule Short-Form (I-PANAS-SF; Thompson, 2007) was used to measure affective arousal among participants. The schedule uses two five-item scales to measure positive affect (active, alert, attentive, determined, inspired; α = .65) and negative affect (afraid, ashamed, hostile, nervous, upset; α = .68; 1 = *not at all,* 5 = *extremely*).

State Empathy and Personal Distress

Following previous research (Batson et al., 1997; Batson et al., 1987; Batson & Shaw, 1991), six adjectives were used to measure state empathy (compassionate, moved, sympathetic, soft-hearted, tender, warm; α = .87) and eight adjectives were used to measure state personal distress (alarmed, grieved, troubled, distressed, upset, disturbed, worried, perturbed; α = .94; 1 = *not at all*, 7 = *extremely*).

Disgust

As one video depicted graphic physical injury, participants rated the extent to which they felt disgust while watching videos in a single-item measure (1 = *not at all*, 7 = *extremely*).

Cognitive Resource Allocation

Cognitive resource allocation was operationalised as self-reported consumption ratings, the number of thoughts listed, and the use of insight words. In a single-item measure, participants self-reported how consumed they were by the experience of watching videos (1 = *not at all*, 7 = *completely*; e.g., Shteynberg et al., 2014). The total number of thoughts listed by participants in the untimed thought-listing task, adapted from Cacioppo and Petty (1981) and included in initial exploratory questions, was also calculated. Finally, participants' responses across exploratory questions were analysed using the insight sub-dictionary from the text analysis program Linguistic Word Count and Inquiry (LIWC; LIWC2015, Version 1.4.0; Pennebaker, Booth, et al., 2015). The insight sub-dictionary comprises 259 words and word stems, including "think" and "know" (*corrected* α = .84; Pennebaker, Boyd, et al., 2015).

Perceived Emotional Synchrony

Participants completed a six-item measure of perceived emotional synchrony. Items were adapted from Páez, Rimé, Basabe, Wlodarczyk, and Zumeta's (2015) Perceived Emotional Synchrony Scale to include "we felt more intense emotions because we all observed the same experience," "we felt a strong emotional bond between us," "we felt a strong rapport between us," "we all shared the same strong feelings," "we felt more sensitive to our emotions because we were surrounded by people who felt the same," and "we shared a moment of unity" (α = .91; 1 = *not at all*, 7 = *very much*).

Moral Salience

Moral salience was operationalised as self-reported feelings of morality and the use of moral words. Participants rated how moral they felt while watching videos in a single-item measure (1 = *not at all*, 5 = *extremely*). Participants' responses across exploratory questions were also analysed using the Moral Foundations Dictionary (MFD; Graham et al., 2009) in the text analysis program LIWC (LIWC2015, Version 1.4.0; Pennebaker, Booth, et al., 2015). The MFD comprises 295 words and word stems related to each of the moral foundations of harm and care, fairness and reciprocity, ingroup and loyalty, authority and respect, and purity and sanctity (α = .86; Graham et al., 2009).

Affiliation

Participants' responses across exploratory questions were analysed using the affiliation sub-dictionary from the text analysis program LIWC (LIWC2015, Version 1.4.0; Pennebaker, Booth, et al., 2015) to measure drive for affiliation among participants. The affiliation sub-dictionary comprises 248 words and word stems, including "ally," "friend," and "social" (*corrected* α = .80; Pennebaker, Boyd, et al., 2015).

Personal Experience

Participants responded to several questions about their personal experiences as they pertained to videos. Participants were asked whether they or someone close to them had had a similar experience to the one depicted in videos. Participants were also asked whether they had previously seen, read, or heard about video actors or previously seen, read, or heard about videos. Responses were presented to participants in a multiple-choice format (e.g., yes, no, don't know). If participants responded that they

had previously seen, read, or heard about a video actor or the video itself, they were asked to specify where they had done so.

Demographic Information

Participants were asked to provide general demographic information, including their gender, year of birth, employment status, ethnic background, religious affiliation, and religious service attendance.

Results

General Data Screening

One participant reported having completed an earlier pilot study that included videos used in Study 3B and was subsequently excluded from analyses (ID 38, physical pain).

Thematic Analysis

Thematic analysis was used to systematically identify recurrent themes across participant responses to initial exploratory questions and corresponding follow-up interview questions. A six-phase approach to analysis was again adopted (see Appendix E, Figures E1–E4; Braun & Clarke, 2006). Initial codes were generated using an inductive approach to ensure that they were strongly linked to the data (Boyatzis, 1998). Subsequent themes were formed using a more theoretical approach to ensure that they also effectively answered pre-defined research questions (Boyatzis, 1998). Final themes extend from participants' perceptions of experiences depicted in videos, participants' own reactions to videos, and sentiments expressed by participants about co-attendees. Themes extending from participants' perceptions of experiences depicted in videos and their own reactions to videos differed between pain conditions and are described as such. However, across pain conditions, participants expressed general curiosity (e.g., "curious," "interested," "engaged") in videos. Themes extending from sentiments

expressed by participants about co-attendees were largely consistent across pain conditions and are described as such.

Physical Pain

In terms of the experience depicted, participants in the physical pain condition focused predominantly on observable aspects of the motorcycle accident. Participants generally gave detailed descriptions of events leading up to the actor's injury, the injury itself, and the surrounding environment. As an example:

> Ben (the rider of the motorcycle) was riding his bike along a dirt track. Upon hitting an obstruction in the road, his motorcycle crashed into the side of the track flinging him off. Ben fell into the shrubs and bushland on the side of the road. Another rider stopped after Ben flagged him down. He ran over to Ben. The first thing the rider did was check for any signs of obvious wounds (broken bones etc.) then proceeded to try and take his helmet off. Ben got his helmet off and the camera changes so the viewer can see Ben. There is a chunk of wood in his cheek. 2.5 cm long chunk of wood embedded in his cheek (ID 5).

Participants described the injury as being "painful," expressing sentiments such as "that would have really hurt" (ID 7) and "that is a ridiculously large piece of wood in his face" (ID 20). In terms of their own reactions, participants in the physical pain condition predominantly expressed negatively valenced emotions, including anxiety (e.g., "anxious," "worried," "scared), shock (e.g., "shock," "surprise"), and disgust (e.g., "disgust," "queasy," "faint"). Participants also expressed "sympathy" and "empathy" for the actor. For example, "but that's how I felt anyway, like scared for him or something like that, worried, wondering how he felt" (ID 41).

Social Pain

In terms of the experience depicted, participants in the social pain condition focused most commonly on observable aspects associated with the actor's retelling of the loss of his child. Participants particularly focused on the actor's emotional state, including his "pain" and "grief". As an example:

> Ben's daughter passed away the night before. Ben stated that his daughter had, had a hard life and he was thankful to have been her father for the short time they were together. Ben was visibly crying and choking up as the emotions were still raw. He explained that he was thankful for her and how he loved her (ID 55).

In addition, participants questioned contextual aspects of the actor's loss, including "did his child suffer from illness? If so what?" (ID 55), "how old was she?" (ID 71), "where is the mother is she around?" (ID 60), and "why is he recording this?" (ID 51). In terms of their own reactions, participants in the social pain condition predominantly expressed negatively valenced emotions, including feeling "sad" and "upset". In some instances, participants also expressed wanting to "cry". As an example, "I was influenced by the tone and emotions being presented by Ben in the video. Seeing him sad and struggling to talk also made me feel sad" (ID 27). Participants also expressed feeling "sympathy" and "empathy" for the vignette actor. For example, "when watching the video, I had in mind my little cousin who is a toddler and how I would feel if he was to pass away, and I believe that made me feel more empathetic and sadness towards Ben's story" (ID 21).

No-Pain

In terms of the experience depicted, participants in the no-pain condition predominantly focused on observable aspects of the fishing trip. In particular,

participants described the equipment used, the fish caught, and the surrounding environment. As an example:

> Ben went fishing in a kayak. It looked like a cold wintery day with brown brick houses and trees with no leaves in the background. He apparently was on a lake. He caught two fish, admired them before returning them to the water (ID 11).

In terms of their own reactions, participants in the no-pain condition predominantly expressed positively valenced emotions, including feeling calm (e.g., "calm," "peaceful," "relaxed") and happy (e.g., "happy," "excited"). These emotions appeared to extend from the experience depicted. For example, "the calm and peaceful surrounding of the river helped me be happy and feel at ease" (ID 67). Of note, some participants instead expressed discomfort with the activity of fishing, expressing sentiments such as "I really don't like watching people fish, it makes me feel really uncomfortable" (ID 34).

Co-Attendees

Sentiments expressed by participants about co-attendees were largely consistent across pain conditions. Participants commonly perceived similar reactions to videos among themselves and co-attendees. Perceived similarities appeared to be based not only on observable co-attendee reactions but also expectations about appropriate reactions. Examples include, "I think so. I think so. I think they might have the same feeling about it, because when we was watching the video I think they had the same face" (ID 2, no-pain) and "both of us kind of grimaced at the sight of the injury so I can deduce that he too felt somewhat uneasy about the video" (ID 45, physical pain). Alternately, "I think they would have had a similar reaction like given the circumstances of it being sad, and things being the way they are" (ID 50, social pain) and "I can't

really tell, but I can only imagine that they also felt sorry for Ben. It is very distressing to see another person in pain" (ID 41, physical pain).

Participants predominantly expressed positive impressions of co-attendees, describing them as "nice" and "friendly". Examples include, "they all seem like nice and calm people, outside the room we glanced and smiled at each other. They all seem very casual and relaxed, ready to be involved in the study" (ID 7, physical pain), "he seemed like a really nice guy. He seemed really approachable and happy, so yeah I'd say positive" (ID 55, social pain) and "the participants look nice and approachable. Not very talkative but there was a comfortable silence. They seem like normal, well dressed, quiet university students" (ID 67, no-pain). Additionally, participants' positive impressions appeared to remain relatively stable. Participants predominantly responded "no" when asked if their impressions of co-attendees had changed over the course of the study. However, for some participants, the shared experience of watching the video appeared to reinforce existing positive impressions. For example, "my impression has not changed at all. I believe she seemed kind when she first came in and this was also reflected in her expression when watching the video on Ben" (ID 21, social pain).

Yet, participants widely expressed paying little attention to co-attendees or having limited interaction with co-attendees over the course of the study. In some instances, lack of attention to co-attendees appeared to influence participants' perceptions of their reactions to videos. Examples include, "I didn't have another opportunity to like further talk or discuss how we felt after watching the film" (ID 31, social pain) and "I honestly have no idea what the other participants were thinking. I have focused on my own thoughts and feelings in regards to the video throughout this questionnaire" (ID 34, no-pain). In some instances, lack of attention to co-attendees also appeared to influence participants' ability or willingness to form impressions of co-

attendees. For example, “no they haven’t. I don’t believe in having an impression of a person until you truly get to know them” (ID 5, physical pain) and “no I don’t think so, we have barely spoken” (ID 76, social pain).

Content Analysis

Content analysis using the text analysis program LIWC (LIWC2015, Version 1.4.0; Pennebaker, Booth, et al., 2015) was performed to objectively analyse differences across pain conditions in participant responses to initial exploratory questions and corresponding follow-up interview questions. LIWC references a built-in dictionary or imported dictionaries to examine various emotional, cognitive, and structural components present in a text sample. For each dictionary word, there is a corresponding dictionary entry that defines one or more sub-dictionaries. LIWC reads written or transcribed verbal text samples stored in digital format, compares each word in the text sample against a user-defined dictionary, and outputs the percentage of total words that comprise each sub-dictionary. Output specifically relevant to the LIWC built-in insight and affiliation sub-dictionaries (LIWC2015, Version 1.4.0; Pennebaker, Booth, et al., 2015), as well as the MFD (Graham et al., 2009), was used in content analyses.

Quantitative Data Screening

Quantitative data were screened for violations of assumptions underlying ANOVA. Visual inspection of the data did not reveal influential univariate outliers at any level of the grouped data (Tabachnick & Fidell, 2013). However, violations of basic normality assumptions for grouped data were identified using the Shapiro-Wilk W statistic (1965). Physical pain ratings in the physical pain condition, $W(22) = .62$, $p < .001$, and no-pain condition, $W(22) = .61$, $p < .001$; emotional pain ratings in the social pain condition, $W(20) = .49$, $p < .001$, and no-pain condition, $W(22) = .59$, $p < .001$; negative affect ratings in the social pain condition, $W(20) = .87$, $p = .010$, and no-pain

condition, $W(22) = .78$, $p < .001$; state personal distress ratings in the no-pain condition, $W(22) = .67$, $p < .001$; disgust ratings in the social pain condition, $W(20) = .57$, $p < .001$, and no-pain condition, $W(22) = .76$, $p < .001$; consumption ratings in the physical pain condition, $W(21) = .67$, $p < .001$; listed thought ratings in the no-pain condition, $W(22) = .91$, $p = .047$; insight word ratings in the social pain condition, $W(20) = .89$, $p = .031$; perceived emotional synchrony ratings in the no-pain condition, $W(22) = .87$, $p = .009$; morality ratings in the no-pain condition, $W(22) = .89$, $p = .023$; moral word ratings in the physical pain condition, $W(22) = .83$, $p = .002$, social pain condition, $W(20) = .73$, $p < .001$, and no-pain condition, $W(22) = .79$, $p < .001$, were all skewed in expected directions. Additionally, violations of homogeneity of variance assumptions were identified using Levene's test (1960). Generalised pain intensity, $F(2, 61) = 6.12$, $p = .004$, physical pain, $F(2, 61) = 10.64$, $p < .001$, emotional pain, $F(2, 61) = 32.98$, $p < .001$, negative affect, $F(2, 61) = 4.87$, $p = .011$, state personal distress, $F(2, 61) = 3.68$, $p = .031$, disgust, $F(2, 61) = 17.45$, $p < .001$, listed thought $F(2, 61) = 5.15$, $p = .009$, insight word, $F(2, 61) = 3.82$, $p = .027$, perceived emotional synchrony, $F(2, 61) = 5.39$, $p = .007$, and affiliation word, $F(2, 61) = 12.49$, $p < .001$, ratings were heteroscedastic. Simulation studies show that ANOVA is highly robust to violations of underlying assumptions, particularly severe violations of normality (Schmider et al., 2010). Consequently, to facilitate interpretation of results, data were analysed in their raw state.

Qualitative data were further screened for violations of assumptions underlying analysis of covariance (ANCOVA), with the intention of controlling for group size and pre-existing relationship strength. To control for pre-existing relationship strength, mean pre-existing relationship ratings were created (0 = *no relationships*, 5 = *very strong relationships*). Twenty participants reported pre-existing relationships with fellow participants. However, only two reported knowing more than one other

participant and the strength of reported relationships was not generally strong ($M_{strength}$ = 3.60, $SD_{strength}$ = 1.40). Subsequent screening revealed violations of the assumption of independence of the independent variable and covariates. Pain conditions differed significantly on both group size and pre-existing relationship strength, $F(2, 61) = 15.00$, $p < .001$ and $F(2, 61) = 6.81$, $p = .002$, respectively. However, in instances of random assignment, it can be argued that group differences on covariates arise by chance (Miller & Chapman, 2001). On this basis, data were analysed as intended. Visual inspection of the data revealed that the assumption of linearity between covariates and outcome variables at all levels of the grouped data was met (Howell, 2007). Conversely, a violation of the assumption of homogeneity of regression coefficients was identified (Howell, 2007). An interaction between pain condition and pre-existing relationship strength was found for physical pain ratings, $F(2, 58) = 4.55$, $p = .015$. As a result, the effect of pre-existing relationship strength on physical pain ratings was not controlled for in analyses.

ANOVA and ANCOVA

Quantitative data relevant to participants' experiences collectively attending to videos were analysed using a series of one-way ANOVA to determine differences across pain conditions (see Appendix F, Table F1). Where appropriate, significant effects were followed by simple contrasts (see Appendix F, Table F2). Quantitative data were further analysed using a series of ANCOVA to control for the effects of group size and pre-existing relationship strength on relevant outcome variables (see Appendix F, Table F3). Analyses were conducted in the statistical software package Stata/IC (Version 15.1).

Generalised Pain Intensity

A significant difference in generalised pain intensity was found between pain conditions, $F(2, 61) = 109.03$, $MSE = 2.01$, $p < .001$, $\eta^2 = .78$. Generalised pain intensity ratings were significantly higher in both the physical pain ($M = 7.56$, $SD = 1.75$) and social pain ($M = 7.08$, $SD = 1.54$) conditions than in the no-pain condition ($M = 1.84$, $SD = 0.79$), *difference* = 5.72, $p < .001$, 95% CI [4.87, 6.58] and *difference* = 5.23, $p < .001$, 95% CI [4.36, 6.11], respectively. Generalised pain intensity ratings were not significantly different between the physical pain and social pain conditions, *difference* = 0.49, $p = .268$, 95% CI [-0.39, 1.36]. The effect of attending to pain on generalised pain intensity ratings remained significant after controlling for group size and pre-existing relationship strength, $F(2, 59) = 99.86$, $MSE = 2.07$, $p < .001$, $\eta^2 = .77$.

Physical Pain

A significant difference in physical pain was found between pain conditions, $F(2, 61) = 54.74$, $MSE = 2.32$, $p < .001$, $\eta^2 = .64$. Physical pain ratings were significantly higher in the physical pain condition ($M = 5.95$, $SD = 1.50$) than in the social pain ($M = 4.35$, $SD = 2.11$) and no-pain ($M = 1.23$, $SD = 0.69$) conditions, *difference* = 1.60, $p = .001$, 95% CI [0.66, 2.55] and *difference* = 4.73, $p < .001$, 95% CI [3.81, 5.65], respectively. Physical pain ratings were also significantly higher in the social pain condition than in the no-pain condition, *difference* = 3.12, $p < .001$, 95% CI [2.18, 4.06]. The effect of attending to pain on physical pain ratings remained significant after controlling for group size, $F(2, 60) = 53.81$, $MSE = 2.35$, $p < .001$, $\eta^2 = .64$.

Emotional Pain

A significant difference in emotional pain was similarly found between pain conditions, $F(2, 61) = 141.75$, $MSE = 1.20$, $p < .001$, $\eta^2 = .82$. Emotional pain ratings

were significantly higher in the social pain condition (M = 6.70, SD = 0.66) than in the physical pain (M = 4.86, SD = 1.70) and no-pain (M = 1.14, SD = 0.47) conditions, *difference* = 1.84, $p < .001$, 95% CI [1.16, 2.51] and *difference* = 5.56, $p < .001$, 95% CI [4.89, 6.24], respectively. Emotional pain ratings were also significantly higher in the physical pain condition than in the no-pain condition, *difference* = 3.73, $p < .001$, 95% CI [3.07, 4.39]. The effect of attending to pain on emotional pain ratings remained significant after controlling for group size and pre-existing relationship strength, $F(2, 59) = 121.18$, $MSE = 1.24$, $p < .001$, $\eta^2 = .80$.

Positive Affect

A significant difference in positive affect was found between pain conditions, $F(2, 61) = 3.31$, $MSE = 0.42$, $p = .043$, $\eta^2 = .10$. Positive affect was significantly higher in the physical pain condition (M = 2.53, SD = 0.66) than in the no-pain condition (M = 2.04, SD = 0.62), *difference* = 0.49, $p = .014$, 95% CI [0.10, 0.88]. Positive affect was not significantly different between the social pain condition (M = 2.19, SD = 0.66) and the physical pain condition, *difference* = -0.34, $p = .096$, 95% CI [-0.74, 0.06], or the no-pain condition, *difference* = 0.15, $p = .445$, 95% CI [-0.25, 0.55]. However, the effect of attending to pain on positive affect did not remain significant after controlling for group size and pre-existing relationship strength, $F(2, 59) = 1.61$, $MSE = 0.41$, $p = .210$, $\eta^2 = .05$.

Negative Affect

A significant difference in negative affect was also found between pain conditions, $F(2, 61) = 17.54$, $MSE = 0.37$, $p < .001$, $\eta^2 = .37$. Negative affect was significantly higher in both the physical pain (M = 2.40, SD = 0.79) and social pain (M = 1.94, SD = 0.53) conditions than in the no-pain condition (M = 1.32, SD = 0.45), *difference* = 1.08, $p < .001$, 95% CI [0.72, 1.45] and *difference* = 0.62, $p = .002$, 95% CI

[0.25, 1.00], respectively. Negative affect was also significantly higher in the physical pain condition than in the social pain condition, *difference* = 0.46, p = .017, 95% CI [0.08, 0.84]. The effect of attending to pain on negative affect remained significant after controlling for group size and pre-existing relationship strength, $F(2, 59) = 16.16$, $MSE = 0.38$, $p < .001$, $\eta^2 = .35$.

State Empathy

A significant difference in state empathy was found between pain conditions, $F(2, 61) = 19.84$, $MSE = 1.53$, $p < .001$, $\eta^2 = .39$. State empathy was significantly higher in both the physical pain ($M = 3.89$, $SD = 1.30$) and social pain ($M = 4.88$, $SD = 1.24$) conditions than in the no-pain condition ($M = 2.48$, $SD = 1.17$), *difference* = 1.40, $p <$ .001, 95% CI [0.65, 2.15] and *difference* = 2.39, $p < .001$, 95% CI [1.63, 3.16], respectively. State empathy was also significantly higher in the social pain condition than in the physical pain condition, *difference* = 0.99, p = .012, 95% CI [0.22, 1.75]. The effect of attending to pain on state empathy remained significant after controlling for group size and pre-existing relationship strength, $F(2, 59) = 15.74$, $MSE = 1.58$, $p <$ .001, $\eta^2 = .35$.

State Personal Distress

A significant difference in state personal distress was also found between pain conditions, $F(2, 61) = 17.38$, $MSE = 1.77$, $p < .001$, $\eta^2 = .36$. State personal distress was significantly higher in both the physical pain ($M = 3.89$, $SD = 1.58$) and social pain ($M = 3.21$, $SD = 1.31$) conditions than in the no-pain condition ($M = 1.59$, $SD = 1.04$), *difference* = 2.30, $p < .001$, 95% CI [1.50, 3.10] and *difference* = 1.62, $p < .001$, 95% CI [0.80, 2.44], respectively. State personal distress was not significantly different between the physical pain and social pain conditions, *difference* = 0.68, p = .101, 95% CI [-0.14, 1.50]. The effect of attending to pain on state personal distress remained significant

after controlling for group size and pre-existing relationship strength, $F(2, 59) = 16.22$, $MSE = 1.79$, $p < .001$, $\eta^2 = .35$.

Disgust

A significant difference in disgust was found between pain conditions, $F(2, 61) = 11.39$, $MSE = 2.56$, $p < .001$, $\eta^2 = .27$. Disgust was significantly higher in the physical pain condition ($M = 3.50$, $SD = 2.26$) than both the social pain ($M = 1.30$, $SD = 0.92$) and no-pain ($M = 1.73$, $SD = 1.24$) conditions, *difference* = 2.20, $p < .001$, 95% CI [1.21, 3.19] and *difference* = 1.77, $p = .001$, 95% CI [0.81, 2.74], respectively. Disgust was not significantly different between the social pain and no-pain conditions, *difference* = -0.43, $p = .391$, 95% CI [-1.42, 0.56]. The effect of attending to pain on disgust remained significant after controlling for group size and pre-existing relationship strength, $F(2, 59) = 7.49$, $MSE = 2.42$, $p = .001$, $\eta^2 = .20$.

Consumption Ratings

A significant difference in consumption was found between pain conditions, $F(2, 59) = 7.69$, $MSE = 2.11$, $p = .001$, $\eta^2 = .21$. Consumption ratings were significantly higher in both the physical pain ($M = 5.76$, $SD = 1.34$) and social pain ($M = 5.25$, $SD = 1.45$) conditions than in the no-pain condition ($M = 4.05$, $SD = 1.56$), *difference* = 1.71, $p < .001$, 95% CI [0.82, 2.61] and *difference* = 1.20, $p = .010$, 95% CI [0.29, 2.11], respectively. Consumption ratings were not significantly different between the physical pain and social pain conditions, *difference* = 0.51, $p = .264$, 95% CI [-0.40, 1.42]. The effect of attending to pain on consumption ratings remained significant after controlling for group size and pre-existing relationship strength, $F(2, 57) = 5.64$, $MSE = 2.05$, $p = .006$, $\eta^2 = .17$.

Listed Thoughts

A significant difference in the number of thoughts listed was found between pain conditions, $F(2, 61) = 6.37$, $MSE = 6.80$, $p = .003$, $\eta^2 = .17$. Listed thoughts were significantly higher in the physical pain condition ($M = 8.45$, $SD = 3.08$) than in the social pain ($M = 6.50$, $SD = 2.59$) and no-pain ($M = 5.73$, $SD = 2.05$) conditions, *difference* = 1.95, $p = .018$, 95% CI [0.34, 3.57] and *difference* = 2.72, $p = .001$, 95% CI [1.16, 4.30], respectively. Listed thoughts were not significantly different between the social pain and no-pain conditions, *difference* = 0.77, $p = .341$, 95% CI [-0.84, 2.38]. The effect of attending to pain on the number of thoughts listed remained significant after controlling for group size and pre-existing relationship strength, $F(2, 59) = 4.59$, $MSE = 6.99$, $p = .014$, $\eta^2 = .13$.

Insight Words

A significant difference in insight words was found between pain conditions, $F(2, 61) = 4.00$, $MSE = 1.92$, $p = .023$, $\eta^2 = .12$. Use of insight words was significantly more frequent in the social pain ($M = 4.76$, $SD = 1.23$) and no-pain ($M = 4.60$, $SD = 1.80$) conditions than in the physical pain condition ($M = 3.65$, $SD = 0.99$), *difference* = 1.11, $p = .012$, 95% CI [0.25, 1.97] and *difference* = 0.95, $p = .027$, 95% CI [0.11, 1.78], respectively. Use of insight words was not significantly different between the social pain and no-pain conditions, *difference* = 0.16, $p = .705$, 95% CI [-0.69, 1.02]. However, the effect of attending to pain on insight words did not remain significant after controlling for group size and pre-existing relationship strength, $F(2, 59) = 1.29$, $MSE = 1.87$, $p = .284$, $\eta^2 = .04$.

Perceived Emotional Synchrony

A significant difference in perceived emotional synchrony was found between pain conditions, $F(2, 61) = 17.00$, $MSE = 1.17$, $p < .001$, $\eta^2 = .36$. Perceived emotional

synchrony was significantly higher in both the physical pain (M = 3.30, SD = 1.28) and social pain (M = 3.15, SD = 1.26) conditions than in the no-pain condition (M = 1.57, SD = 0.59), *difference* = 1.72, $p < .001$, 95% CI [1.07, 2.38] and *difference* = 1.58, $p < .001$, 95% CI [0.91, 2.25], respectively. Perceived emotional synchrony was not significantly different between the physical pain and social pain conditions, *difference* = 0.15, $p = .665$, 95% CI [-0.52, 0.81]. The effect of attending to pain on perceived emotional synchrony remained significant after controlling for group size and pre-existing relationship strength, $F(2, 59) = 16.97$, $MSE = 1.19$, $p < .001$, $\eta^2 = .37$.

Morality Ratings

A significant difference in feelings of morality was found between pain conditions, $F(2, 61) = 4.32$, $MSE = 1.31$, $p = .018$, $\eta^2 = .12$. Morality ratings were significantly higher in the social pain condition (M = 2.90, SD = 1.33) than in the no-pain condition (M = 1.86, SD = 0.94), *difference* = 1.04, $p = .005$, 95% CI [0.33, 1.74]. Morality ratings were not significantly different between the physical pain condition (M = 2.41, SD = 1.14) and the social pain and no-pain conditions, *difference* = -0.49, $p = .170$, 95% CI [-1.20, 0.22] and *difference* = 0.55, $p = .119$, 95% CI [-0.14, 1.23], respectively. The effect of attending to pain on morality ratings remained significant after controlling for group size and pre-existing relationship strength, $F(2, 59) = 3.89$, $MSE = 1.35$, $p = .026$, $\eta^2 = .12$.

Moral Words

A significant difference in moral words was not found between pain conditions, $F(2, 61) = 0.14$, $p = .865$, $MSE = 0.05$, $\eta^2 = .005$. Use of moral words was not significantly different between the physical pain (M = 0.16, SD = 0.21), social pain (M = 0.15, SD = 0.29), and no-pain (M = 0.12, SD = 0.18) conditions. The effect of attending

to pain on moral words remained non-significant after controlling for group size and pre-existing relationship strength, $F(2, 59) = 0.11$, $MSE = 0.05$, $p = .895$, $\eta^2 = .004$.

Affiliation Words

A significant difference in affiliation words was found between pain conditions, $F(2, 61) = 9.42$, $MSE = 0.96$, $p < .001$, $\eta^2 = .24$. Use of affiliation words was significantly more frequent in both the physical pain ($M = 1.94$, $SD = 1.09$) and social pain ($M = 1.86$, $SD = 1.21$) conditions than in the no-pain condition ($M = 0.79$, $SD = 0.52$), *difference* = 1.16, $p < .001$, 95% CI [0.57, 1.75] and *difference* = 1.07, $p = .001$, 95% CI [0.46, 1.67], respectively. Use of affiliation words was not significantly different between the physical pain and social pain conditions, *difference* = 0.09, $p = .772$, 95% CI [-0.52, 0.69]. The effect of attending to pain on affiliation words remained significant after controlling for group size and pre-existing relationship strength, $F(2, 59) = 10.46$, $MSE = 0.95$, $p < .001$, $\eta^2 = .26$.

Discussion

The purpose of Study 3B was to conduct an exploratory analysis of the cognitive and affective processes evoked when physically proximate individuals collectively attend to others' pain in person. Pain was found to be successfully manipulated. In line with the proposition that individuals who collectively attend to others' pain are motivated to affiliate with one another, hypothesised differences in drive for affiliation between pain conditions were supported. Further, evidence was found for several processes associated with collectively attending to others' pain in person, which have the potential to mediate reported affiliative effects. More specifically, hypothesised differences between pain conditions in cognitive resource allocation, perceived emotional synchrony, and moral salience were at least partially supported.

Manipulation of Pain

Physical and social pain were found to be successfully manipulated across videos. Both videos depicting pain were perceived to be significantly more intense, as well as significantly more physically and emotionally painful, than the non-painful video. In this connection, participants in the physical and social pain conditions referenced the pain experienced by video actors. Both videos depicting pain also elicited significantly more negative affect than the non-painful video. Participants in the physical pain condition expressed feelings of anxiety, shock, and disgust, while participants in the social pain condition predominantly expressed feeling sad and upset. Alternately, participants in the no-pain condition predominantly expressed feeling happy and calm. Further, both videos depicting pain elicited significantly more state empathy and personal distress than the non-painful video. Participants in the physical and social pain conditions consistently reported sympathy and empathy for video actors.

Drive to Affiliate

In line with the proposition that individuals who collectively attend to others' pain are motivated to affiliate with one another, and as hypothesised, collectively attending to both physical and social pain elicited significantly more frequent use of affiliation words than collectively attending to non-painful content. The use of affiliation words in both the physical and social pain conditions was moderately frequent compared to base rates (reported by Pennebaker, Boyd, et al., 2015). On average, 1.94% of total words used by participants in the physical pain condition and 1.86% of total words used by participants in the social pain condition were affiliation words, in comparison to 0.79% of total words used by participants in the no-pain condition. However, given the nature of questions asked to participants, it is difficult to differentiate between the use of affiliation words in reference to video actors and the use

of affiliation words in reference to co-attendees. Participants widely expressed paying little attention to co-attendees over the course of the study, indicating that drive for affiliation may not have been directed towards them. Still, for some participants, the shared experience of attending to others' pain appeared to reinforce positive impressions: "we did watch a fairly confronting video together, so that has made me feel almost connected to them, having shared such an experience" (ID 7, physical pain). Thus, at the least, findings from this study provide preliminary support for the proposition that collectively attending to others' pain promotes affiliation among those with whom it is attended outside of ritual contexts.

Cognitive Resource Allocation

Evidence supporting the hypothesis that collectively attending to others' pain would command significantly more of participants' cognitive resources than collectively attending to non-painful content was measure dependent. Participants reported that they were significantly more consumed by the experience of collectively attending to others' physical and social pain as compared to non-painful content. Further, participants listed significantly more thoughts after collectively attending to others' physical pain as compared to non-painful content. Comparatively, in the social pain condition, participants appeared to reflect on the significance of co-attended pain by questioning contextual aspects of the video actor's loss (e.g., "did his child suffer from illness?" ID 55). However, participants did not list significantly more thoughts after collectively attending to others' social pain as compared to non-painful content. Additionally, the use of insight words did not significantly differ between pain and non-pain conditions after controlling for group size and pre-existing relationship strength. Therefore, overall, findings from this study provide moderate support for the possibility

that collectively attending to others' pain leads to affiliation among co-attendees via self-reflection, as is suggested by the modes of religiosity theory.

Notably, the modes of religiosity theory suggests that infrequent but highly dysphorically arousing collective experiences prompt considerable cognitive processing of both co-attended stimuli and co-attendees, with resulting memories for co-attendees creating a basis for interpersonal bonding (Atkinson & Whitehouse, 2011; Whitehouse, 2004, 2005; Whitehouse & Lanman, 2014). Although participants in this study reported being more consumed by videos depicting pain, they also widely expressed paying little attention to co-attendees. As such, it is unclear to what extent collectively attending to videos depicting pain prompted cognitive processing of the co-attended video exclusively or included knowledge of co-attendees. In this connection, previous research suggests that highly arousing collective experiences elicit reflection extending from a period of one week (Páez et al., 2015; Rimé et al., 2010) to several months (Richert et al., 2005; Xygalatas, Schjoedt, et al., 2013). Therefore, more specific measurement of the direction of cognitive resource allocation following collective attention to others' pain, at even a one-week delay, may provide greater insight into the extent to which processing includes both co-attended stimuli and co-attendees.

Perceived Emotional Synchrony

The hypothesis that collectively attending to others' pain would elicit significantly greater perceived emotional synchrony than collectively attending to non-painful content was supported. Participants who collectively attended others' physical and social pain reported significantly greater perceived emotional synchrony than participants who attended to non-painful content. In terms of specific emotional states, videos depicting both physical and social pain elicited significantly stronger negative affect, state empathy, and personal distress in comparison to the non-painful video.

Further, the video depicting physical pain elicited significantly stronger feelings of disgust than the non-painful video. Relatedly, perceived similarities in emotional states appeared to be based on not only observable reactions among co-attendees but also expectations about appropriate reactions to pain. No opportunity was given to participants to actively discuss their emotional states. Moreover, participants widely expressed paying little attention to co-attendees over the course of the study. As a result, synchronised affect among co-attendees was likely a largely automatic process resulting from a collective attention state. Similar to findings from Study 2B, this finding is consistent with previous research suggesting that individuals assume affective consensus with those around them (Coleman, 2018; Ross et al., 1977), as well as research showing that negative valance synchronises individuals' brain areas associated with emotional sensation and understating of others' action (Nummenmaa et al., 2012). In sum, findings from this study are consistent with existing evidence for the possibility that collectively attending to others' pain leads to affiliation among co-attendees via perceived emotional synchrony (Fischer et al., 2014; Konvalinka et al., 2011; Páez et al., 2007; Páez et al., 2015; Xygalatas et al., 2011).

Moral Salience

The hypothesis that collectively attending to others' pain would make moral concepts significantly more salient than collectively attending to non-painful content was partially supported. Participants reported that they felt significantly more moral while collectively attending to others' social pain as compared to non-painful content. However, no difference was found in feelings of morality between the physical pain and no-pain conditions. Further, participants' use of moral words did not significantly differ between pain and no-pain conditions.

One explanation for these discrepancies is that affiliation among those who collectively attend to others' social pain operates through alternate mechanisms than affiliation among those who collectively attend to others' physical pain. Yet, the concept of moral cleansing, in which attending to others' pain is thought to act as a moral reminder, has predominantly been evidenced in response to physically mediated pain (Bastian et al., 2011; Mitkidis et al., 2017; Shariff & Norenzayan, 2007; Shu et al., 2012; van Bunderen & Bastian, 2014). An alternate explanation for these discrepancies is the influence of specific painful experiences attended to in this study on moral thinking. For example, participants in the social pain condition collectively attended to a father emotionally recounting the death of his child. In this connection, there is some evidence to suggest that mortality salience influences moral judgements (Trémolière et al., 2012). In comparison, participants in the physical pain condition collectively attended to the disgust-inducing facial impalement of a motorbike rider. However, a strong link has also been shown between disgust and moral judgement, whereby feeling disgust elicits more severe moral judgments (Białek et al., 2020; Rozin & Fallon, 1987; Tracy et al., 2019).

Also relevant to the interpretation of moral salience findings in Study 3B is low statistical power associated with its modest sample size. A sensitivity power analysis revealed that the minimum detectable effect of a one-way ANOVA with 64 participants across three independent groups, using power of 80% and an alpha of .05, is $\eta^2 = 0.14$ (G*Power Version 3.1.9.6; see Faul et al., 2007). A subsequent power analysis revealed that on the basis of the effect size observed for morality ratings in Study 3B, $\eta^2 = .12$, a minimum sample of 75 participants would be required to obtain 80% power with an alpha of .05 (G*Power Version 3.1.9.6; see Faul et al., 2007). However, in comparison, on the basis of the extremely small effect size observed for moral word usage in Study

3B, $\eta^2 = .005$, a minimum sample of 1971 participants would be required to obtain 80% power with an alpha of .05 (G*Power Version 3.1.9.6; see Faul et al., 2007). Therefore, it is possible that the observed pattern of morality ratings, but not non-significant moral word usage findings, are attributable to low statistical power. In sum, while findings from this study lend some support to the idea that collectively attending to others' pain leads to affiliation among co-attendees by way of moral cleansing, they also highlight the need for further investigation into the mediating role of moral cleansing following collective attention to both physical and social pain.

Conclusions

Findings from Study 3B offer preliminary support for the proposition that individuals who collectively attend to others' physical and social pain are motivated to connect with one another, at least when co-attendees are physically proximate. Findings from Study 3B further suggest that collectively attending to the focal event of pain in an in-person context aligns both the cognitive and emotional states of co-attendees. In doing so, findings from Study 3B offer insight into mechanisms that might mediate the interpersonal effects of collectively attending to others' pain. Within this thesis, insight gained into these mechanisms was specifically employed in the development of subsequent online studies.

Chapter 5

The Affiliative Power of Pain Online (*Manuscript*)

Statement of Contribution to a Co-Authored Paper

This chapter includes a co-authored paper. The status of the co-authored paper, including all authors, are:

- Mitchell, J., Occhipinti, S., & Oaten, M. (2020). The Affiliative Power of Pain Online. *Manuscript submitted for publication.*

My contribution to the paper involved:

- Conceptualisation, Methodology, Investigation, Data Curation, Formal Analysis, Writing - Original Draft, Writing - Review and Editing.

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The Affiliative Power of Pain Online

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Abstract

Pain is rarely suffered alone. In contemporary online contexts, public manifestations of pain can command the collective attention of hundreds, even millions of online users. Across two experimental studies, we explored the possibility that in online contexts collectively attending to others' pain influences interpersonal relations among those with whom it is attended. In Study 1 we found evidence for the phenomenon of pain collectively attended to online. In Study 2 we found evidence to suggest that in online contexts collectively attending to others' physical and social pain both indirectly promotes affiliative attitudes among attendees through perceived emotional synchrony and indirectly lessens generosity among attendees through moral salience. Considered together, our findings highlight that in online contexts an interplay of cognitive and affective processes account for varying interpersonal outcomes among those who collectively attend to other's pain. Our findings increase practical understanding of how shared experiences of pain can be harnessed to influence social change online, which we discuss in the context of the Covid-19 pandemic.

Keywords: physical pain, social pain, interpersonal affiliation, cognitive resources, synchrony, moral salience

Introduction

Pain commands our collective attention (Eccleston & Crombez, 1999). Even in contemporary online contexts, where attention is a commodity, public manifestations of pain command the collective attention of numerous online users. To illustrate, in 2020 actor Dwayne Johnson lost his father unexpectedly. In a heartfelt eulogy Johnson described his grief, sharing that he wished that he had "just one more shot, you know, just to say goodbye…" Johnson subsequently posted the eulogy to the social media platform Instagram. It has since been viewed more than 11,000,000 times and has amassed more than 70,000 comments (Johnson, 2020).

Existing empirical evidence explains that individuals choose to share their pain with others to seek social support (Hadjistavropoulos et al., 2011), that those who experience pain together become bonded (Bastian, Jetten, & Ferris, 2014), and that those who attend to others' pain offer social support to alleviate suffering (Batson et al., 1987; Craig, 2009; Williams et al., 2002). What is missing from current discourse is understanding of how collectively attending to others' pain influences relations among those with whom it is attended. During the collective attention state, individuals who attend to a common manifestation of pain are perceived to do so with singular attentional focus (Shteynberg, 2015). One possibility is that this unique form of shared experience promotes affiliative attitudes and behaviours among co-attendees. In this context, we define affiliation as comprising of processes by which individuals involve themselves in interpersonal bonds (Feldman, 2012; Merriam-Webster, n.d.). Within the digital age, such an effect has the potential to facilitate large-scale bonding. A better understanding of this possibility will extend current understanding of human pain and interpersonal affiliation, as well as their relationship in online contexts. Given that desire for interpersonal attachment is a fundamental human motivation (Baumeister &

Leary, 1995), understanding interpersonal affiliation and its antecedents has wide-ranging implications.

Here, we first review evidence linking pain and affiliation, leading to the proposition that merely attending to others' pain is sufficient to promote social bonding. Next we discuss the digital age, leading to the added proposition that attending to others' pain also has the potential to promote social bonding in online contexts. We subsequently review accounts which can be used explain this proposition, highlighting the potential for multiple mediating mechanisms. We then outline the current studies.

Physical and Social Pain as *Social Glue*

Pain is rarely suffered alone, but more commonly manifested in social environments where the suffers' distress is shared with nearby others (Hadjistavropoulos et al., 2011). Generally speaking, shared experiences facilitate liking (Pinel et al., 2006), closeness (Haj-Mohamadi et al., 2018; Wolf et al., 2016), and conformity (Pinel et al., 2010). However, shared pain appears to be particularly potent in promoting interpersonal affiliation. A growing number of anecdotal accounts and empirical studies link shared physical pain, specifically, to interpersonal affiliation. Physical pain being an "unpleasant sensory and emotional experience arising from actual or potential tissue damage, or described in terms of such damage" (The International Association for the Study of Pain Task Force on Taxonomy, 1994, p. 210). Numerous accounts exist of camaraderie among soldiers during war (Elder & Clipp, 1989; Whitehouse et al., 2017), athletes bonded within painful sporting contexts (Downey, 2007; Turner & Wainwright, 2003; Whitehouse et al., 2017), as well as of fusion among survivors of large-scale disasters (Drury et al., 2009; Jong et al., 2015; Rodríguez et al., 2006; Vezzali et al., 2016). Corroborating empirical evidence shows that strangers who share physically painful experiences bond to a greater extent,

cooperate more (Bastian, Jetten, & Ferris, 2014), and participate in more supportive interactions (Bastian et al., 2018) than strangers who share functionally similar but non-painful experiences. Accordingly, shared physical pain may be seen to foster an environment in which strangers are motivated to affiliate, separate from alternate group processes such as pain for the group (Aronson & Mills, 1959; Olivola & Shafir, 2013) and common fate (Brewer & Kramer, 1986; Campbell, 1958). It follows that, pain may not need to necessarily be experienced personally to act as a social glue. As archetypal sign of proximal threat (Craig, 2009) pain interrupts, distracts, and demands the attention of not only the sufferer but also the collective attention of other social agents (Crombez et al., 1997).

In this connection, anthropological research provides evidence for affiliation among those who merely attend to others' physical pain. Collective rituals have been in existence for over 150,000 years (White et al., 2003), including seemingly unnecessarily painful practices of self-flagellation, circumcision, fire-walking, and body piercing (Glucklich, 2003). Adding to anthropological speculation (Durkheim, 1915; Fischer & Xygalatas, 2014; Henrich, 2009; Irons, 1996; Morinis, 1985; Norenzayan & Shariff, 2008; Sosis & Bressler, 2003; van Gennep, 1960), historical evidence (Atkinson & Whitehouse, 2011; Sosis & Bressler, 2003) and recent experimental field studies (Bulbulia et al., 2013; Mitkidis et al., 2017; Xygalatas, Mitkidis, et al., 2013) suggest that painful ritual practices in fact serve the evolutionary purpose of promoting mutually enhancing cooperative commitments among both ritual performers and ritual attendees. Field studies of the Hindu festival of Thaipusam report that performers and attendees of high intensity rituals involving physically painful practices express more inclusive social identities and donate significantly more to collective causes than performers of low intensity rituals, with perceived pain positively related to donation (Xygalatas,

Mitkidis, et al., 2013). Further, that physically painful ritual practices promote honesty among ritual attendees, but not among ritual performers (Mitkidis et al., 2017). Findings such as these suggest that merely attending to others' physical pain is sufficient to promote affiliative attitudes and behaviours among those with whom it is attended. An effect, which appears to operate in addition to dissonance motivated commitment of ritual performers (Konvalinka et al., 2011; Norenzayan & Shariff, 2008; Sosis, 2003; Xygalatas, Mitkidis, et al., 2013) and extends beyond empathy evoked altruism offered to ritual performers who endure painful practices (Batson et al., 1987; Craig, 2009; Williams et al., 2002). On this basis, we make the proposition that even outside of ritual contexts collectively attending to others' physical pain may be sufficient to promote affiliative attitudes and behaviours among co-attendees to a greater extent than collective attention to similar non-painful experiences.

Several anecdotal accounts and an increasing number of experimental studies provide further evidence for affiliation among those who are also exposed to social pain. Social pain being an unpleasant emotional experience arising from perceived distance from desired relationship partners or groups (Eisenberger & Lieberman, 2004; MacDonald & Leary, 2005). For instance, accounts have long-existed of fusion among individuals who are embarrassed during trials of initiation (Aronson & Mills, 1959; Gerard & Mathewson, 1966; Keating et al., 2005; Whitehouse et al., 2017). Experimental research more specifically shows that individuals who are socially excluded feel greater group-based identification (Schmitt & Branscombe, 2002), conform more to others' opinions (Williams et al., 2002), cooperate more with others (Ouwerkerk et al., 2005), work harder in group settings (Williams & Sommer, 1997), and allocate higher cash rewards to others (Maner et al., 2007). Exposure to social pain is therefore considered sufficient to motivate individuals to recruit affiliative strategies

to repair or seek new social connections (Smart Richman & Leary, 2009), comparable to the function of physical pain as social glue. Perhaps to the extent, we propose, that merely attending to others' social pain is also sufficient to promote affiliative attitudes and behaviours among co-attendees to a greater extent than collective attention to similar non-painful experiences.

As we have presented, evidence from a diverse range of literatures draws links between shared experiences of pain and interpersonal affiliation. The large majority of which is notably premised on the physical co-presence of those who personally experience and attend to pain. Yet, over the last several decades humans have steadily developed new technologies for social interaction. As a result, we have shifted from fewer in-person interactions to more online, technology-mediated interactions (Lieberman & Schroeder, 2020).

The Digital Age

Over 80% of Americans now report going online on a daily basis, including the 28% who say they are *almost constantly* online (Perrin & Kumar, 2019). The digital age is distinguished by a revolution in technological mediation through which we interreact with one another. Face-to-face interactions, landline telephone calls, and postal mail are now joined by mobile phone calls, video calls, email, messaging, social media, video sharing, and more (Baym, 2010). Empirical evidence suggests that individuals utilise technologies such as these to enhance their social lives (Habes, 2019; Haridakis & Hanson, 2009; Khan, 2017). In this connection, the shift from offline to online interactions has fundamentally changed the way humans form interpersonal bonds (Lieberman & Schroeder, 2020). Online technology allows millions of people worldwide to communicate effortlessly, expanding and diversifying social networks (Baym, 2010; Lieberman & Schroeder, 2020), as well as blurring the boundary between

interpersonal and mass communication (Baym, 2010). In this way, online environments provide unique public spaces for manifesting personal experiences of pain (Chou et al., 2011; Egan & Moreno, 2011; Egnoto et al., 2014; Gonzalez-Polledo & Tarr, 2016; Heaivilin et al., 2011; Jashinsky et al., 2014; Moreno et al., 2011). Pain which was formerly privately shared and commanded only the attention of nearby others, is now also manifested publicly online and commands the collective attention of numerous geographically dispersed others. As humans continue to immerse themselves online, we argue that the potential for collectively attended pain is unprecedented. Further, building upon established links between shared experiences of pain and interpersonal affiliation, we propose that in contemporary online contexts attending to others' physical and social pain may be sufficient to promote affiliative attitudes and behaviours among co-attendees to a greater extent than collective attention to similar non-painful content (Hypotheses 1 and 2, respectively). An effect, which to our knowledge, is yet to be explored. In comparison to pain attended to in-person, pain attended to online has the potential to bond together individuals on a much larger scale across geographical boundaries.

Explanatory Accounts

Extending from shared attention, anthropological, and wider social psychological literatures, a number of explanations exist as to why collectively attending to others' pain should promote affiliation among co-attendees. Despite this, the specific mechanisms that mediate predicted effects remain ambiguous. It is unlikely that any single mechanism accounts for affiliative attitudes and behaviours among co-attendees. Rather, we propose that an interplay of cognitive and affective processes described in the reviewed accounts likely offers the most complete explanation for predicted effects.

According to one account, experiences which are highly arousing, particularly those which are highly dysphorically arousing, prompt considerable personal reflection and evoke strong emotions to be stored in episodic memory. Additionally, memories are thought to involve who was present during the experience, creating strong interpersonal bonds among them (Atkinson & Whitehouse, 2011; Whitehouse, 2004, 2005; Whitehouse et al., 2017). In support of this reasoning, experimental studies have shown that performers of collective rituals who experience strong emotional reactions, particularly those who experience strong dysphoric arousal, exhibit greater and deeper reflection on their ritual experiences as compared to performers who experience little emotional arousal (Richert et al., 2005; Russell et al., 2016; Xygalatas, Schjoedt, et al., 2013). Further, experimental studies have linked shared non-ritualised experiences to social bonding via personal reflection. Such findings have been replicated across several large-scale dysphoric experiences involving bodily assault, verbal attack, and humiliation (Jong et al., 2015). Of note, shared dysphoric experiences have also been linked to strong group cohesion via personal reflection in online contexts, where individuals are geographically dispersed and dysphoric experiences have no measurable material impact on attendees' lives (Buhrmester et al., 2018). Therefore, though available evidence has been largely correlational to date, greater cognitive processing of dysphorically arousing experiences offers one promising explanation for why greater affiliation should be expected among those who collectively attend to others' pain as compared to those who share neutral experiences. In this connection, we propose that cognitive resource allocation is one pathway that may mediate the predicted effects of collectively attending to others' physical and social pain on affiliation among co-attendees in online contexts (Hypothesis 3).

Alternately, Durkheim (1915) famously theorised that collective events lead to an emotional state of *collective effervescence* that minimises individual distinctions. Researchers have subsequently proposed that imagined responses to collective events align attendees' relevant cognitive, affective, and physiological states generating a sense of unity among them (Fischer et al., 2014; Konvalinka et al., 2011; Xygalatas et al., 2011). Field studies support the presence of synchronous empathic arousal, specifically, among attendees of painful collective rituals. Data from collective fire-walking rituals suggests that ritual attendees experience increased fatigue (Fischer et al., 2014) and fine-grained commonalities in heart-rate dynamics with related performers (Konvalinka et al., 2011; Xygalatas et al., 2011). Further, attendance at collective gatherings including socio-political protests and anti-racism campaigns has been reported to promote collective identity, identity fusion, and social integration as mediated by the perception of emotional synchrony among co-attendees (Páez et al., 2007; Páez et al., 2015). Importantly, collective attention to intense negative emotional stimuli strengthens social ties independently of actively disclosing one's feelings to others (Rennung & Göritz, 2015) and thus also perhaps in the absence of physical co-presence as in online contexts. Indeed, evidence suggests that individuals assume alignment of their own affective reaction with the affective reaction of those around them (Coleman, 2018; Ross et al., 1977). In sum, perceived emotional synchrony arising from negatively valanced experiences offers another promising explanation for why affiliation should be expected among those who collectively attend to others' pain. As a result, we propose that perceived emotional synchrony is another pathway that may mediate the predicted effects of collectively attending to others' physical and social pain on affiliation among co-attendees in online contexts (Hypothesis 4).

In a less commonly cited account, attending to others' pain is thought to serve as a moral reminder (Bastian et al., 2011; Shariff & Norenzayan, 2007; Shu et al., 2012) that prompts attendees to act prosocially in order to achieve moral purification (Shariff & Norenzayan, 2007; van Bunderen & Bastian, 2014). Field studies report that attendees but not performers of painful collective rituals act more honestly after ritual attendance, indicating that the specific act of attending to others' pain may activate a moral code that prioritises moral cleansing (Mitkidis et al., 2017). More generally, the use of moral reminders has been reported as an effective means of reducing unethical behaviour including within online contexts (Hwang, 2015). Although this specific line of reasoning remains relatively unexplored, moral cleansing offers a theoretically plausible explanation for why affiliation should be expected among those who attend to others' pain. Thus, we propose that moral salience may be another pathway that mediates the predicted effects of collectively attending to others' pain on affiliation among co-attendees in online contexts (Hypothesis 5).

The Current Studies

Our predictions were tested within an overarching research program containing a number of studies, an initial two of which are reported here. In the first study reported, Study 1, we sought to explore the phenomenon of pain collectively attended to online. In the second study reported, Study 2, we sought to quantify affiliative outcomes among those who collectively attend to others' pain online and identify mechanisms that mediate these outcomes. Study protocols were approved by the Griffith University Human Ethics Committee (Reference Number: 2017/187), in accordance with the National Statement of Ethical Conduct in Human Research. As a condition of ethical approval, those participants who did not wish to watch videos depicting pain were

advised not to take part in studies. Informed consent was obtained from all participants at the beginning of each study.

Study 1

In Study 1 we sought to explore the phenomenon of pain collectively attended to in online contexts. Engagement with online video continues to grow across demographic groups, outpacing the adoption rate of many other online activities (Madden, 2009). In 2018 the video-sharing site YouTube was reportedly used by nearly 75% of adults and 94% of young adults (Smith & Anderson, 2018). On this basis, we first sought to identify usual engagement frequency with online videos depicting pain. Second, we sought to explore perceived collective attention to online videos depicting painful and non-painful experiences.

Method

Seventy-four undergraduate students (49 female, 25 male; M_{age} = 25.31 years $range_{age}$ = 19–49 years) recruited from Griffith University were remunerated with course credit for completion of an online questionnaire. A link to the questionnaire was provided to participants upon recruitment. At the beginning of the questionnaire participants rated their usual engagement with a specified set of video types. Following previous research (Purcell, 2010), video types included "comedy or funny videos," "news videos," "educational videos," "movies or TV shows," "music videos," "political videos," "animation or cartoons," "sports videos," "commercials or advertisements," and "other". Additional video types included "videos involving physical pain" and "videos involving social pain" (0 = *never*, 1 = *very rarely*, 5 = *very frequently*). Participants were then randomly assigned to one of three pain conditions in an independent groups design. Depending on the condition they were randomised into participants were presented with a video depicting either a physically painful (i.e., facial

impalement; $n = 25$), socially painful (i.e., loss of child; $n = 22$), or non-painful (i.e., fishing; $n = 27$) experience. Videos were sourced from the video-sharing website YouTube to depict real-world experiences, an approach employed to address the threat to external validity posed by the depiction of artificially constructed experiences (Ashton-James et al., 2014; Danziger et al., 2006; Westbury & Neumann, 2008). All videos were matched as closely as possible (e.g., depicted a Caucasian male). Videos depicting pain were further matched on pilot pain intensity and state personal distress ratings. All videos were equal in length (1:13 minutes). It was emphasised that videos were "also being watched by other Griffith University Students as part of this study." Participants were instructed to add a comment beneath videos, collected for use in subsequent studies. Videos were followed by a single-item measure of perceived collective attention. The collective attention state is defined as the perception of in-the-moment attention to stimuli from a first-person-plural perspective (Shteynberg, 2015). On this basis, participants rated the degree to which they agreed with the statement "we are attending to the video" (1 = *strongly disagree,* 7 = *strongly agree*). Additional related but un-reported measures were also included in the questionnaire.

Results

Usual Engagement

In terms of usual engagement, participants most frequently reported engaging with educational videos (100.00%, $M = 3.47$, $SD = 1.18$), comedy or funny videos (98.65%, $M = 3.62$, $SD = 1.30$), and movies or TV shows (97.30%, $M = 3.72$, $SD = 1.29$). Followed by news videos (93.24%, $M = 2.38$, $SD = 1.46$), music videos (91.89%, $M = 2.77$, $SD = 1.60$), animation or cartoons (83.78%, $M = 1.76$, $SD = 1.31$), political videos (77.03%, $M = 1.66$, $SD = 1.46$), sports videos (70.27%, $M = 1.73$, $SD = 1.67$), and commercials or advertisements (64.86%, $M = 1.14$, $SD = 1.15$). Other types of

videos participants reported with including gaming videos and podcasts (14.86%, *M* = 0.32, *SD* = 0.97). Of importance, the majority of participants reported having engaged with online videos involving physical and social pain, though on average reported engaging with them relatively infrequently (72.97%, *M* = 1.62, *SD* = 1.50 and 72.97%, *M* = 1.69, *SD* = 1.44, respectively).

Perceived Collective Attention

Using one-way ANOVA we found a significant difference in perceived collective attention between pain conditions, $F(2, 71) = 4.42$, $p = .016$, $\eta^2 = .11$. Simple contrasts showed that perceived collective attention ratings were significantly higher in both the physical pain ($M = 4.48$, $SD = 1.42$; $p = .034$) and social pain ($M = 4.77$, $SD = 1.41$; $p = .006$) conditions than in the no-pain condition ($M = 3.63$, $SD = 1.42$). Perceived collective attention ratings were not significantly different between the physical pain and social pain conditions ($p = .482$).

Discussion

We found engagement with online content depicting pain to be a relatively common experience. Over 70% of participants reported engaging with online videos depicting physical and social pain. Moreover, we found evidence to suggest that collectively attending to others' pain online is a particularly powerful form of shared experience. While online videos elicited a general feeling of "we are attending," videos depicting pain elicited significantly stronger collective attention ratings than non-painful content.

Study 2

In Study 2 we subsequently sought to test the prediction that in online contexts collective attention to others' physical and social pain leads to greater affiliation among co-attendees than collective attention to non-painful content (Hypotheses 1– 2). To

better understand affiliative outcomes, we also sought to test the predictions that cognitive resource allocation, perceived emotional synchrony, and moral salience would act in parallel to mediate the predicted effects of collectively attending to others' physical and social pain on affiliation among co-attendees online (Hypotheses 3– 5).

Method

Participants

Participants recruited from Griffith University were remunerated with course credit for completion of two online questionnaires, distributed upon recruitment and at one-week follow-up. We collected 185 complete responses to the first questionnaire and 166 complete responses to the second questionnaire. Using participant identification numbers, we then successfully matched data from 93 participants across questionnaires. Due to delayed response times to the second questionnaire (> 14 days) data from two participants was dropped. Consequently, data from 91 participants were included in analyses (66 female, 25 male; M_{age} = 23.32 years, $range_{age}$ = 18– 61 years).

Design and Procedure

A link to the first online questionnaire was provided to participants upon recruitment (Time 1). At the beginning of the questionnaire participants were randomly assigned to one of three pain conditions in an independent groups design. Depending on the condition they were randomised into, participants were presented with a video depicting either a physically painful (i.e., facial impalement; n = 31), socially painful (i.e., loss of child; n = 28), or non-painful (i.e., fishing; n = 32) experience. Videos were identical to those used in Study 1, with the exception of the non-painful video which was edited to exclude the catching of fish. Videos were presented to participants in a mock online video format and accompanied by a set of comments constructed from de-identified participant responses in Study 1 (e.g., "pretty cool man, do you find fishing

therapeutic," no-pain). It was emphasised that "comments were made by a group of Griffith University students who watched the video just like you." Adding to the mock online video format, participants were able to add their own comment beneath videos, not included in analyses. Videos were accompanied by measures of cognitive resource allocation, perceived emotional synchrony, moral salience, and affiliation. Shared dysphoric experiences have been found to encourage reflection extending from a period of one week (Páez et al., 2015; Rimé et al., 2010). On this basis, approximately one week after they had completed the first questionnaire, participants were emailed a link to the second online questionnaire ($M_{completion}$ = 8.23 days, $range_{completion}$ = 5–12 days; Time 2). In the questionnaire, participants were reminded that in the first questionnaire they had been presented with a video that had also been watched and commented on by a group of Griffith University students. Participants were then presented with further measures of cognitive resource allocation, as well as repeat measures of affiliation. Additional related but un-reported measures were also included in both questionnaires.

Measures

Cognitive Resource Allocation

We operationalised cognitive resource allocation as self-reported consumption, reflection, and memory ratings. Immediately after attending to videos participants completed a single-item measure of how consumed they were by the experience (1 = *not at all*, 7 = *completely*; e.g., Shteynberg et al., 2014). To measure reflection at one-week follow-up participants rated how often they thought about the video over the last week (1 = *I have not thought about it at all*, 7 = *I have thought about it very frequently*). Additionally, to measure memory at one-week follow-up participants rated how well they remembered both "the video and the experience depicted in it" and "students and

their comments on the video" (α = .75; 1 = *I don't remember at all*, 7 = *I remember very well*).

Perceived Emotional Synchrony

Immediately after attending to videos participants completed a six-item measure of perceived emotional synchrony. Items were adapted from Páez, Rimé, Basabe, Wlodarczyk, and Zumeta's (2015) Perceived Emotional Synchrony Scale to include "we felt more intense emotions because we all observed the same experience," "we felt a strong emotional bond between us," "we felt a strong rapport between us," "we all shared the same strong feelings," "we felt more sensitive to our emotions because we were surrounded by people who felt the same," and "we shared a moment of unity" (α = .95; 1 = *not at all*, 7 = *very much*).

Moral Salience

Immediately after attending to videos participants completed a single-item measure of how moral they felt while watching each video (1 = *not at all*, 5 = *extremely*).

Affiliation

We operationalised affiliative attitudes as self-reported cohesion, interpersonal closeness, and desire to affiliate. Both immediately after attending to videos and at one-week follow-up participants completed an eleven-item measure of cohesion. Items were adapted from previous research (Bastian, Jetten, & Ferris, 2014; Leach et al., 2007) to include "I feel a sense of solidarity with the students in this group," "I feel connected to the students in this group," "I feel part of this group of students," "I feel a sense of loyalty to the students in this group," "I feel I can trust the students in this group," "I feel that the students in this group have a lot in common," "I feel like there is unity between the students in this group," "I see myself as a member of this group," "I am

glad to be categorised as a member of this group," "I identify with the students in this group," and "I feel strong ties to the students in this group" (α = .96; 1 = *strongly disagree*, 7 = *strongly agree*). Both immediately after attending to videos and at one-week follow-up participants were also presented with a single-item pictorial measure of interpersonal closeness between the self and a given in-group. Adapted from Schubert and Otten's (2002) Self-Group Overlap scale, the measure comprised of seven pairs of circles varying in their degree of overlap, with a high degree of overlap representing a high degree of interpersonal closeness (1 = *no overlap*, 7 = *high degree of overlap*). Finally, both immediately after attending to videos and at one-week follow-up participants were asked whether they "would like to spend more time with the students who also watched the video outside of this study" as a measure of desire to affiliate (1 = *not at all*, 7 = *very much*; e.g., Lakin & Chartrand, 2003).

We further operationalised affiliative behaviours as low-cost generosity measured in a hypothetical game played immediately after participants attended to videos (Güth, 2010; Güth et al., 2012). Following Zhao et al. (2016), participants were presented with 11 different payoff combinations described in terms of hypothetical points. Participants' own payoff was fixed at five points, while payoffs for other students who watched the video varied in one-point increments between zero points and ten points (e.g., "You receive 5 points. Each of the other students receives 0 points"). Accordingly, the most generous choice was that with the highest payoff (0 = *ungenerous*, 10 = *generous*).

Results

Data Screening

Data was visually inspected to identify influential univariate outliers at all levels of the grouped data (Tabachnick & Fidell, 2013). One participant in the no-pain condition was associated with influential data and was excluded from analyses.

ANOVA

We investigated the effect of collectively attended pain on affiliation using one-way ANOVA, followed by appropriate simple contrasts. Means and standard deviations for all antecedent and consequent variables are shown in Table 1. The only significant difference between pain conditions was marginal and resulted from interpersonal closeness measured at one-week follow-up, $F(2, 87) = 3.19$, $p = .046$, $\eta^2 = .07$. At one-week follow-up interpersonal closeness was significantly higher in the social pain condition than in the no-pain condition ($p = .015$), though was not significantly different between the physical pain condition and the social pain ($p = .088$) and no-pain ($p = .442$) conditions. Comparatively, we did not find significant differences between pain conditions in interpersonal closeness measured immediately after participants attended to videos, $F(2, 87) = 1.18$, $p = .311$, $\eta^2 = .03$, cohesion measured immediately after participants attended to videos, $F(2, 87) = 0.86$, $p = .426$, $\eta^2 = .02$, cohesion measured at one-week follow-up, $F(2, 87) = 1.42$, $p = .248$, $\eta^2 = .03$, participants' desire to affiliate measured immediately after they attended to videos, $F(2, 87) = 0.86$, $p = .428$, $\eta^2 = .02$, participants' desire to affiliate measured at one-week follow-up, $F(2, 87) = 1.06$, $p = .351$, $\eta^2 = .02$, or generosity, $F(2, 87) = 1.23$, $p = .297$, $\eta^2 = .03$.

Table 1

Means (and Standard Deviations) of Antecedent and Consequent Variables across Pain Conditions

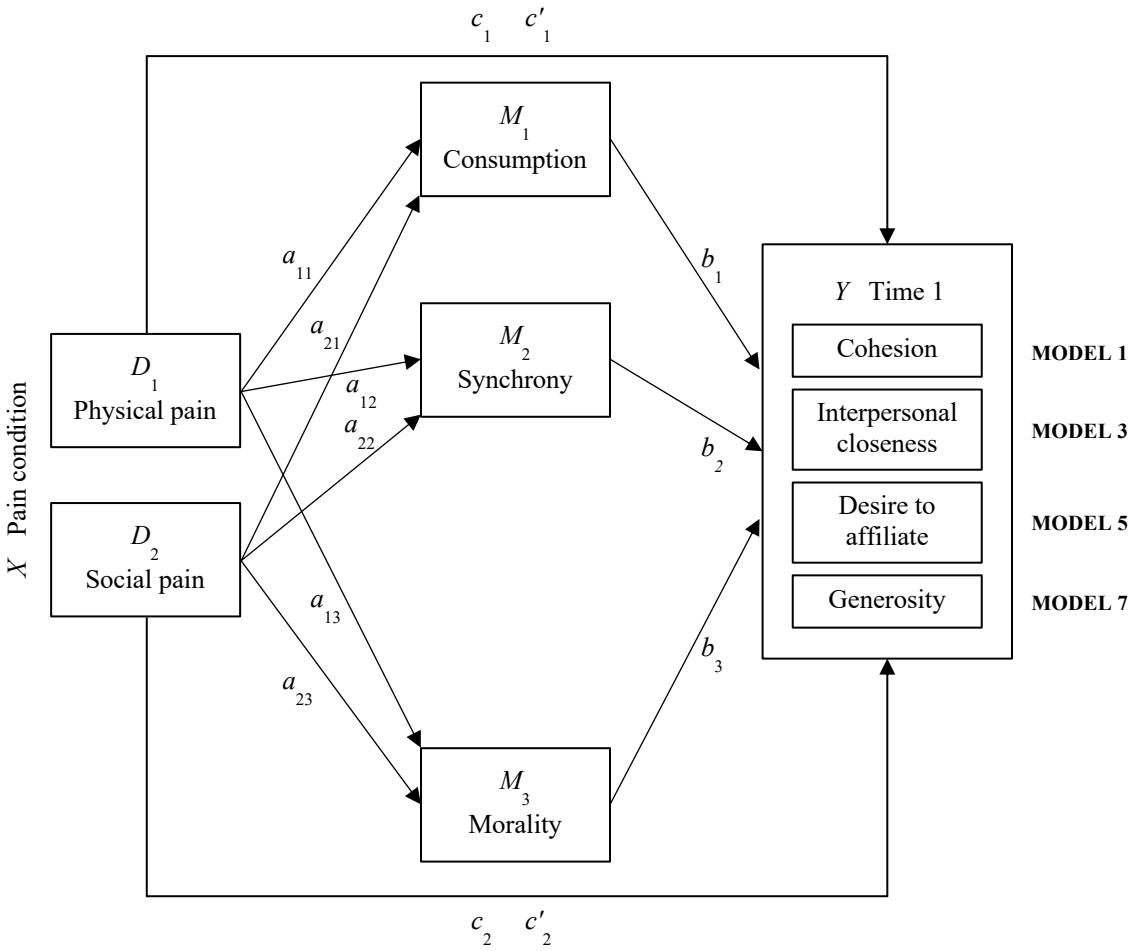
	Pain Condition		
Variable	Physical pain	Social pain	No-pain
Consumption	5.16 (1.32)	4.71 (1.72)	3.90 (1.60)
Reflection	1.77 (1.18)	1.36 (0.73)	1.52 (0.63)
Memory	3.73 (1.53)	2.95 (1.08)	3.18 (1.23)
Perceived emotional synchrony	3.76 (1.33)	3.45 (1.77)	2.10 (1.02)
Morality	2.39 (1.28)	2.50 (1.40)	1.65 (0.84)
Cohesion, Time 1	3.16 (1.26)	3.25 (1.48)	2.81 (1.44)
Cohesion, Time 2	2.48 (1.20)	2.99 (1.26)	2.88 (1.30)
Interpersonal closeness, Time 1	3.19 (1.30)	3.50 (1.40)	2.90 (1.72)
Interpersonal closeness, Time 2	2.52 (1.26)	3.11 (1.23)	2.26 (1.44)
Desire to affiliate, Time 1	2.84 (1.61)	3.32 (1.25)	3.13 (1.38)
Desire to affiliate, Time 2	2.68 (1.45)	3.21 (1.32)	3.03 (1.56)
Generosity	5.87 (2.19)	6.54 (2.20)	5.68 (2.17)

Mediation Analyses

Methodological studies using empirical simulation have shown that mediated effects may be statistically significant even when the total effect is not (for a review see O'Rourke & MacKinnon, 2018). Consequently, across seven separate models we tested mediated pathways between collectively attended pain and affiliation as planned. Predicted mediation models are graphically summarised in Figures 1 and 2, while observed mediation models are depicted in Supplementary Figures S1 through S7. Intercorrelations between antecedent and consequent variables are shown in Table 2. Consistent with contemporary approaches, mediation models were tested using ordinary least squares path analyses in the PROCESS macro (Version 3.4; Hayes, 2017) for the statistical software package SPSS (Version 25). Mediation models were conducted with pain condition as a multicategorical antecedent to examine the effect of attending to physical or social pain relative to attending to non-painful content online. As such, pain condition was treated using indicator coding with no-pain specified as the reference group (Hayes & Preacher, 2013). Mediation models were also conducted with parallel multiple mediators to allow for a formal comparison of mechanisms which might account for the predicted affiliative effects of collectively attending to others' pain online. Indirect effects were bootstrapped with 10,000 replications. Using this approach, bootstrapped 95% confidence intervals for indirect effects that do not contain zero are considered significant (Hayes, 2017).

Figure 1

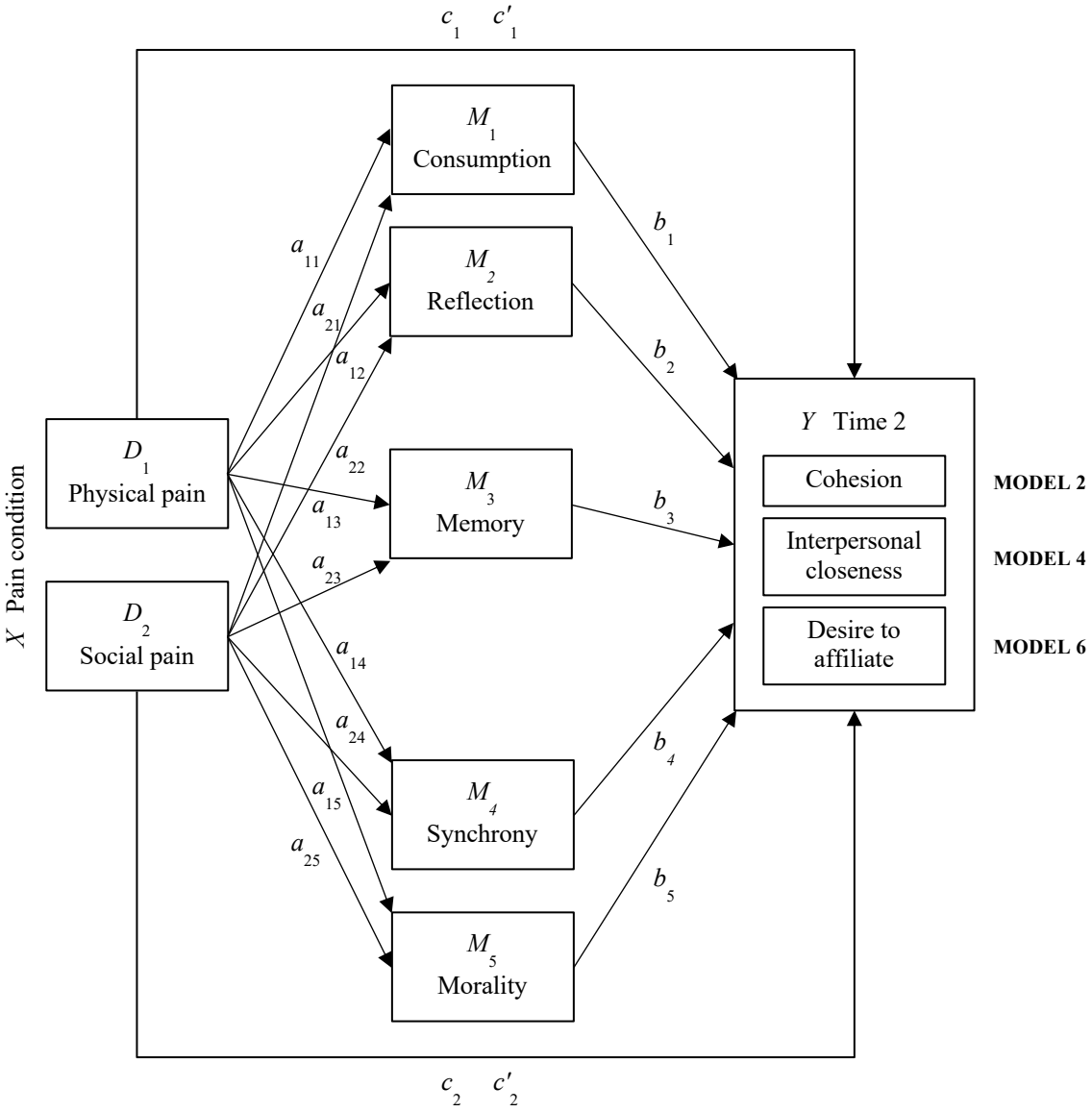
Graphical Summary of Mediation Models at Time 1



Note. Graphical summary of models depicting the predicted relative effects of collectively attending to others' physical and social pain on affiliative attitudes and behaviours measured immediately after participants attended to videos as mediated by consumption, perceived emotional synchrony, and morality.

Figure 2

Graphical Summary of Mediation Models at Time 2



Note. Graphical summary of models depicting the predicted relative effects of collectively attending to others' physical and social pain on affiliative attitudes measured at one-week follow-up as mediated by consumption, reflection, memory, perceived emotional synchrony, and morality.

Table 2

Intercorrelations between Antecedent and Consequent Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Physical pain	-												
2. Social pain	-.49***	-											
3. Consumption	.26**	.05	-										
4. Reflection	.18	-.15	.16	-									
5. Memory	.24*	-.18	.27**	.19	-								
6. Synchrony	.31**	.15	.58***	.26**	.03	-							
7. Morality	.13	.18	.26**	.25*	.08	.48***	-						
8. Cohesion, Time 1	.05	.09	.44***	.25*	.03	.70***	.32**	-					
9. Cohesion, Time 2	-.17	.12	.26**	.23*	.07	.36***	.25*	.64***	-				
10. Closeness, Time 1	.002	.14	.31**	.40***	.06	.42***	.18	.63***	.55***	-			
11. Closeness, Time 2	-.05	.25*	.30**	.32**	.08	.42***	.35***	.54***	.64***	.66***	-		
12. Affiliate, Time 1	-.13	.11	.23*	.34***	-.01	.34***	.25*	.55***	.62***	.53***	.47***	-	
13. Affiliate, Time 2	-.15	.12	.13	.21*	-.03	.26**	.15	.43***	.67***	.32**	.52***	.61***	-
14. Generosity	-.05	.16	.14	.01	.05	-.04	-.19	-.06	-.02	.13	-.01	.15	.01

Note. Synchrony = perceived emotional synchrony; Closeness = interpersonal closeness; Affiliate = desire to affiliate.

* $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Cohesion at Time 1 and Time 2

In separate models, we tested the relative effect of collectively attending to others' pain on cohesion measured immediately after participants attended to videos (Model 1) and at one-week follow-up (Model 2) as mediated by cognitive resource allocation, perceived emotional synchrony, and moral salience. Both physical and social pain indirectly influenced cohesion through perceived emotional synchrony, when cohesion was measured immediately after participants attended to videos, $a_{12}b_{2\text{physical pain}} = 1.14$, bootstrap $SE = 0.23$, bootstrap 95% CI = [0.70, 1.62] and $a_{22}b_{2\text{social pain}} = 0.92$, bootstrap $SE = 0.28$, bootstrap 95% CI = [0.41, 1.51], respectively. Both physical and social pain also indirectly influenced cohesion through perceived emotional synchrony, when cohesion was measured one-week follow-up, $a_{14}b_{4\text{physical pain}} = 0.54$, bootstrap $SE = 0.22$, bootstrap 95% CI = [0.16, 1.05] and $a_{24}b_{4\text{social pain}} = 0.43$, bootstrap $SE = 0.20$, bootstrap 95% CI = [0.11, 0.91], respectively. Participants who collectively attended to others' pain as compared to non-painful content reported greater perceived emotional synchrony and participants who reported greater perceived emotional synchrony reported greater cohesion with co-attendees. There was no evidence that physical or social pain indirectly influenced cohesion through cognitive resource allocation or moral salience.

Interpersonal Closeness at Time 1 and Time 2

In separate models, we tested the relative effect of collectively attending to others' pain on interpersonal closeness measured immediately after participants attended to videos (Model 3) and at one-week follow-up (Model 4) as mediated by cognitive resource allocation, perceived emotional synchrony, and moral salience. Both physical and social pain indirectly influenced interpersonal closeness through perceived emotional synchrony, when closeness was measured immediately after participants

attended to videos, $a_{12}b_{2\text{physical pain}} = 0.67$, bootstrap *SE* = 0.24, bootstrap 95% CI = [0.26, 1.19] and $a_{22}b_{2\text{social pain}} = 0.54$, bootstrap *SE* = 0.20, bootstrap 95% CI = [0.19, 0.97], respectively. Both physical and social pain also indirectly influenced interpersonal closeness through perceived emotional synchrony, when closeness was measured at one-week follow-up, $a_{14}b_{4\text{physical pain}} = 0.39$, bootstrap *SE* = 0.20, bootstrap 95% CI = [0.04, 0.84] and $a_{24}b_{4\text{social pain}} = 0.31$, bootstrap *SE* = 0.17, bootstrap 95% CI = [0.03, 0.69], respectively. Participants who collectively attended to others' pain as compared to a non-painful content reported greater perceived emotional synchrony and participants who reported greater perceived emotional synchrony reported greater interpersonal closeness with co-attendees. There was no evidence that physical or social pain indirectly influenced interpersonal closeness through cognitive resource allocation or moral salience.

Desire to Affiliate at Time 1 and Time 2

In separate models, we tested the relative effect of collectively attending to others' pain on participants' desire to affiliate measured immediately after participants attended to videos (Model 5) and at one-week follow-up (Model 6) as mediated by cognitive resource allocation, perceived emotional synchrony, and moral salience. Both physical and social pain indirectly influenced desire to affiliate through perceived emotional synchrony, when desire was measured immediately after participants attended to videos, $a_{12}b_{2\text{physical pain}} = 0.55$, bootstrap *SE* = 0.23, bootstrap 95% CI = [0.14, 1.02] and $a_{22}b_{2\text{social pain}} = 0.44$, bootstrap *SE* = 0.21, bootstrap 95% CI = [0.10, 0.91], respectively. Both physical and social pain also indirectly influenced desire to affiliate through perceived emotional synchrony, when desire was measured at one-week follow-up, $a_{14}b_{4\text{physical pain}} = 0.49$, bootstrap *SE* = 0.26, bootstrap 95% CI = [0.04, 1.08] and $a_{24}b_{4\text{social pain}} = 0.40$, bootstrap *SE* = 0.24, bootstrap 95% CI = [0.03, 0.97], respectively.

Participants who collectively attended to others' pain as compared to a non-painful content reported greater perceived emotional synchrony and participants who reported greater perceived emotional synchrony reported greater desire to affiliate with co-attendees. There was no evidence that physical or social pain indirectly influenced participants' desire to affiliate through cognitive resource allocation or moral salience.

Generosity

We tested the relative effect of collectively attending to others' pain on generosity measured immediately after participants attended to videos as mediated by consumption, perceived emotional synchrony, and morality (Model 7). Both physical and social pain indirectly influenced generosity through morality, $a_{13}b_{3\ \text{physical pain}} = -0.32$, bootstrap $SE = 0.21$, bootstrap 95% CI = [-0.83, -0.02] and $a_{23}b_{3\text{social pain}} = -0.37$, bootstrap $SE = 0.23$, bootstrap 95% CI = [-0.91, -0.03], respectively. Participants who collectively attended to others' pain as compared to a non-painful content reported greater morality. In turn, participants who reported greater morality displayed less generosity. There was no evidence that physical or social pain indirectly influenced generosity through consumption or perceived emotional synchrony.

Discussion

In online contexts, collective attention to other's physical and social pain did not generally lead to a significant direct effect on affiliation among co-attendees in comparison to collective attention to non-painful content. However, collective attention to others' physical and social pain did indirectly influence affiliation among co-attendees in comparison to collective attention to non-painful content (Hypotheses 1–2). We found perceived emotional synchrony to mediate the influence of collectively attending to others' pain on affiliative attitudes in online contexts, though not affiliative behaviours. As hypothesised, collectively attending to others' physical and social pain

indirectly promoted cohesion, interpersonal closeness, and desire to affiliate measured both immediately after participants attended to videos and at one-week follow-up through its effect on perceived emotional synchrony (Hypothesis 3). Alternately, we found moral salience to mediate the influence of collectively attending to others' pain on affiliative behaviours in online contexts, though not affiliative attitudes. Instead of increasing generosity among co-attendees, as hypothesised, moral salience was associated with less generosity among co-attendees (Hypothesis 4). We found no evidence that, as hypothesised, collectively attending to others' pain indirectly influences affiliative attitudes or behaviours through its effect on cognitive resource allocation (Hypothesis 5). Considered together, our findings indicate that several cognitive and affective processes account for the interpersonal effects of collectively attending to others' pain online.

General Discussion

To begin, we found evidence confirming the potential for collective attention to others' pain online. Further, we found evidence supporting the idea that collectively attending to others' pain is a particularly powerful form of shared experience. More specifically, we found evidence to suggest that in online contexts merely attending to others' pain indirectly influences interpersonal relations among co-attendees through multiple pathways.

Indirect Effects

We found collectively attending to others' pain indirectly promoted cohesion, interpersonal closeness, and desire to affiliate among co-attendees through perceived emotional synchrony in online contexts. Our findings advance understanding of the causal influence of interpersonal synchrony on affiliation (Hove & Risen, 2009; Jackson et al., 2018; Lang et al., 2017; Mazzurega et al., 2011; Páez et al., 2015; Paladino et al.,

2010; Wiltermuth & Heath, 2009), by showing that the perception of emotional synchrony can serve to promote affiliative attitudes independent of coordinated action (e.g., marching in step, dancing in rhythm). Of note, we did not find evidence for the mediating role of perceived emotional synchrony on generosity. As a result, our findings point to the need for better understanding of the relationship between affiliative attitudes and behaviours. In this connection, some preliminary evidence suggests that in online contexts continued communication following a synchronous state may be one way to convert interpersonal bonds into prosocial actions (Buhrmester et al., 2018; Garcia & Rimé, 2019).

We further found collectively attending to others' pain indirectly lessened generosity among co-attendees through moral salience in online contexts. Our findings contrast research which has found evidence for moral cleansing following collective attention to others' pain (Mitkidis et al., 2017). Rather, our findings are consistent with the concept of moral licensing, which suggests that by attending to others' pain individuals earn moral credentials that establish their virtue and license them to act in morally dubious ways with impunity (Merritt et al., 2012; Merritt et al., 2010). Inconsistencies in these outcomes highlight the potential importance of framing in harnessing affiliation following collective attention to others' pain. For example, strategies such as clearly linking personal accounts of pain to subsequent moral acts (Lee & Hsieh, 2013; Mazar & Zhong, 2010) and emphasising the benefits of moral decisions (Garcia et al., 2020) have been found to encourage personal sacrifice.

Finally, the allocation of cognitive resources to collectively attended pain did not influence affiliation among co-attendees in online contexts. Our findings are unexpected given that collective attention to viral media activity has been specifically shown to result in deep processing of and reflection on stimuli, resulting in the

formation of strong interpersonal bonds among co-attendees (Buhrmester et al., 2018). However, Buhrmester et al. (2018) reported that cohesion among individuals increased most for those who not only continued to reflect deeply on the experience but who also felt the experience was central to their own lives even though it had no material impact. On this basis, one possibility is that the experience of shared pain in our studies was not perceived as central to participants' lives, and therefore did not prompt them to reflect on its meaning or those with whom it was shared.

Implications

Our findings are significant in several ways. To our knowledge, they represent one of the first empirical explorations of the interpersonal effects of collectively attending to others' pain on relations among co-attendees outside of ritual contexts. They also expand understanding of shared experiences of pain by examining pain that is not only physical but also social in nature. Further, they represent one of few formal direct comparisons of theories accounting for affiliation among those who collectively attend to others' pain. As such, our findings both advance understanding of the social significance of pain and add to interdisciplinary work uncovering the social mechanisms through which interpersonal affiliation is promoted. In doing so, our findings increase practical understanding of how pain can be harnessed to influence social change. To illustrate, in December 2019 a new coronavirus (SARS-CoV-2) emerged leading to a global pandemic of acute respiratory syndrome (COVID-19). The pandemic has placed significant psychological burden on individuals by requiring large-scale prosocial action (Van Bavel et al., 2020). Our findings suggest that sharing personal experiences of suffering as a result of the pandemic online may create a sense of oneness that minimises individual distinctions among physically isolated communities through the perception of emotional synchrony. Expanding on our findings, encouragement of

continued communication following a synchronous state, such as within the comments sections of social media posts, may help to convert interpersonal bonds into sustained prosocial motivations (Buhrmester et al., 2018; Garcia & Rimé, 2019). In this connection, initial figures indicate willingness to restrict one's everyday life to reduce infection rates and lower the burden on health care systems is generally high (Betsch, 2020; Saeri et al., 2020). Yet, our findings also suggest that messaging surrounding personal experiences of pain as a result of the pandemic may, in some instances, license individuals to act less morally. Indeed, images shown in the media imply wide-spread flouting of social distancing rules and panic buying of toilet paper (Saeri et al., 2020). Considered in conjunction with existing literature, our findings indicate that strategies such as clearly linking personal accounts of suffering to subsequent moral requests (Lee & Hsieh, 2013; Mazar & Zhong, 2010) may be used in messaging to instead encourage personal sacrifice. In these ways, our findings may be used to explain varying interpersonal responses to others' pain, contributing to work seeking to maintain social connection, reduce social conflict, and ignite social change within the context of the pandemic. Of note, our findings are premised upon the use of technology-mediated forms of social interaction. Online technologies are recognised as being uniquely suited to the political communication of social movements seeking to solve collective action problems (Theocharis et al., 2014).

Limitations

While promising, our findings represent a preliminary investigation subject to limitations and requiring further replication. Across both studies we sampled from an Australian undergraduate student population, which is recognised as including a relatively high proportion of ethnically and linguistically diverse students. However, cultural background has specifically been found to influence empathic responses to pain

(Atkins et al., 2016; Cassels et al., 2010; Jami et al., 2019; Zhao et al., 2019), as well as moral decision making (Dehghani et al., 2009; Han et al., 2014). Replication of our effects across cultural boundaries is therefore encouraged to better understand potential cross-cultural differences. Additionally, across all experimental conditions we primed participants with their shared university attendance. As such, the observed effects of collectively attending to others' pain appear to extend beyond affiliative responses to shared identity (Hein et al., 2010; Stürmer et al., 2006; Stürmer et al., 2005). However, some evidence suggests that prior social bonds are a prerequisite for emotional synchrony (Boothby et al., 2016; Konvalinka et al., 2011; Xygalatas et al., 2011). Thus, replication of our effects among strangers is also encouraged to better understand the importance of prior social bonds between co-attendees. Of further consideration is the stability of our findings. For example, the pattern of mediated, direct, and total effects in mediation models tested indicated the possible presence of inconsistent mediation (MacKinnon et al., 2007; MacKinnon et al., 2000) and consequently the need for replication.

Conclusions

Some researchers have argued that pain is a specific, biologically rooted experience that is particularly powerful in binding groups together (Fischer & Xygalatas, 2014). In this vein, we have presented novel evidence for affiliative attitudes among those who collectively attend to others' pain online. However, we have also presented novel evidence for non-affiliative behaviours among those who collectively attend to others' pain online. In doing so, we have highlighted that in online contexts an interplay of cognitive and affective processes account for varying interpersonal outcomes among those who attend to other's pain. As expected, replication of our preliminary findings is required to make more conclusive claims about the extent of the

causal relationship between collective attention to others' pain and affiliation among co-attendees. In addition, to keep pace with the evolution of technology-mediated social interaction, further exploration of our findings is required to identify meaningful practical implications in online contexts.

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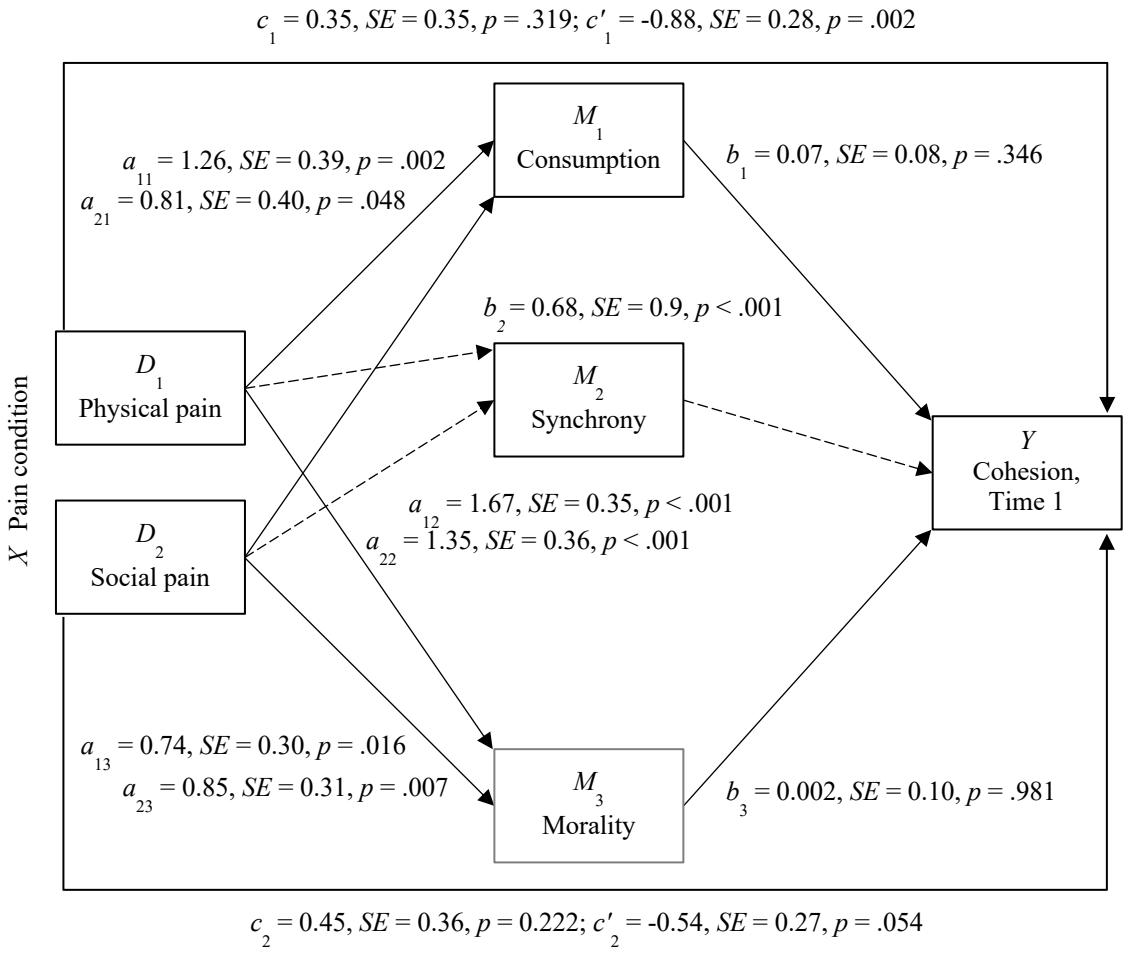
Supplementary Materials

Figure S1

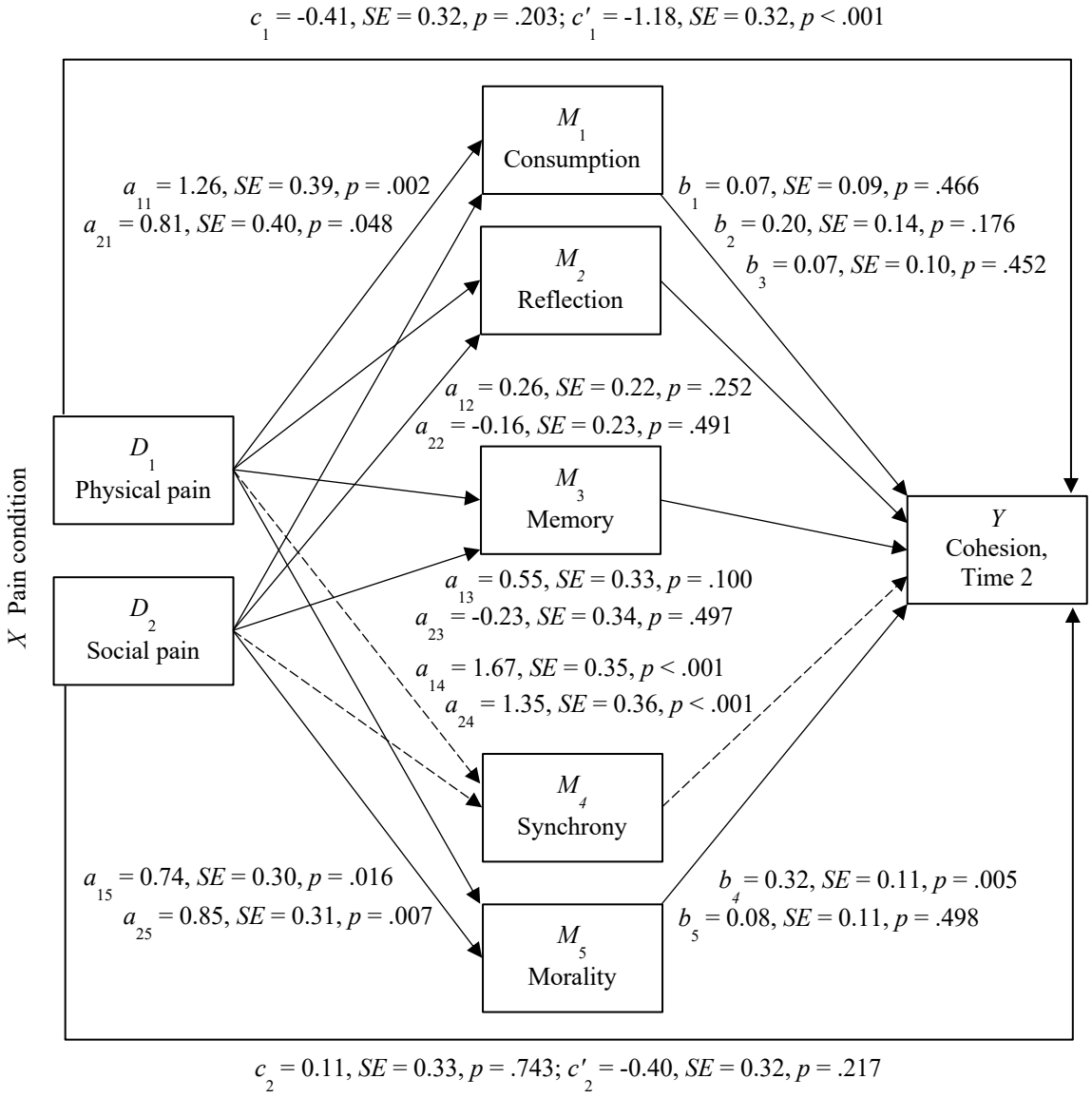
Mediation Model 1



Notes. Model 1 depicting the observed relative effect of collectively attending to others' physical and social pain on cohesion measured immediately after participants attended to videos as mediated by consumption, perceived emotional synchrony, and morality. - - - = significant *ab* pathway.

Figure S2

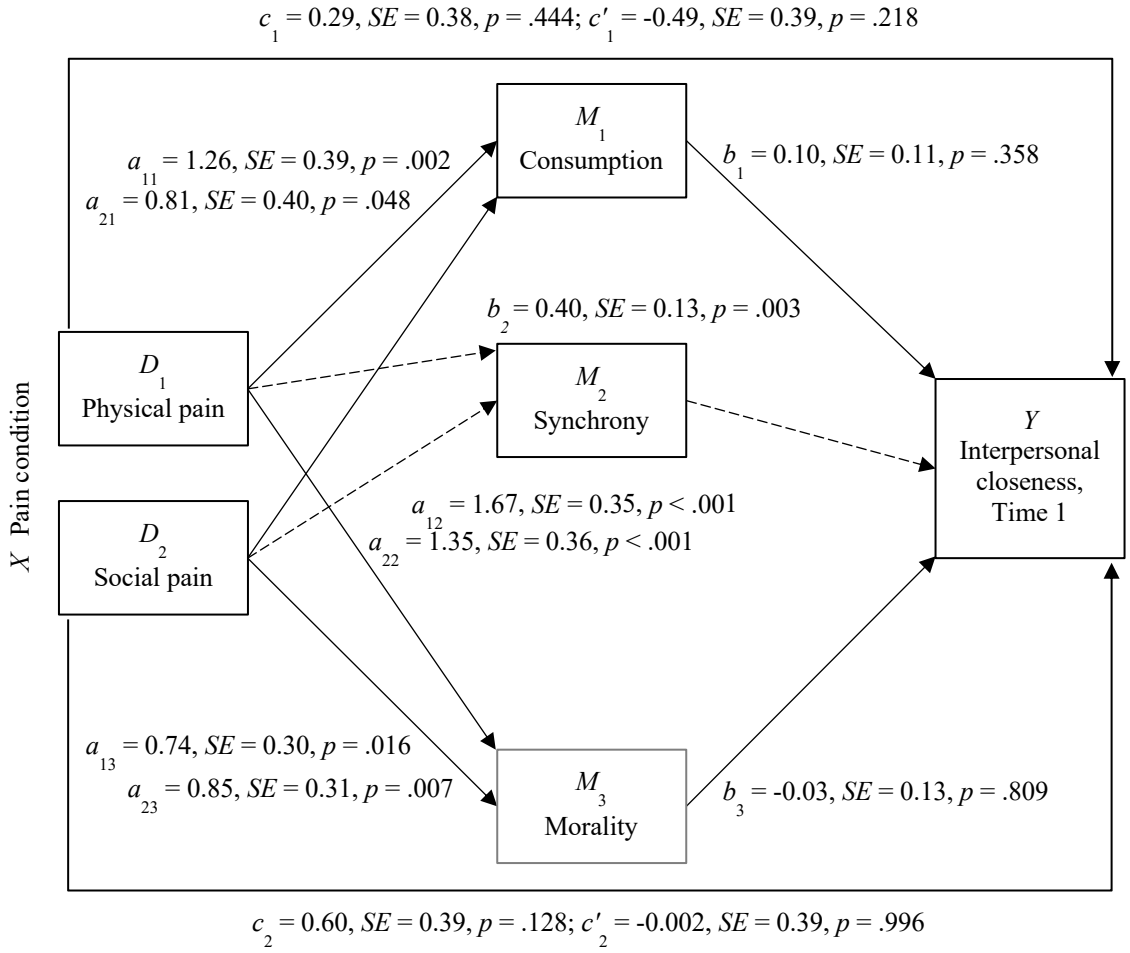
Mediation Model 2



Note. Model 2 depicting the observed relative effect of collectively attending to others' physical and social pain on cohesion measured at one-week follow-up as mediated by consumption, reflection, memory, perceived emotional synchrony, and morality. - - - = significant *ab* pathway.

Figure S3

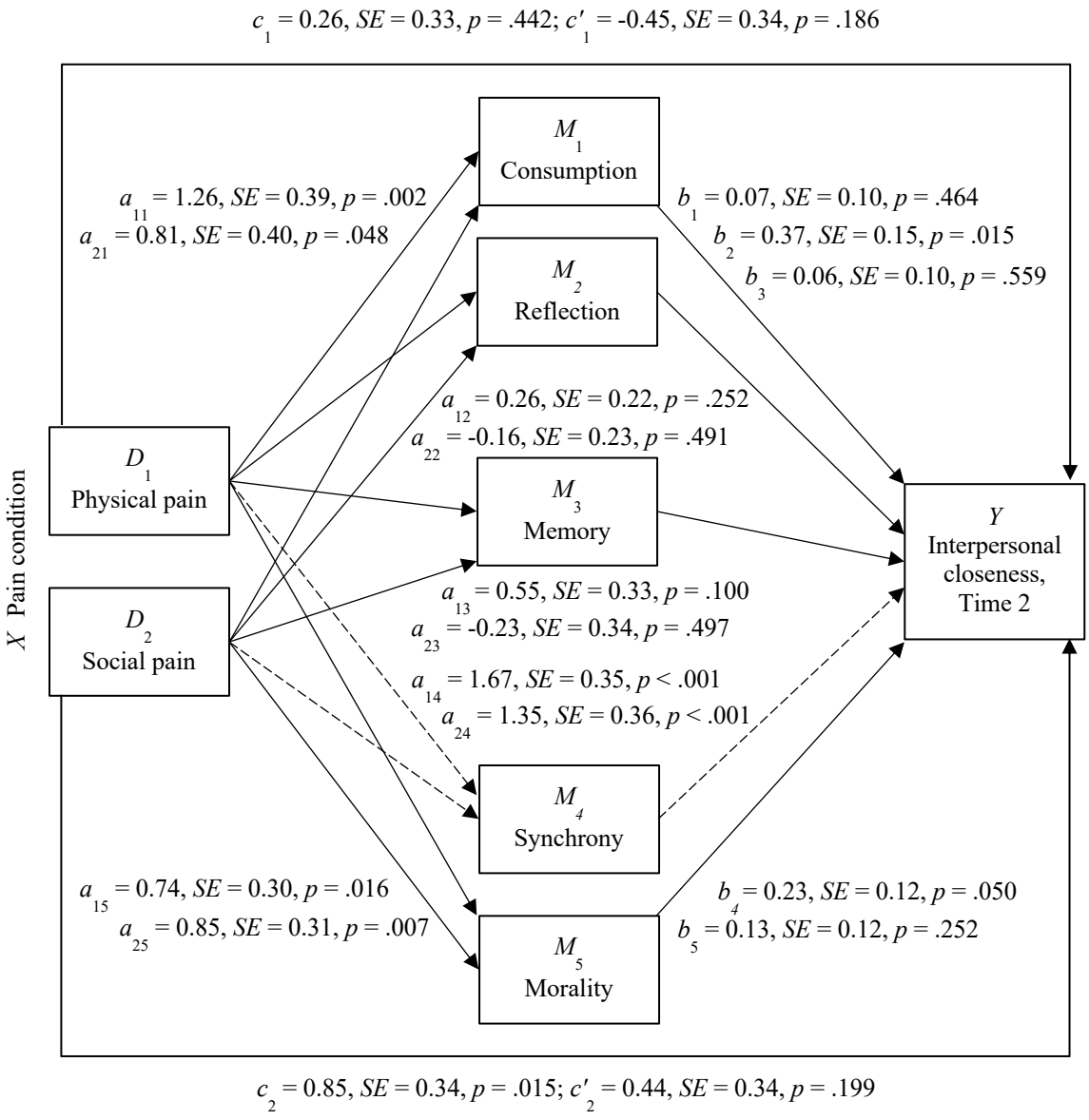
Mediation Model 3



Note. Model 3 depicting the observed relative effect of collectively attending to others' physical and social pain on interpersonal closeness measured immediately after participants attended to videos as mediated by consumption, perceived emotional synchrony, and morality. - - - = significant *ab* pathway.

Figure S4

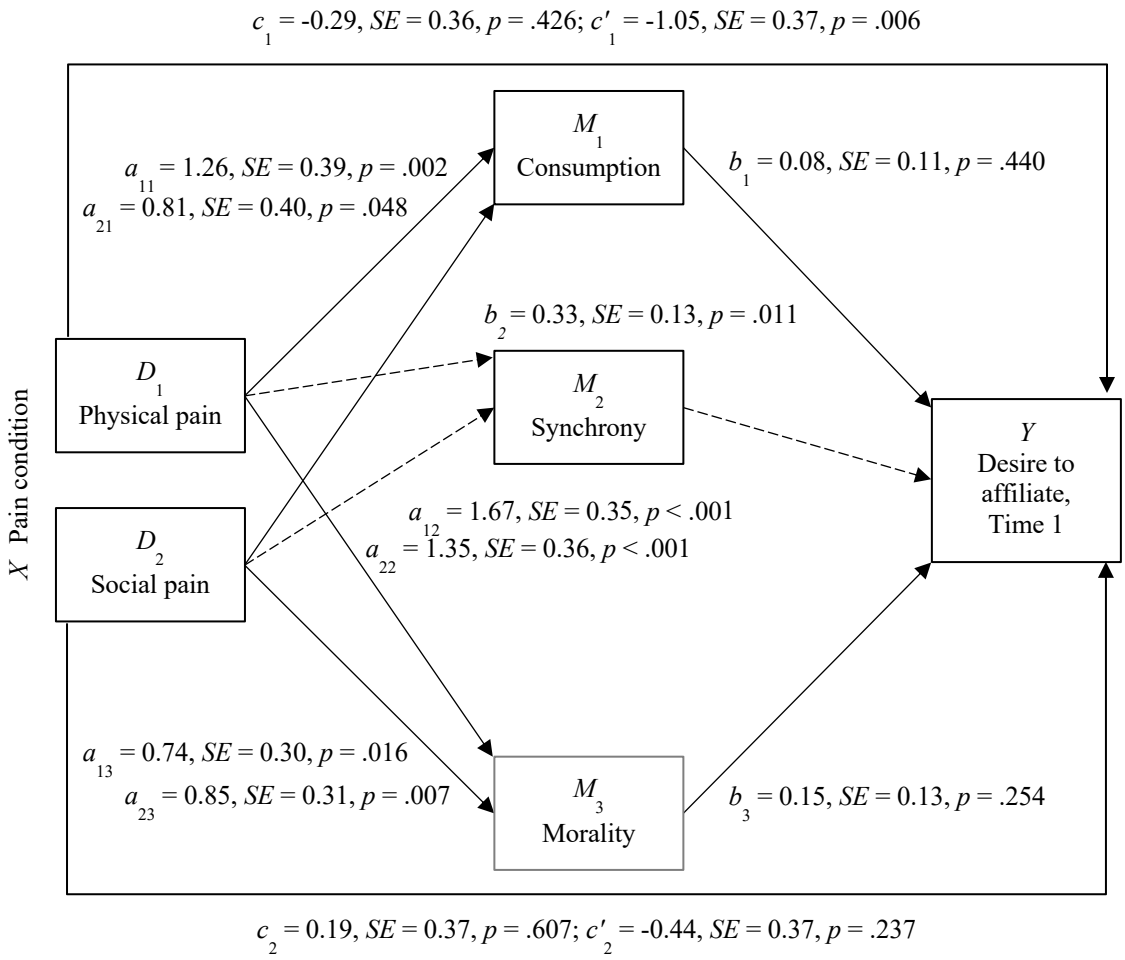
Mediation Model 4



Note. Model 4 depicting the observed relative effect of collectively attending to others' physical and social pain on interpersonal closeness measured at one-week follow-up as mediated by consumption, reflection, memory, perceived emotional synchrony, and morality. - - - = significant *ab* pathway.

Figure S5

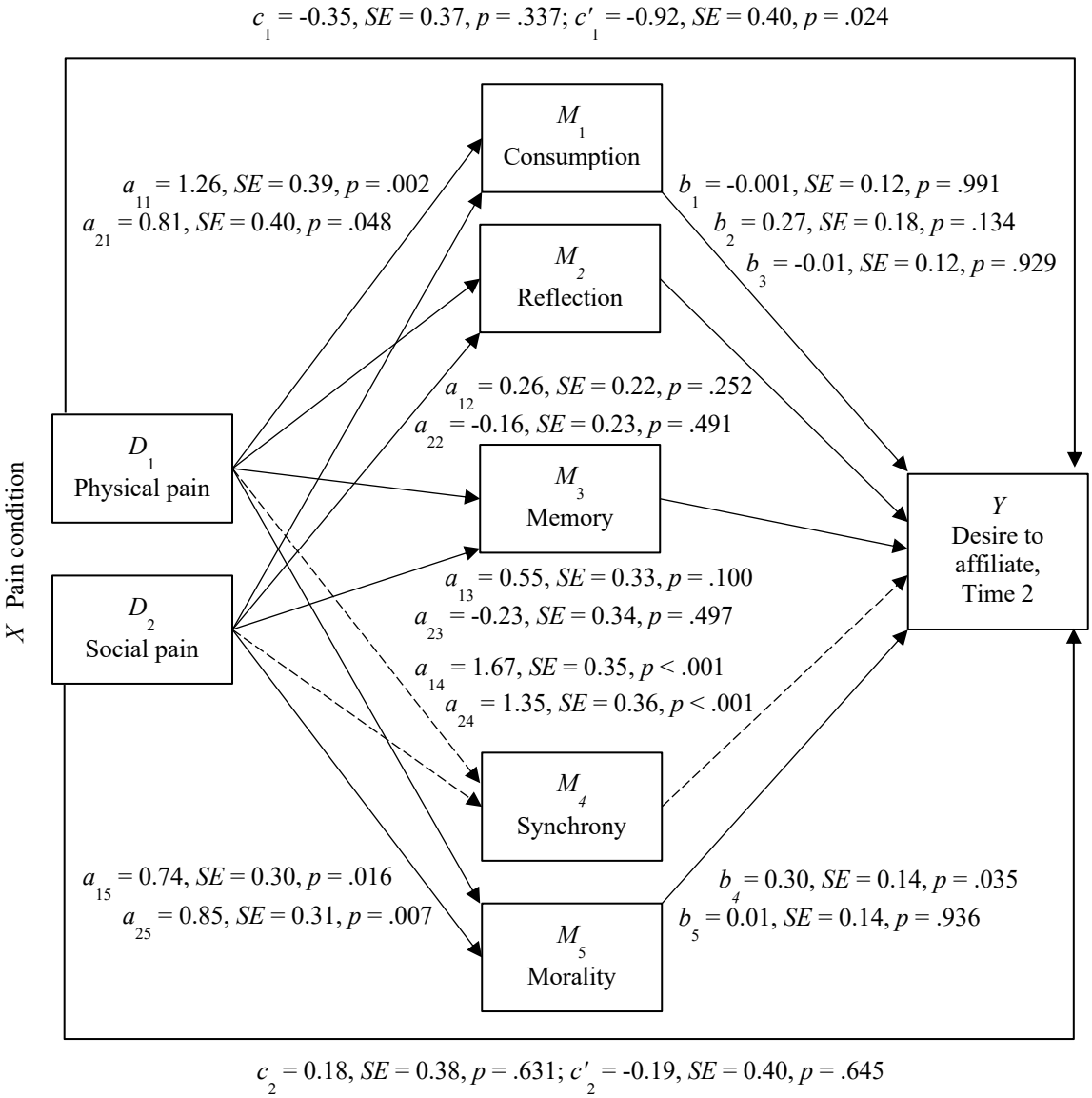
Mediation Model 5



Note. Model 5 depicting the observed relative effect of collectively attending to others' physical and social pain on desire to affiliate measured immediately after participants attended to videos as mediated by consumption, perceived emotional synchrony, and morality. - - - = significant *ab* pathway.

Figure S6

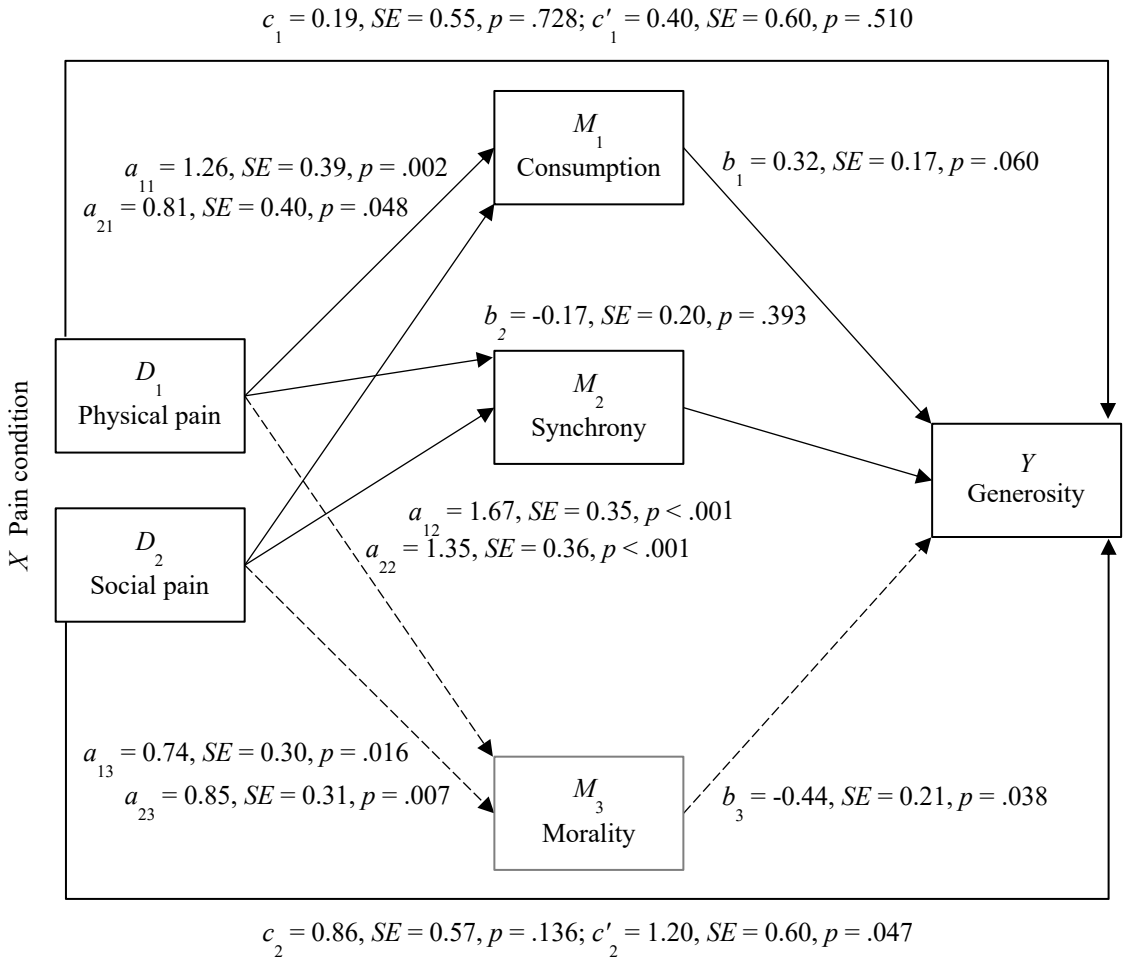
Mediation Model 6



Note. Model 6 depicting the observed relative effect of collectively attending to others' physical and social pain on desire to affiliate measured at one-week follow-up as mediated by consumption, reflection, memory, perceived emotional synchrony, and morality. - - - = significant *ab* pathway.

Figure S7

Mediation Model 7



Note. Model 7 depicting the observed relative effect of collectively attending to others' physical and social pain on generosity measured immediately after participants attended to videos as mediated by consumption, perceived emotional synchrony, and morality. - - - = significant *ab* pathway.

Chapter 6

General Discussion

The primary aim of this thesis was to explore the extent to which attending to others' physical and social pain promotes affiliation among those with whom it is attended in online contexts. The secondary aim of this thesis was to identify the mechanisms that account for these predicted effects. In seeking to achieve these aims, findings reported in this thesis have detailed the experience of attending to others' pain via vignette (Study 1 and Study 3B), evidenced the phenomenon of collective attention to others' pain online (Studies 2A and 2B), quantified the extent to which collectively attending to others' pain promotes affiliation among co-attendees online, and identified mechanisms that mediate observed affiliative effects (*manuscript* Study 2). These findings are discussed in the context of existing literature, as are relevant implications, limitations, and future directions.

The Phenomenon

Engagement with online videos depicting both physical and social pain was found to be high and incidental to usual online activity within this thesis (> 70%). During the course of their usual engagement with online videos, participants reported encountering the depiction of others' physical and social pain, including when engaging with comedy videos, educational videos, news videos, TV shows, and movies (Study 2A). In addition, online videos depicting both physical and social pain were found to elicit significantly higher collective attention ratings than non-painful online videos (Study 2B). This finding appears to both support the idea that collective attention can be commanded online and suggest that pain intensifies shared experiences, even when co-attendees are numerous and geographically dispersed.

Of note, perceived collective attention was measured in this thesis using a single-item, in which participants were asked to rate the degree to which they agreed with the statement "we are attending to the video" on a scale ranging from 1 (*strongly disagree*) *to* 7 (*strongly agree*; Study 2B). This measure was developed in line with the definition of collective attention as the perception of simultaneous co-attention with others (Shteynberg, 2015). However, it is acknowledged that subsequent ratings are open to alternate interpretation, including the suggestion that they reflect individual as opposed to collective attention. From this view, asking individuals to instead rate the nature of their attention on a continuum anchored by *I was attending alone* and *we were attending together* may better differentiate between perceptions of individual and collective attention to others' pain online.

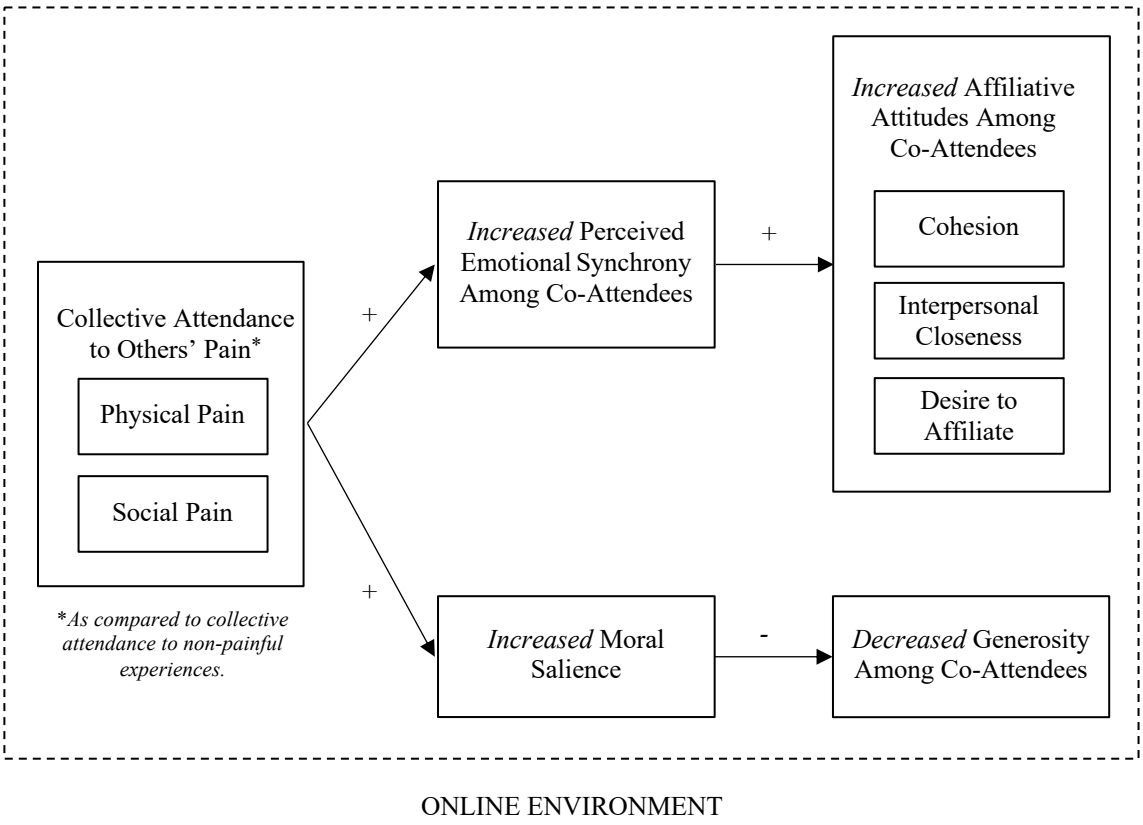
Interpersonal Effects

Collectively attending to others' physical and social pain in person was subsequently found to elicit a stronger drive for affiliation among physically proximate attendees than collectively attending to non-painful content (Study 3B). As expressed by one participant: "we did watch a fairly confronting videos together, so that has made me feel almost connected to them, having shared such an experience" (ID 7, physical pain; Study 3B). Of particular interest, collectively attending to others' physical and social pain online was found to indirectly, though not directly, influence affiliation among numerous geographically dispersed co-attendees (*manuscript* Study 2). More specifically, collectively attending to others' physical and social pain was found to indirectly promote interpersonal closeness, cohesion, and desire to affiliate among co-attendees through perceived emotional synchrony in online contexts (*manuscript* Study 2). Yet, collectively attending to others' physical and social pain was also found to indirectly reduce low-cost generosity among co-attendees through moral licensing in

online contexts (*manuscript* Study 2). This pattern of seemingly contradictory indirect affiliative effects is graphically represented in Figure 9.

Figure 9

Graphical Summary of Observed Interpersonal Effects of Collectively Attending to Others' Pain Online



Note. Graphical summary of observed indirect interpersonal effects of collectively attending to others' physical and social pain, as compared to collectively attending to non-painful experiences, on affiliative attitudes and behaviours among co-attendees in online contexts.

Synchrony, Cohesion, Closeness, and Desire to Affiliate

Collectively attending to others' physical and social pain was found to elicit significantly higher perceived emotional synchrony than collectively attending to non-painful content in both in-person (Study 3B) and online (*manuscript* Study 2) contexts. Moreover, in online contexts, participants who perceived greater emotional synchrony reported significantly greater cohesion, interpersonal closeness, and desire to affiliate with co-attendees both immediately after collective attention states and at a one-week follow-up (*manuscript* Study 2). These findings suggest that affiliative attitudes, previously reported in response to physically painful collective rituals (Xygalatas, Mitkidis, et al., 2013), extend to collectively attended non-ritualised physical and social pain via the perception of emotional synchrony. The mediating role of perceived emotional synchrony found in this thesis is consistent with Durkheim's (1915) concept of collective effervescence and, as such, advances current understanding of the conditions under which interpersonal synchrony influences affiliation. More specifically, findings reported in this thesis show that affective synchrony can promote interpersonal bonding irrespective of physical proximity and in the absence of coordinated movement (e.g., marching in step, timed vocalisation; cf. Fischer et al., 2014; Konvalinka et al., 2011; Páez et al., 2007; Páez et al., 2015; Xygalatas et al., 2011). Findings reported in this thesis also show that affective synchrony is assumed independently of active emotional sharing (e.g., disclosing feelings to co-attendees; Rennung & Göritz, 2015). Thus, within the context of this thesis, affective synchrony may be seen as the perception of synchronous emotional experiences emerging from a collective attention state, occurring in the absence of mutual causal influence, and resulting in interpersonal bonding. Of note, online videos depicting both physical and social pain were found to elicit responses similar to those associated with attendance to

others' pain in person, including state empathy, state personal distress, and negative affect (Study 1, Study 2B, and Study 3B). In sum, findings reported in this thesis provide promising support for the mediating role of perceived emotional synchrony in promoting affiliative attitudes among those who collectively attend to others' pain online. While not explored in this thesis, pathways through which perceived emotional synchrony may theoretically influence affiliative attitudes include self-other blurring (Lang et al., 2017; Mogan et al., 2017; Overy & Molnar-Szakacs, 2009; Tarr et al., 2014), reinforced cooperation (Lang et al., 2017; Reddish et al., 2016), mirror neuron stimulation (Iacoboni, 2009; Overy & Molnar-Szakacs, 2009), and opioid system activation (Dunbar et al., 2016; Lang et al., 2017; Launay et al., 2016; Tarr et al., 2014).

Although evidence was found in this thesis for the mediating role of perceived emotional synchrony on affiliative attitudes, a relationship was not found between perceived emotional synchrony and generosity among co-attendees (*manuscript* Study 2). Yet, recent meta-analyses report a medium effect of interpersonal synchrony on both affiliative attitudes and behaviours (Mogan et al., 2017; Rennung & Göritz, 2016). One possible explanation for this discrepancy is the online nature of collective experiences and subsequent opportunities for affiliation used in this thesis. While some work has explored the function of synchronised online activities (Choudhury et al., 2009; Latzko-Toth, 2010) and digital emotion contagion (Goldenberg & Gross, 2020), the specific phenomenon of perceived emotional synchrony online has attracted little empirical attention. Considered alone, the findings presented in this thesis suggest that the effect of perceived emotional synchrony on affiliative behaviours does not extend from in-person to online contexts. However, another explanation for this discrepancy relates to the measurement of affiliative behaviours. Specifically, a low-cost hypothetical generosity game was used in this thesis, as many instances of real-world generosity

involve decisions that benefit others at minimal personal cost (e.g., posthumous organ donation; Zhao et al., 2016). However, in more commonly used public goods games, decisions to benefit one's partner are always at a cost to self-interest and are often incentivised. In this connection, previous work suggests that decisions within economic games vary as a result of both cost-to-self (i.e., costless vs. costly) and incentivisation (i.e., hypothetical vs. monetary incentive; Zhao et al., 2016). Therefore, findings reported in this thesis also indicate the need for better understanding of the relationship between interpersonal synchrony and specific affiliative behaviours, particularly online.

Moral Licensing and Generosity

Collectively attending to others' social pain in in-person contexts (Study 3B) and others' physical and social pain in online contexts (*manuscript* Study 2) was also found to elicit significantly higher feelings of morality than collectively attending to non-painful content. A relationship was not found between moral salience and cohesion, interpersonal closeness, or the desire to affiliate in online contexts. Yet, moral salience was found to influence affiliative behaviours among co-attendees online, whereby participants who felt more moral displayed less generosity towards co-attendees (*manuscript* Study 2). This finding contrasts evidence for affiliative behaviours in response to collectively attended ritualised pain (Mitkidis et al., 2017; Xygalatas, Mitkidis, et al., 2013). For example, consistent with the concept of moral cleansing, Mitkidis et al. (2017) reported that individuals act more morally following in-person attendance to physically painful ritual practices. Instead, the mediating role of moral salience found in this thesis is aligned with the concept of moral licensing, which suggests that prior moral acts license individuals to act in morally dubious ways with impunity (Merritt et al., 2012; Merritt et al., 2010). From this view, the act of attending

to others' pain earns individuals' moral credentials that establish their virtue and license them to act less morally than they may otherwise.

One possibility, relevant to the failure of studies reported in this thesis to replicate moral cleansing effects, is that moral cleansing and licensing are elicited under different circumstances. For example, moral decision making is known to be influenced by how moral an act is perceived (Mazar & Zhong, 2010), the relatedness between an act and the opportunity to make a moral choice (Lee & Hsieh, 2013), the emphasis placed on the benefits of moral decisions (Garcia et al., 2020), and opportunities to establish a moral reputation (Rotella & Barclay, 2020). Also relevant to the interpretation of moral salience findings in this thesis is the seeming instability of moral cleansing and licensing effects. Several published studies have failed to replicate moral cleansing effects (Earp et al., 2014; Fayard et al., 2009; Rotella & Barclay, 2020), an issue that is common to embodiment phenomena (Hu et al., 2016; Johnson et al., 2014; Liu & Liao, 2018). Moreover, a number of large studies have similarly failed to replicate moral licensing effects (Blanken et al., 2014; Ebersole et al., 2016; Rotella & Barclay, 2020; Urban et al., 2019). Indeed, following their failure to replicate both moral licensing and cleansing effects, Rotella and Barclay (2020) proposed that neither effect is likely to be elicited online.

Therefore, although findings reported in this thesis provide some support for moral licensing following collective attention to others' pain online, when considered in the context of existing literature they also indicate the need for deeper understanding of moral effects in online contexts. It would be of particular interest to examine the extent to which individuals feel that they earn credentials by attending to others' pain online across a range of moral traits, such as sincerity, honesty, and trustworthiness (Baldwin et al., 1990; Brambilla et al., 2011; Brambilla et al., 2012; Krakowiak & Tsay-Vogel,

2015). It would also be of interest to more generally assess the accessibility of moral concepts following attention to others' pain online using, for example, word-completion tasks (e.g., _ _ ral could be completed by moral; Gino et al., 2011; Shu et al., 2012).

Cognitive Resource Allocation

Notably, the act of collectively attending to others' physical and social pain was found to be significantly more consuming than collectively attending to non-painful content in both in-person (Study 3B) and online (*manuscript* Study 2) contexts. However, increased allocation of cognitive resources to co-attended pain did not result in significantly more reflection over a one-week period or significantly better memory at one-week follow-up in online contexts (*manuscript* Study 2). There was also no evidence that cognitive resource allocation mediated the influence of collectively attending to others' pain on affiliative attitudes or behaviours in online contexts (*manuscript* Study 2). These findings are inconsistent with the modes of religiosity theory (Atkinson & Whitehouse, 2011; Whitehouse, 2004, 2005; Whitehouse & Lanman, 2014). Further, they are unexpected given that collective attention to dysphoric viral media activity has been shown to result in strong identity fusion among co-attendees via deep processing of and reflection on co-attended stimuli (Buhrmester et al., 2018). In this connection, cohesion among individuals who collectively attend to dysphoric viral media activity has been found to increase most for those who continue to reflect deeply on the experience and feel the experience is central to their own lives (Buhrmester et al., 2018). Although videos used across studies reported in this thesis depicted real-world experiences, which pilot ratings suggested were perceived to be relatively intense in nature, they were also presented solely in an experimental context. As a result, it is possible that the experience of shared pain was not perceived as central to attendees' lives and that this contributed to the failure of studies reported in this

thesis to find support for the mediating role of cognitive resource allocation. Relatedly, Jong et al. (2015) have highlighted that the precise nature of personal reflection that links shared negative experiences to interpersonal bonding is unclear within existing literature. Future research utilising alternate measures may assist in clarifying whether, for example, different kinds of self-attentiveness (e.g., reflection or intellectual self-attentiveness; Trapnell & Campbell, 1999) feature differently in the relationship between shared pain and interpersonal bonding.

A Summary of Contradictory Effects

In sum, within this thesis, collectively attending to others' pain was simultaneously found to indirectly promote affiliative attitudes and indirectly lessen affiliative behaviours among co-attendees online. It is widely understood that pain elicits both prosocial and antisocial responses (Bastian, Jetten, Hornsey, et al., 2014). Still, the seemingly contradictory findings of this thesis suggest a need for further formal comparison of the cognitive and affective processes that account for them. In this connection, some research suggests that while acute stress may increase prosocial behaviour by intensifying the sharing of others' emotions, this comes at the cost of reduced cognitive appraisal abilities, including taking the perspective of others (Tomova et al., 2017). On this basis, it is possible that interactions between the cognitive and affective mediators examined in this thesis contributed to the specific pattern of results reported. Further, the contradictory nature of findings reported in this thesis also highlights the need for better understanding of how affiliative attitudes can be converted into meaningful affiliative behaviours online. One line of thinking suggests that communication between co-attendees following a collective attention state can serve to augment affiliation (Buhrmester et al., 2018; Cui et al., 2016; Garcia & Rimé, 2019; Lin et al., 2014; Lobato & Sainz, 2020). For example, analysis of social relations following

the 2007 Virginia Tech school shooting showed that while event-specific community activities generated solidarity after the tragedy, general community activities sustained solidarity (e.g., casual conversations with community members; Hawdon & Ryan, 2011). Relatedly, analysis of digital traces of 62,114 Twitter users after the 2015 Paris terrorist attacks found long-term expressions of solidarity were related to the previous expression of collective emotions (Garcia & Rimé, 2019). As has been highlighted by Buhrmester et al. (2018), understanding the impact of continued communication and identifying the key components of affiliation that augment communication after a precipitating collective attention state could lead to positive practical applications in terms of harnessing affiliative outcomes.

Implications

Presented in this thesis are evidence for the capacity of pain to command collective attention online, a novel investigation into the interpersonal effects of collectively attending to others' pain on relations among co-attendees online, and one of few formal direct comparisons of mechanisms linking shared pain to interpersonal affiliation. The use of experimental designs, mixed research methods (i.e., qualitative, quantitative), distinct samples, and varying modalities (i.e., in-person, online) across studies reported in this thesis served to maintain high internal validity while establishing causality. As a result, findings reported in this thesis advance existing literature in several ways. First, findings reported in this thesis add to theoretical understanding of both physical and social pain. For example, physical and social pain were conceptualised within this thesis as separate but overlapping constructs, found to result in common psychosocial outcomes. As a result, findings reported in this thesis add to a richer theoretical understanding of human pain in general (Ferris, 2019). Second, findings reported in this thesis contribute to understanding of the social significance of

pain across both in-person and online contexts. More specifically, findings reported in this thesis expand understanding of the circumstances under which collectively experienced pain can simultaneously bond individuals together and license them to act less generously towards one another. In doing so, findings reported in this thesis contribute to work seeking to uncover the antecedents of interpersonal affiliation. Many collective action problems encompass the pain of others, such as ongoing intergroup conflict (Whitehouse et al., 2017), acts of terror (Drury et al., 2009; Jong et al., 2015), global warming (Whitehouse et al., 2013), natural disaster (Rodríguez et al., 2006; Vezzali et al., 2016), extreme poverty (Whitehouse et al., 2013), and pandemic (Van Bavel et al., 2020). Therefore, understanding how collective attention to others' pain might motivate social action among unspecified numbers of online users contributes to the ever-growing body of work seeking to solve these problems.

Limitations and Future Directions

Nonetheless, this thesis was largely exploratory and, as such, reported findings are preliminary and subject to limitations. For example, studies reported in this thesis were consistently associated with modest sample sizes due to resource limitations, particularly limitations associated with time. The sample size of the final study conducted as part of this thesis was further reduced by issues associated with the use of invalid participant identification numbers, repeat participation, and loss at follow-up (*manuscript* Study 2; see Appendix G). As a result, several quantitative findings reported in this thesis may be seen to lack sufficient statistical power. Relatedly, the inclusion of multiple parallel mediators in the final study reported in this thesis was associated with certain risks, including greater sampling variance and reduced power for tests of indirect effects (*manuscript* Study 2; Hayes, 2017). Further, the pattern of mediated, direct and total effects in mediation models tested in the final study of this

thesis indicated the possible presence of inconsistent mediation (*manuscript* Study 2; MacKinnon et al., 2007; MacKinnon et al., 2000). For these reasons, well-powered replication of effects reported in this thesis is required to confirm their stability. Parameters from mediation models tested in this thesis may be used in conjunction with extensive Monte Carlo data simulation to inform sample-size planning for future work specifying complex mediation models (*manuscript* Study 2; see Thoemmes et al., 2010). Notably, a sample size of 558 participants is considered necessary to achieve 80% power for small effects when testing a single mediator model using percentile bootstrapping (Fritz & MacKinnon, 2007). In addition to those already discussed, several other considerations are also relevant to the limitations and future directions of findings reported in this thesis.

Pre-Existing Shared Identity

In all studies reported in this thesis, participants were primed to some extent with their shared university attendance. As a result, the interpersonal effects of collectively attending to others' pain online reported in this thesis appear to extend beyond known affiliative responses to shared identity (Hein et al., 2010; Stürmer et al., 2006; Stürmer et al., 2005). Yet, it is also unclear exactly how important pre-existing shared identity is to the affiliative effects reported in this thesis. Psychological distance has been found to moderate the amplification of shared experiences (Boothby et al., 2016). Further, there is some evidence to suggest that prior social bonds are a prerequisite for the perception of emotional synchrony during collective experiences (Boothby et al., 2016; Konvalinka et al., 2011; Xygalatas et al., 2011) and that interpersonal synchrony is most pronounced when coupled with shared intentionality (Reddish et al., 2013). On this basis, pre-existing shared identity may be expected to moderate the interpersonal effects of collectively attending to others' pain online. Such

an effect would suggest that the affiliative responses reported in this thesis occur in real-world contexts only among pre-existing online groups whose group membership is, for example, based on shared values (e.g., wildlife conservation; Buhrmester et al., 2018). However, it has also been theorised that collective attention online may be possible without prior close relational ties. Specifically, it is thought that collective attention may be possible because individuals know that co-attendees chose to attend to the same content as them (Shteynberg, 2015), allowing for a relational connection based on similarity of online viewing preferences (Pinel et al., 2006). Therefore, replication of the indirect affiliative effects reported in this thesis among co-attendees with varying degrees of relational closeness, including strangers, is encouraged to determine whether they are contingent upon pre-existing shared identity.

The Nature of Attention

Relatedly, findings from all studies reported in this thesis are premised upon collective, as opposed to individual, attention online. Indeed, collective attention is ubiquitous in the contemporary world (Shteynberg, 2015). When engaging with online videos specifically, there are numerous ways in which individuals both become aware of and interact with co-attendees, including taking note of video views, reacting to videos, and sharing videos with others (Study 2A). However, it is unclear whether the indirect affiliative effects reported in this thesis are contingent upon knowledge of co-attention. Therefore, future comparison of the interpersonal effects of collectively attending to others' pain online among individuals who are both aware and unaware of the existence of co-attendees is encouraged. Although online content is rarely attended to in isolation, such findings would offer further insight into the complex relationship between shared pain and interpersonal affiliation.

For example, some work suggests that collective attention to valenced stimuli amplifies emotional reactions relative to individual attention (Boothby et al., 2014; Boothby et al., 2017; Shteynberg et al., 2014). In this thesis, perceived emotional synchrony was found to promote affiliative attitudes among co-attendees (*manuscript* Study 2). Although the nature of affective synchrony was not explicitly examined, online videos depicting pain were consistently found to elicit state empathy, state personal distress, and negative affect (Study 1, Study 2B, and Study 3B). In this connection, one possibility is that both individual and collective attention to others' pain online promotes a generalised state of empathic affiliation. Empathy following individual attention to others' pain has been shown to increase monetary offers towards strangers (Barraza & Zak, 2009) and caring for unrelated stigmatised group members (Cargile, 2016). From this view, both individual and collective attention to others' pain online may be expected to promote a generalised state of empathy-induced-affiliation towards others. Should such an effect be found, it may be assumed that the affiliative effects reported in this thesis had little connection to the collective context created. However, given the amplifying effects of collective relative to individual attention, it may be more likely that empathy-induced-affiliation is strongest following collective attention to others' pain.

An alternate possibility is that individual attention to others' pain online decreases collective orientation via negative affect. Previous work suggests that while sharing negative affect with others increases social bonding (Hawdon & Ryan, 2011), experiencing negative affect alone decreases social identification and enhances personal identity salience (Wegge et al., 2012). Further, experiencing intense negative affect in unison with others during shared attention has been found to lead to higher levels of group cohesion than experiencing intense negative affect individually but in a group

setting (Rennung & Göritz, 2015). From this view, it would be theoretically unlikely that individual attention to others' pain online would promote affiliative attitudes without knowledge of co-attendees to buffer the otherwise detrimental effects of feeling negative affect alone. As a result, the affiliative effects reported in this thesis would be seen to be contingent upon the collective nature of attending to others' pain online.

It is also possible that both of these affective processes operate in parallel. From this view, in instances of collective attention to others' pain online, affiliation may be indirectly promoted among co-attendees via a generalised state of synchronous empathic concern and the buffering effects of sharing negative affect. Comparatively, in instances of individual attention to others' pain online, affiliative responses promoted via a generalised state of empathic concern may be diminished by the isolating feeling of experiencing negative affect alone. However, such theorisation does not account for the negative role of moral licensing on generosity among co-attendees in this thesis (*manuscript* Study 2). Little empirical consideration appears to have been given to the influence of individual versus group contexts on moral licensing. Nonetheless, it may be theorised that individuals feel licensed to act less generously after both collective and individual attention to others' pain online. Again, should such an effect be found, it may be assumed that the affiliative effects reported in this thesis had little connection to the collective context created. However, given the amplifying effects of collective relative to individual attention, it is also possible that individuals feel that they earn more moral credentials following collective attention to others' pain. The pattern of conditional indirect pathways outlined is graphically represented in Appendix H.[1] As was found in

[1] It is recommended that the moderated mediation model outlined be tested using a 2 (attention: individual, collective) x 2 (stimuli: pain, no-pain) independent groups design in which participants respond to a range of affiliative measures. It is further recommended that extensive Monte Carlo data simulation be used to inform sample-size planning for future work specifying the moderated mediation model outlined (see Thoemmes et al., 2010). Parameters from mediation models tested in the final study in this thesis may be used to guide these simulations (*manuscript* Study 2).

this thesis, it is likely that indirect pathways associated with both collective and individual attention to others' pain online vary by the specific affiliative attitude or behaviour under examination.

Cross-Cultural Generalisability

In all studies reported in this thesis, participants were sampled from a single undergraduate student population. As a public university in Australia, the Griffith University student population is recognised as being relatively socio-economically, ethnically, and linguistically diverse. However, relevant to findings reported in this thesis for the mediating role of perceived emotional synchrony, cultural background has been found to moderate empathic responses to both physical and social pain (Atkins et al., 2016; Cassels et al., 2010; Jami et al., 2019; Zhao et al., 2019). For example, in some instances, individuals with interdependent cultural norms have been reported to express higher cognitive empathy than individuals who share independent cultural norms (Jami et al., 2019). On this basis, the affiliative effects reported in this thesis may be expected to be strongest among individuals from countries with interdependent cultural norms and, therefore, greater empathic responsiveness. In addition, relevant to findings reported in this thesis for the mediating role of moral salience, cultural background has been implicated in moral thinking (Dehghani et al., 2009; Han et al., 2014; Simbrunner & Schlegelmilch, 2017). Therefore, it would be of interest to examine whether the exact pattern of findings reported in this thesis extends across cultural boundaries.

Non-Painful Experiences

Some researchers have argued that publicly manifested pain serves as a particular social technology that humans have co-opted for creating cohesive in-groups (Fischer & Xygalatas, 2014). In this vein, findings reported in this thesis advance

understanding of the contexts under which shared pain motivates individuals to affiliate. However, other experiences share many of the same qualities of both physical and social pain, including physiological arousal and negative affect (Price, 2000). As a result, collective attention to dysphoric but not necessarily painful experiences may motivate similar interpersonal responses to those reported in this thesis. Further, shared positive experiences are well-known to foster feelings of closeness, including sharing extraordinary as opposed to ordinary experiences (Min et al., 2017). In building upon this work, it would therefore be of interest to examine the exact qualities of pain that amplify the interpersonal effects of collective attention.

Conclusions

Findings reported in this thesis represent a novel, preliminary empirical investigation into whether previously reported links between shared pain and interpersonal affiliation extend to relations among individuals who collectively attend to others' physical and social pain in online contexts. As such, this thesis contributes to theoretical understanding of the nature and social significance of pain, as well as work seeking to uncover the antecedents of interpersonal affiliation. In doing so, this thesis also advances understanding of how seemingly dysphoric collective experiences can be utilised for social change in contemporary online culture. Still, further research is needed to develop a complete model of the circumstances under which collectively attending to others' pain motivates individuals to affiliate with one another.

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Appendix A

Written- and Video- Vignettes in Study 1

	Vignette methodology	
Experience	Written	Video
Physical pain		.
Facial impalement	Mike and his father often ride their motorcycles together. Recently, Mike and his father took their motorcycles off-road. On one of the off-road trails Mike fell off his motorcycle. When he fell, a piece of tree branch pierced through Mike's cheek. Even though he was wearing a helmet, the tree branch managed to slide under his helmet and pierce his cheek. Mike immediately felt pain in his cheek and called out to his father for help. Mike's father helped take off his helmet. The tree branch remained in Mike's cheek. The piece of tree branch was approximately 2.5 centimetres in diameter and pierced approximately 6 centimetres into Mike's cheek. As Mike moved and spoke, blood flowed from his injury. Mike lost feeling in his cheek due to the severity of his injury. Mike was taken to hospital, where doctors removed the tree branch and closed his injury with 24 stitches.	
Broken bone	James was recently at an indoor skate park with friends, practicing jumps on his skateboard. He had successfully landed a series of jumps but fell when he attempted to land the final jump. When he fell, James broke his right femur, the bone in his leg connecting his hip to his knee. James immediately cried out in pain and clutched his leg. As his friends rushed to help him, James lay on the ground unable to move. His leg bulged abnormally with the broken bone. James's friends called an ambulance. James continued to cry out and clench his teeth in pain while he waited for paramedics to arrive. Once paramedics arrived, they worked to stabilise James's leg, which caused him further discomfort. Even after James was given pain medication, he was still felt a considerable amount of pain. James had to be airlifted to hospital for treatment due to the severity of his injury.	.

	Vignette methodology	
Experience	Written	Video
Social pain		.
Loss of child	Ben and his wife had a young daughter. Ben's daughter suffered from serious health problems for all of her life and required full time care. Over the past year her health had deteriorated even further. After being admitted to hospital, Ben's daughter passed away. Ben's daughter's life was a very difficult one. Although she was not expected to live long, Ben had not prepared himself for his daughter's death. Following the loss of his daughter, Ben was consumed by grief. He found it difficult to even think about his daughter without crying. However, Ben tried to remain positive. He talked about how he felt honoured to have had time with his daughter and the gift she had been to him and his family. He also talked about how grateful he felt for having the privilege of being her father for the few years that she was alive.	
Loss of parent	Brad's father recently had brain aneurysm. Brad's father was rushed to hospital, where doctors kept him alive using a life support machine. Brad's father was kept alive in hospital for several days, until the decision was made to turn his life support machine off. Brad's father passed away shortly after his life support machine was turned off. Brad sat with his father, and held his hand, as he took his last breaths. He considered himself lucky to have been able to say goodbye to his father before he passed away. Brad and his father were very close. Losing his father was a very difficult experience for Brad. In the days following his father's death, Brad tried to be strong and remain positive. However, he was devastated by the loss of his father. When he talked about his father Brad's speech was stilted and he struggled not to cry.	.

	Vignette methodology	
Experience	Written	Video
Loss of parent	Chris's father was diagnosed with lung cancer last year. After he was diagnosed, Chris's father had a combination of surgery and chemotherapy to treat the tumour in his lung. However, the treatments were unsuccessful. At the age of 57, Chris's father lost his fight against cancer and passed away. Chris and his father were very close. Chris was devastated by his father's death. When Chris lost his father, it was one of the most difficult times in his life. Chris found it hard to believe that he had lost his father. Each morning he woke up and hoped his father's death was a horrible nightmare. The most difficult part for Chris was realising that he would never be able to hug his father again. In the days following his father's death Chris tried to remain strong. However, he found it difficult to talk or even think about his father without crying.	.
No-pain		
Fishing	Sam is a keen fisherman. Sam recently went fishing in his kayak at a lake popular for freshwater bass fishing. Once he arrived at the lake, Sam positioned his kayak on the shore and packed it with his fishing equipment. After getting into the kayak himself, Sam paddled out onto the lake. Not long after casting his line Sam felt a pull on his fishing rod. Sam reeled in a freshwater bass, which was approximately 1 kilogram in weight. Sam unhooked the fish from his rod and then released it back into the lake. Sam cast his line again. Not long after he felt a pull on his fishing rod. Sam reeled in another freshwater bass, which was approximately 600 grams in weight. Sam unhooked the fish from his rod and released it back into the lake. After he released the fish Sam kayaked back to shore.	.

	Vignette methodology	
Experience	Written	Video
Snowboarding	Alex recently went on a snowboarding holiday with some of his friends. Alex and his friends stayed at the snowfield where they planned to go snowboarding. On the first day of the holiday, Alex and one of his friends decided to go snowboarding together. They took a chair lift to the top of the mountain at the snowfield. On the chair lift Alex and his friend talked about how much they were enjoying the snow. Alex was looking forward to getting to the top of the mountain, as it had been at least two years since he last snowboarded. Alex exited the chair lift and took a moment to appreciate the view from the top of the mountain. Alex then followed his friend, who had already begun snowboarding down the mountain. As he snowboarded, Alex continued to enjoy the views from the mountain. Alex also enjoyed the fresh air as he snowboarded.	.

Appendix B

Summary Statistics from Mixed-Effects Models in Study 1

Source	*F*	*df*	*p*	η2
Generalised pain intensity				
Methodology	0.00	1, 455	.958	-
Experience	352.29	6, 455	< .001	.82
Methodology x Experience	1.12	6, 455	.349	.01
FPS-R				
Methodology	26.45	1, 455	< .001	.05
Experience	592.80	6, 455	< .001	.89
Methodology x Experience	6.52	6, 455	< .001	.08
Physical pain				
Methodology	0.38	1, 455	.538	.001
Experience	288.38	6, 455	< .001	.79
Methodology x Experience	0.35	6, 455	.911	.005
Emotional pain				
Methodology	1.68	1, 455	.196	.004
Experience	336.41	6, 455	< .001	.82
Methodology x Experience	1.77	6, 455	.103	.02
State empathy				
Methodology	0.50	1, 455	.478	.001
Experience	113.23	6, 455	< .001	.60
Methodology x Experience	1.00	6, 455	.426	.01
State personal distress				
Methodology	6.50	1, 455	.011	.01
Experience	83.58	6, 455	< .001	.52
Methodology x Experience	2.36	6, 455	.030	.03
Disgust				
Methodology	6.23	1, 455	.013	.01
Experience	33.81	6, 455	< .001	.31
Methodology x Experience	1.21	6, 455	.302	.02

Appendix C

Thematic Maps in Study 2A

Figure C1

First Thematic Map in Study 2A

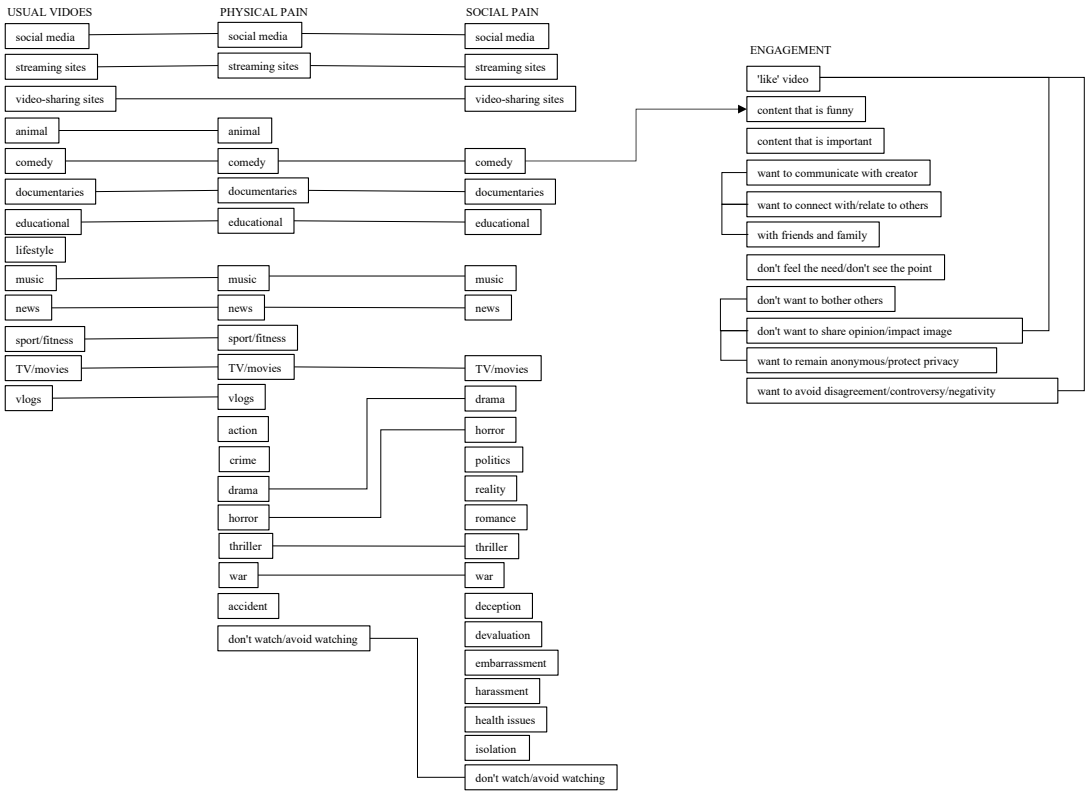


Figure C2

Second Thematic Map in Study 2A

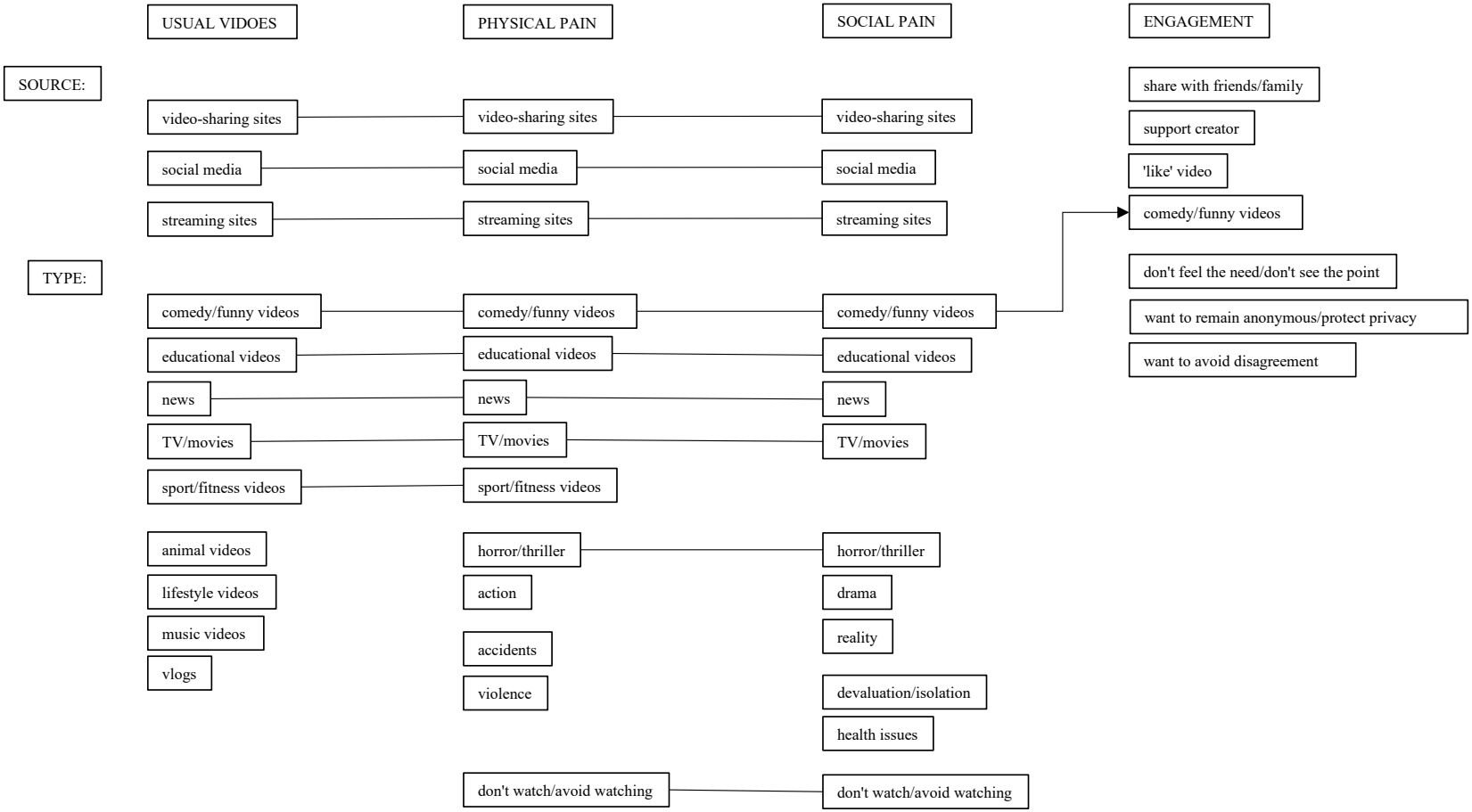
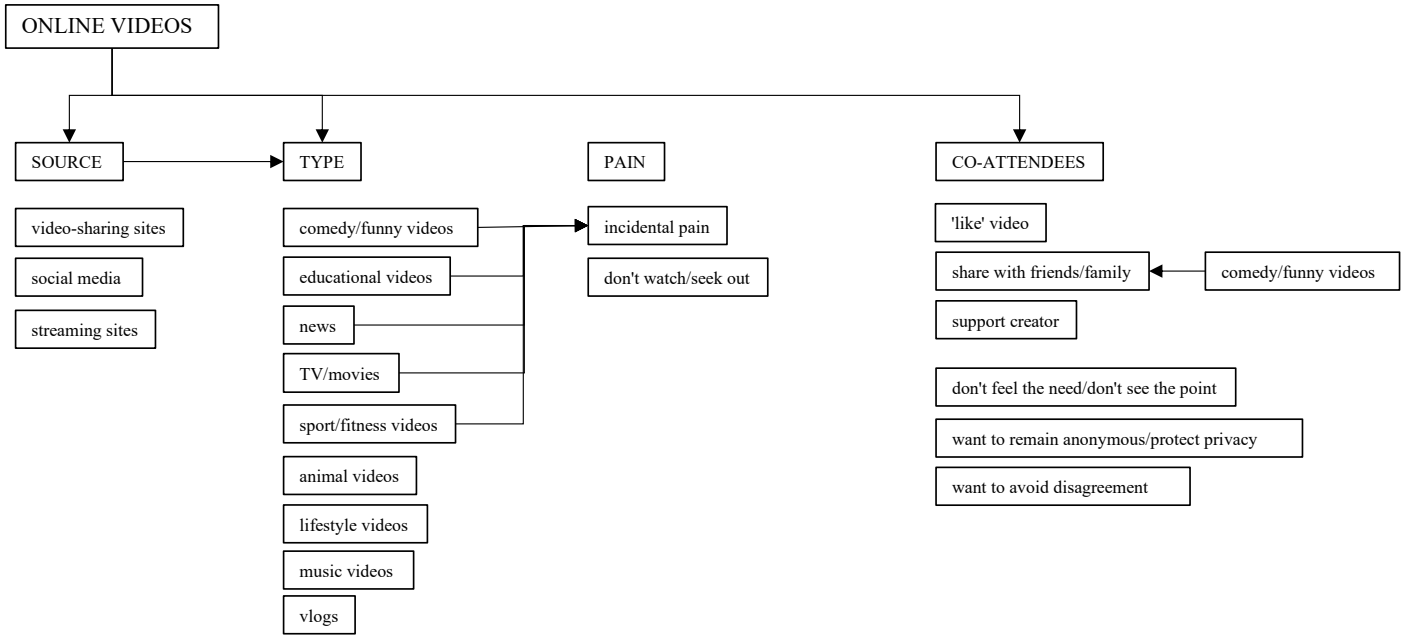


Figure C3

Final Thematic Map in Study 2A



Appendix D

Thematic Maps in Study 2B

Figure D1

First Thematic Map in Study 2B

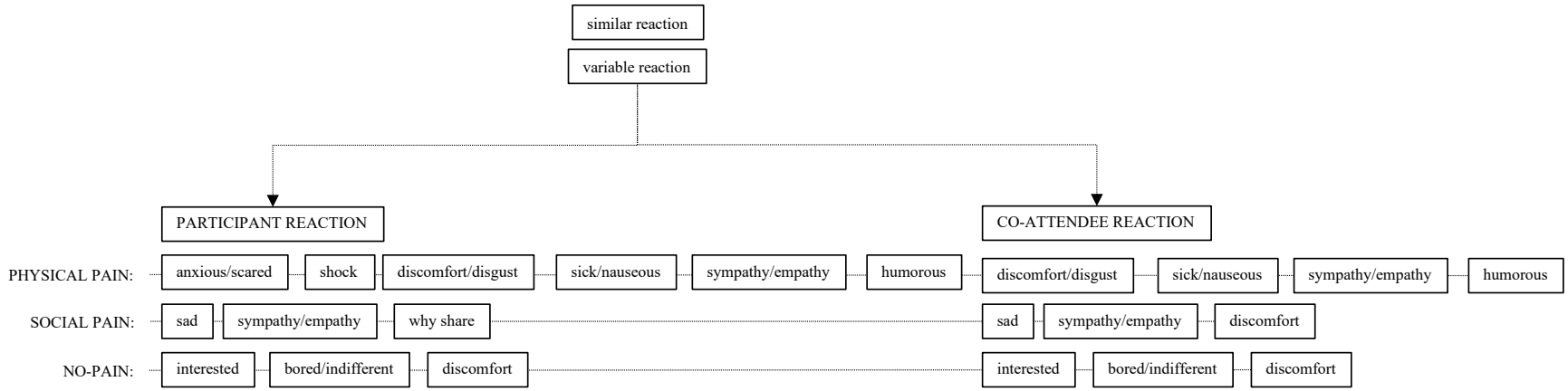


Figure D2

Second Thematic Map in Study 2B

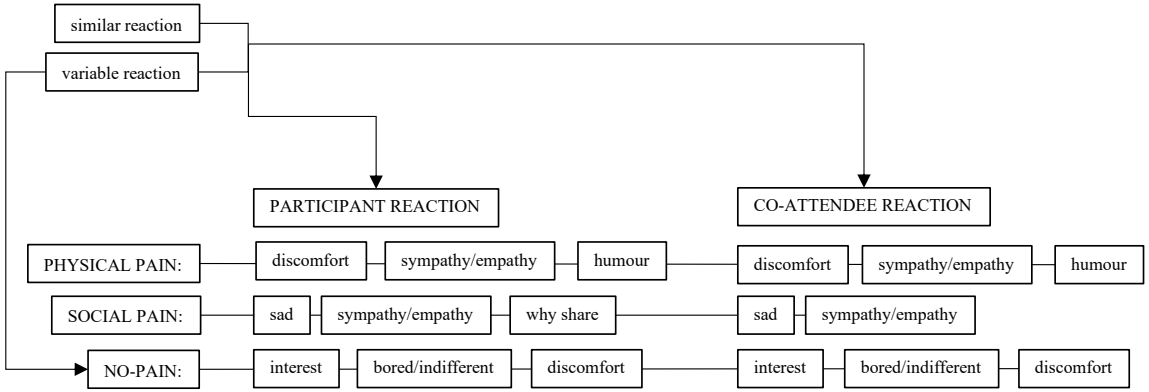
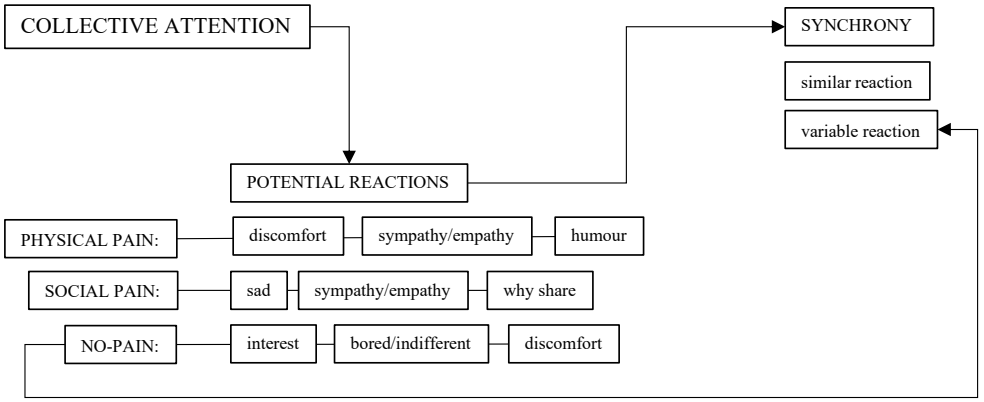


Figure D3

Final Thematic Map in Study 2B



Appendix E

Thematic Maps in Study 3B

Figure E1

First Thematic Map in Study 3B

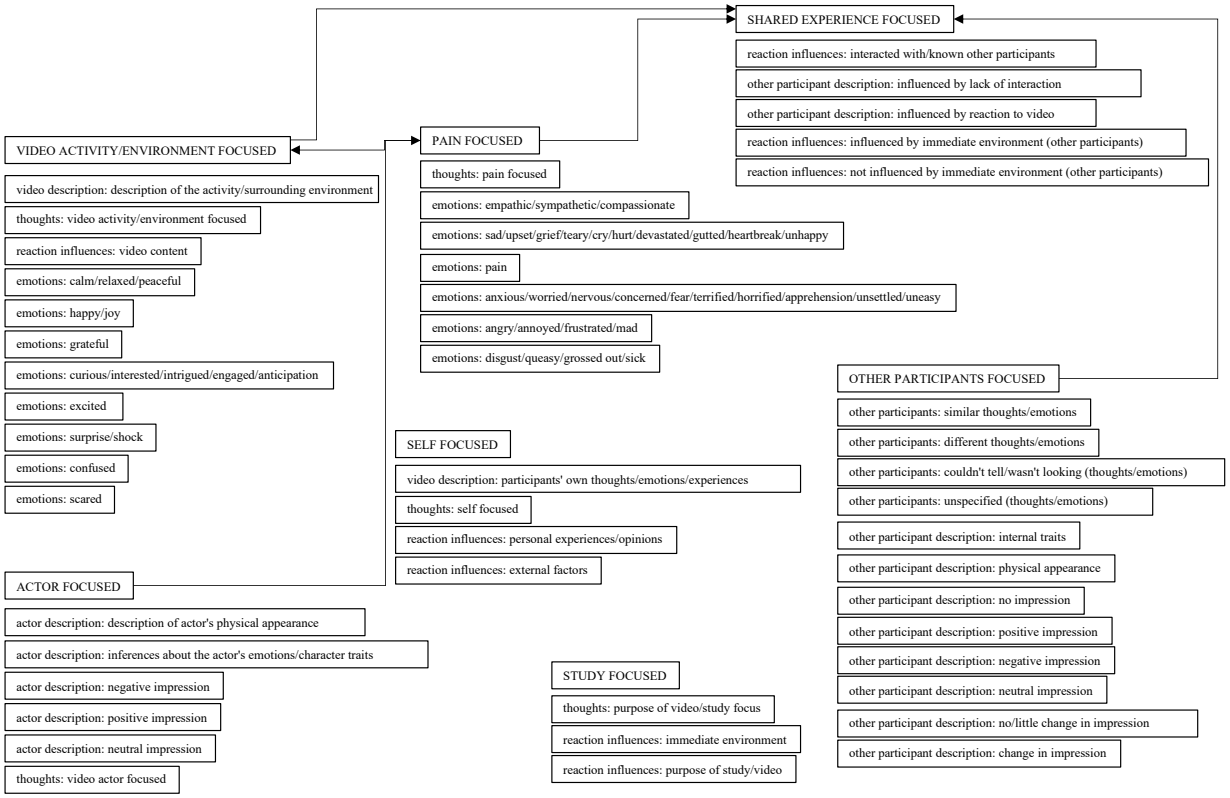


Figure E2

Second Thematic Map in Study 3B

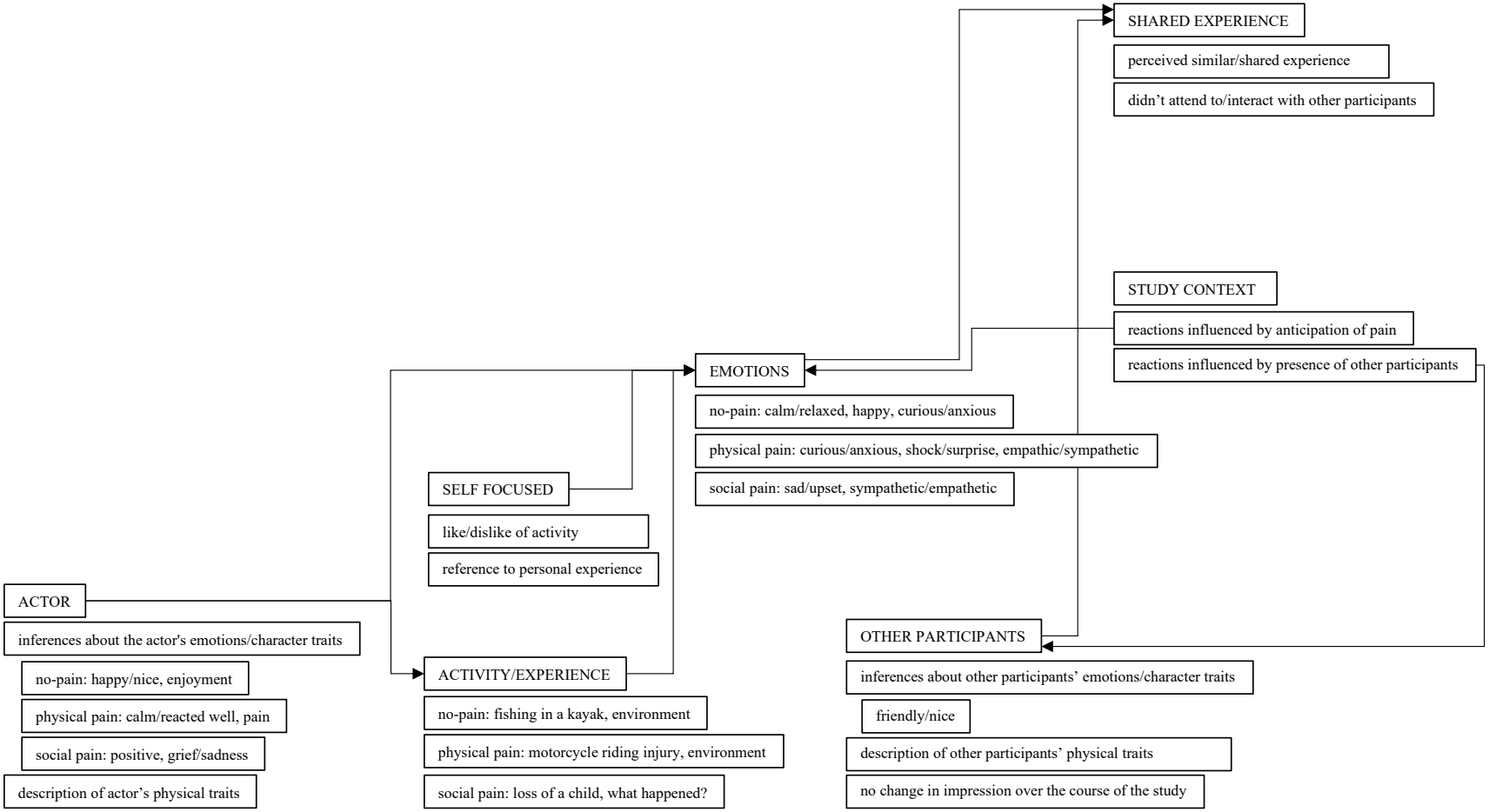


Figure E3

Third Thematic Map in Study 3B

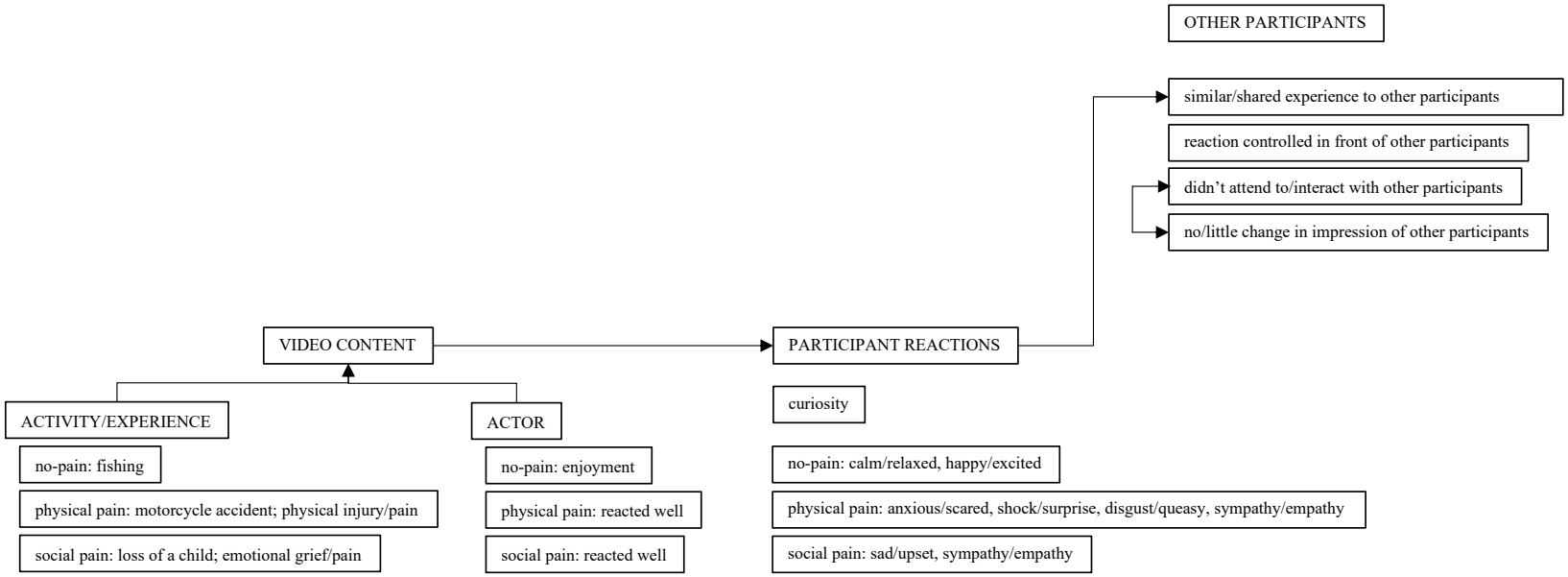
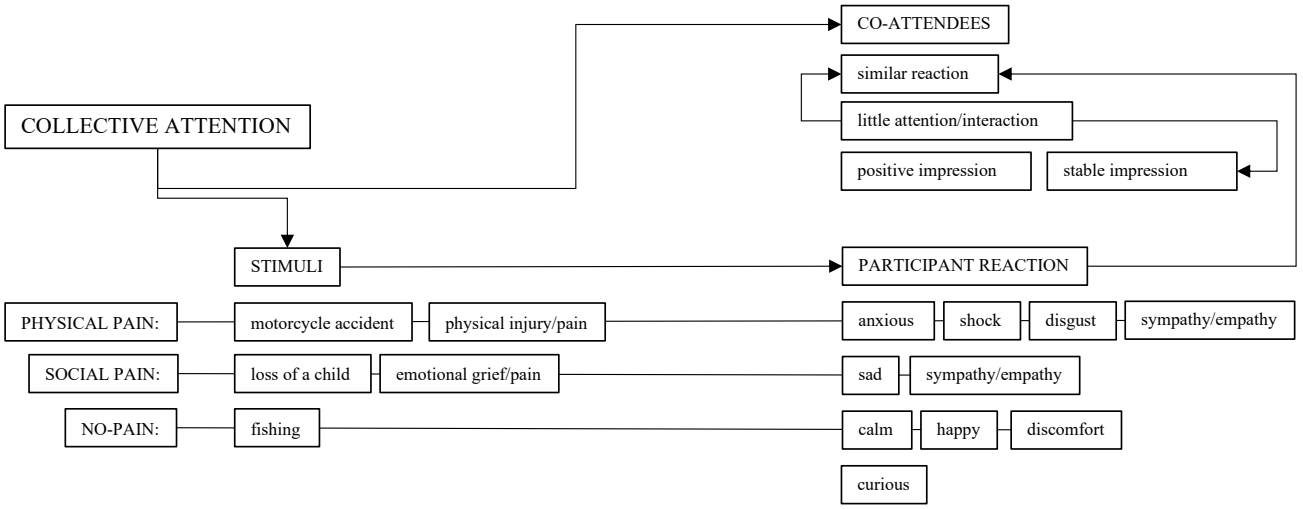


Figure E4

Final Thematic Map in Study 3B



Appendix F

Summary Statistics from Study 3B

Table F1

ANOVA Statistics in Study 3B

Source	*F*	*df*	*MSE*	*p*	η2
Generalised pain intensity	109.03	2, 61	2.01	< .001	.78
Physical pain	54.74	2, 61	2.32	< .001	.64
Emotional pain	141.75	2, 61	1.20	< .001	.82
Positive affect	3.31	2, 61	0.42	.043	.10
Negative affect	17.54	2, 61	0.37	< .001	.37
State empathy	19.84	2, 61	1.53	< .001	.39
State personal distress	17.38	2, 61	1.77	< .001	.36
Disgust	11.39	2, 61	2.56	< .001	.27
Consumption ratings	7.69	2, 59	2.11	.001	.21
Listed thoughts	6.37	2, 61	6.80	.003	.17
Insight words	4.00	2, 61	1.92	.023	.12
Perceived emotional synchrony	17.00	2, 61	1.17	< .001	.36
Morality ratings	4.32	2, 61	1.31	.018	.12
Moral words	0.14	2, 61	0.05	.865	.005
Affiliation words	9.42	2, 61	0.96	< .001	.24

Table F2

Simple Contrast Statistics across Pain Conditions in Study 3B

Source	Difference	*p*	95% CI
Generalised pain intensity			
Physical pain vs. No-pain	5.72	< .001	[4.87, 6.58]
Social pain vs. No-pain	5.23	< .001	[4.36, 6.11]
Physical pain vs. Social pain	0.49	.268	[-0.39, 1.36]
Physical pain			
Physical pain vs. No-pain	4.73	< .001	[3.81, 5.65]
Social pain vs. No-pain	3.12	< .001	[2.18, 4.06]
Physical pain vs. Social pain	1.60	.001	[0.66, 2.55]
Emotional pain			
Physical pain vs. No-pain	3.73	< .001	[3.07, 4.39]
Social pain vs. No-pain	5.56	< .001	[4.89, 6.24]
Physical pain vs. Social pain	-1.84	< .001	[-2.51, -1.16]
Positive affect			
Physical pain vs. No-pain	0.49	.014	[0.10, 0.88]
Social pain vs. No-pain	0.15	.445	[-0.25, 0.55]
Physical pain vs. Social pain	0.34	.096	[-0.06, 0.74]
Negative affect			
Physical pain vs. No-pain	1.08	< .001	[0.72, 1.45]
Social pain vs. No-pain	0.62	.002	[0.25, 1.00]
Physical pain vs. Social pain	0.46	.017	[0.08, 0.84]
State empathy			
Physical pain vs. No-pain	1.40	< .001	[0.65, 2.15]
Social pain vs. No-pain	2.39	< .001	[1.63, 3.16]
Physical pain vs. Social pain	-0.99	.012	[-1.75, -0.22]
State personal distress			
Physical pain vs. No-pain	2.30	< .001	[1.50, 3.10]
Social pain vs. No-pain	1.62	< .001	[0.80, 2.44]
Physical pain vs. Social pain	0.68	.101	[-0.14, 1.50,]
Disgust			
Physical pain vs. No-pain	1.77	.001	[0.81, 2.74]
Social pain vs. No-pain	-0.43	.391	[-1.42, 0.56]
Physical pain vs. Social pain	2.20	< .001	[1.21, 3.19]
Consumption ratings			
Physical pain vs. No-pain	1.71	< .001	[0.82, 2.61]
Social pain vs. No-pain	1.20	.010	[0.29, 2.11]
Physical pain vs. Social pain	0.51	.264	[-0.40, 1.42]

Source	Difference	*p*	95% CI
Listed thoughts			
Physical pain vs. No-pain	2.72	.001	[1.16, 4.30]
Social pain vs. No-pain	0.77	.341	[-0.84, 2.38]
Physical pain vs. Social pain	1.95	.018	[0.34, 3.57]
Insight words			
Physical pain vs. No-pain	-0.95	.027	[-1.78, -0.11]
Social pain vs. No-pain	0.16	.705	[-0.69, 1.02]
Physical pain vs. Social pain	-1.11	.012	[-1.97, -0.25]
Perceived emotional synchrony			
Physical pain vs. No-pain	1.72	< .001	[1.07, 2.38]
Social pain vs. No-pain	1.58	< .001	[0.91, 2.25]
Physical pain vs. Social pain	0.15	.665	[-0.52, 0.81]
Morality ratings			
Physical pain vs. No-pain	0.55	.119	[-0.14, 1.23]
Social pain vs. No-pain	1.04	.005	[0.33, 1.74]
Physical pain vs. Social pain	-0.49	.170	[-1.20, 0.22]
Affiliation words			
Physical pain vs. No-pain	1.16	< .001	[0.57, 1.75]
Social pain vs. No-pain	1.07	.001	[0.46, 1.67]
Physical pain vs. Social pain	0.09	.772	[-0.52, 0.69]

Note. CI = confidence interval.

Table F3

ANCOVA Statistics Controlling for Group Size and Pre-Existing Relationship Strength in Study 3B

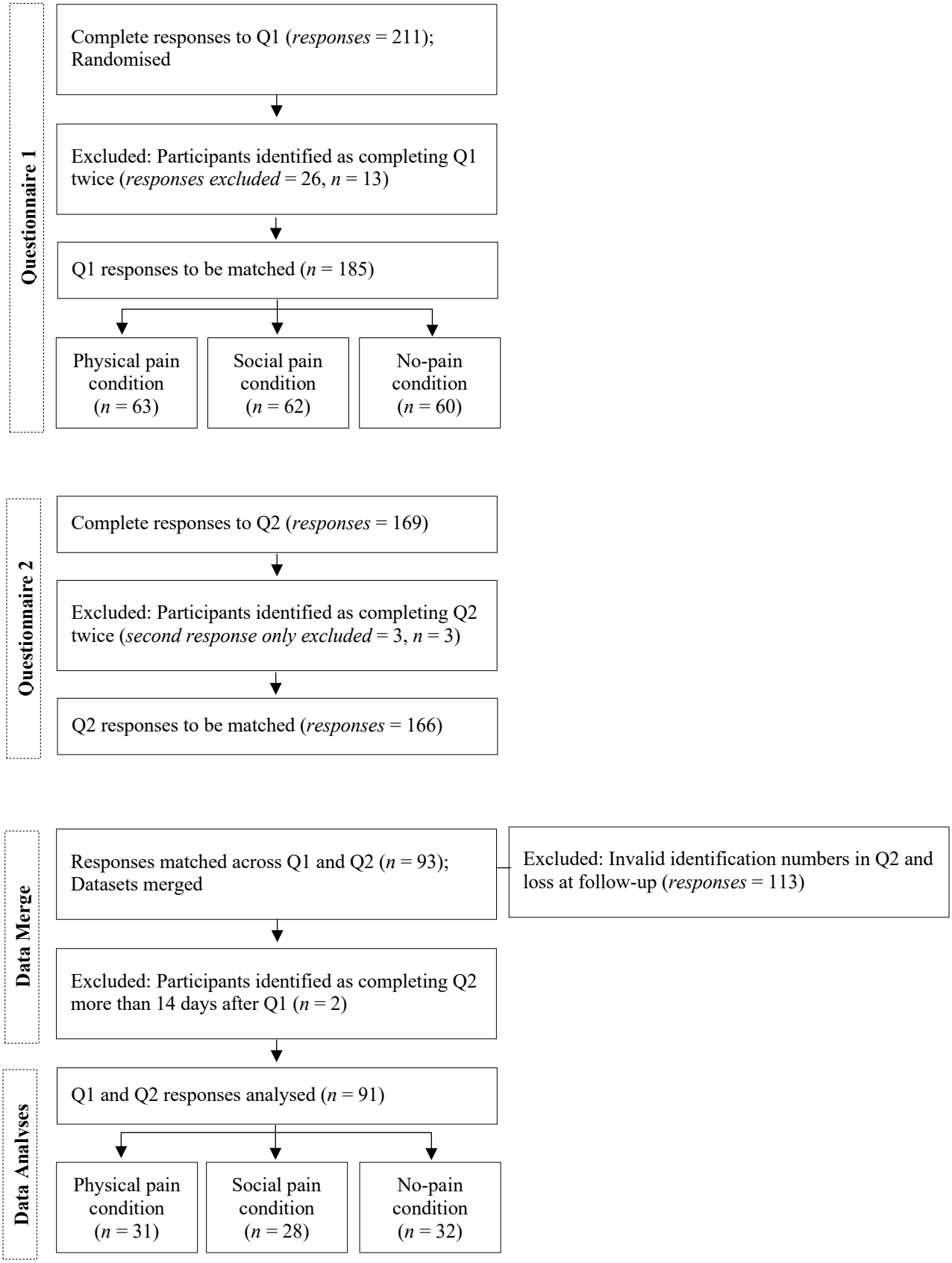
Source	*F*	*df*	*MS*	*p*	η^2
Generalised pain intensity					
Model	52.79	4	109.46	< .001	.78
Condition	99.86	2	207.04	< .001	.77
Group size	0.03	1	0.07	.857	.001
Pre-existing relationship strength	0.04	1	0.08	.849	.001
Residual		59	2.07		
Physical pain					
Model	35.97	3	84.64	< .001	.64
Condition	53.81	2	126.63	< .001	.64
Group size	0.07	1	0.17	.787	.001
Residual		60	2.35		
Emotional pain					
Model	68.58	4	85.27	< .001	.82
Condition	121.18	2	150.67	< .001	.80
Group size	0.01	1	0.02	.907	< .001
Pre-existing relationship strength	0.01	1	0.01	.922	< .001
Residual		59	1.24		
Positive affect					
Model	2.60	4	1.06	.045	.15
Condition	1.61	2	0.65	.210	.05
Group size	0.00	1	0.00	.987	< .001
Pre-existing relationship strength	3.49	1	1.42	.067	.06
Residual		59	0.41		
Negative affect					
Model	8.57	4	3.26	< .001	.37
Condition	16.16	2	6.15	< .001	.35
Group size	0.07	1	0.03	.790	.001
Pre-existing relationship strength	0.17	1	0.06	.682	.003
Residual		59	0.38		
State empathy					
Model	9.68	4	15.29	< .001	.40
Condition	15.74	2	24.87	< .001	.35
Group size	0.11	1	0.17	.743	.002
Pre-existing relationship strength	0.13	1	0.21	.715	.002
Residual		59	1.58		

Source	*F*	*df*	*MS*	*p*	η^2
State personal distress					
Model	8.89	4	15.90	< .001	.38
Condition	16.22	2	29.01	< .001	.35
Group size	1.15	1	2.05	.289	.02
Pre-existing relationship strength	0.01	1	0.02	.910	< .001
Residual		59	1.79		
Disgust					
Model	7.39	4	17.89	< .001	.33
Condition	7.49	2	18.13	.001	.20
Group size	4.52	1	10.95	.038	.07
Pre-existing relationship strength	1.77	1	4.29	.188	.03
Residual		59	2.42		
Consumption ratings					
Model	4.94	4	10.10	.002	.26
Condition	5.64	2	11.54	.006	.17
Group size	0.58	1	1.19	.449	.01
Pre-existing relationship strength	3.67	1	7.51	.060	.06
Residual		57	2.05		
Listed thoughts					
Model	3.19	4	22.28	.019	.18
Condition	4.59	2	32.11	.014	.13
Group size	0.17	1	1.16	.685	.003
Pre-existing relationship strength	0.13	1	0.90	.721	.002
Residual		59	6.99		
Insight words					
Model	3.03	4	5.66	.024	.171
Condition	1.29	2	2.40	.284	.042
Group size	2.37	1	4.43	.129	.039
Pre-existing relationship strength	0.90	1	1.68	.347	.015
Residual		59	1.87		
Perceived emotional synchrony					
Model	8.66	4	10.31	< .001	.37
Condition	16.97	2	20.20	< .001	.37
Group size	0.00	1	0.002	.968	< .001
Pre-existing relationship strength	1.11	1	1.32	.296	.02
Residual		59	1.19		

Source	*F*	*df*	*MS*	*p*	η^2
Morality ratings					
Model	2.15	4	2.89	.086	.13
Condition	3.89	2	5.23	.026	.12
Group size	0.14	1	0.19	.707	.002
Pre-existing relationship strength	0.09	1	0.12	.768	.001
Residual		59	1.35		
Moral words					
Model	0.14	4	0.01	.968	.009
Condition	0.11	2	0.01	.895	.004
Group size	0.24	1	0.01	.626	.004
Pre-existing relationship strength	0.06	1	0.002	.815	.001
Residual		59	0.05		
Affiliation words					
Model	5.28	4	5.04	.001	.26
Condition	10.46	2	9.97	< .001	.26
Group size	1.78	1	1.70	.187	.03
Pre-existing relationship strength	0.78	1	0.75	.380	.01
Residual		59	0.95		

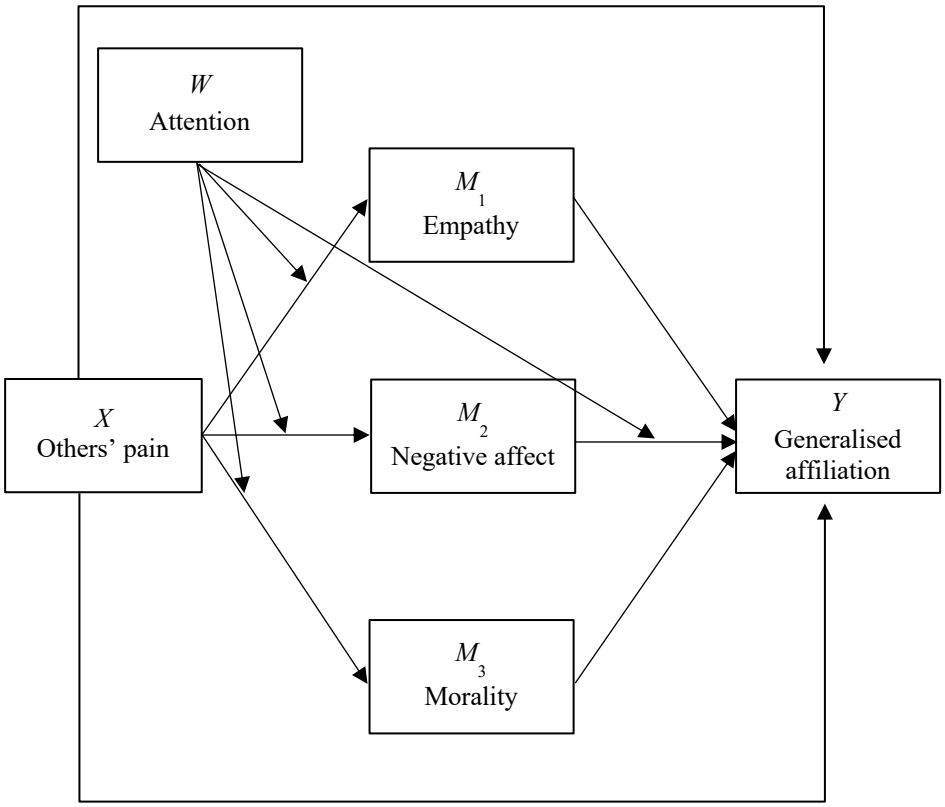
Appendix G

Participant Flow in *Manuscript* Study 2



Appendix H

Graphical Summary of Theorised Indirect Interpersonal Effects of Attending to Others' Pain Online Moderated by the Nature of Attention



Note. Graphical summary of a theorised conditional process model in which the relative effects of attending to others' pain online on generalised affiliation are mediated by empathy, negative affect, and morality, and the relative effects of attending to others' pain online on empathy, negative affect, and morality are moderated by the nature of attention, as is the effect of negative affect on generalised affiliation. In the model, it is theorised that attention to others' pain online promotes feelings of empathy, negative affect, and morality and that these feelings are amplified when pain is the subject of collective as compared to individual attention. The subsequent effects of empathy, negative affect, and morality on generalised affiliation are then theorised to differ. Greater feelings of empathy are theorised to promote more affiliative responses. Comparatively, while negative affect is theorised to promote generalised affiliation when attention to others' pain online is collective, negative affect experienced alone during individual attention is theorised to reduce affiliative responses. Finally, greater feelings of morality are theorised to license less affiliative responses.