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< Factors involving interpersonal conflict >

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Abstract

The present study investigates the impact of awe on forgiveness, revenge, and dehumanization. Awe, an emotional response to vast and transcendent stimuli, has been shown to promote prosocial behavior and social connectedness. This research aims to extend our understanding of awe's effects by examining whether it can increase forgiveness, decrease revenge, and reduce dehumanization. Sixty-four first-year psychology students were randomly assigned to watch a video inducing either space awe, nature awe, or a neutral relaxation control. Participants then completed self-report measures on forgiveness, revenge motivation, and dehumanization. Results showed no significant effect of awe on forgiveness or revenge motivation, contradicting previous findings on awe's prosocial impacts. However, exposure to the space awe condition significantly reduced dehumanization compared to the control condition. These findings suggest that while awe may not directly influence forgiveness or revenge, it has the potential to increase humanization, especially through the space awe condition. Future research should explore more robust methods of inducing awe, such as virtual reality, to better understand its psychological effects.

Keywords: Awe, Forgiveness, Revenge, Dehumanization, Prosocial behavior, Small self, Social connectedness

Introduction

Looking at a beautiful sunset, contemplating the vastness of time, and the beauties of nature and space can evoke a strong emotional response (Frijda, 1986; Lazarus, 1991; LeDoux, 1996). This emotional response, often labeled as awe, has been shown to foster social connectedness and reduce self-focus (Prade & Saroglou, 2016; Yaden et al., 2019), potentially leading to prosocial behaviors (Keltner & Haidt, 2003). However, while previous research has investigated the broad effects of awe on prosocial behavior (Piff et al., 2015; Stellar et al., 2017), the impacts of awe on forgiveness, revenge, and humanization remain under-examined. Understanding these effects could have significant implications for improving interpersonal and intergroup relationships.

More research on awe is evident as the literature focusses on the general prosocial effects of awe, such as increased generosity and cooperation (Piff et al., 2015). However, it is unclear whether these effects extend to other constructs like forgiveness, revenge and humanization. Liao et al. (2024) found a positive association between awe and interpersonal forgiveness. Induced awe significantly increased the tendency to forgive. This effect was mediated by the sense of small-self elicited by awe. However, more research is needed to see if these findings can be replicated, and whether the benefits of awe carry over to forgiveness-relevant outcomes. Addressing these gaps in literature can expand our understanding of how awe influences social dynamics. The current study aims to fill this gap by examining whether awe can lead to increased forgiveness, decreased motivation for revenge, and increased humanization of others.

Forgiveness-related responses to transgressions

Forgiveness can be defined as the psychological process where one makes a voluntary decision to let go of negative emotions and resentment towards an aggressor, fostering a sense of compassion (Enright et al., 1998). Forgiveness should be distinguished from related

concepts like reconciliation. Reconciliation refers to “the restoration of trust in an interpersonal relationship through mutually trustworthy behaviors” (Worthington & Drinkard, 2000), which is not necessary for forgiveness. One can forgive people with whom they do not want to resume a relationship with (McCullough et al., 2005). Forgiveness involves letting go of negative emotions and cognition directed at the offender. The so-called victim gives up resentful emotions and fosters positive emotions, thoughts and cognitions (Enright et al., 1998). In interpersonal relationships, when individuals engage in forgiveness, there is a cognitive shift that involves letting go of negative feelings and resentment toward the transgressor. This shift is linked to a decreased motivation for revenge. When individuals forgive, they are less likely to want to get back at the person who hurt them. The cognitive shift leads them to a more benevolent and understanding perspective, decreasing the need for revenge (Enright et al., 1998). The process of forgiveness has two elements: a decrease in negative emotions, thoughts, attitudes, and in the motivation to either avoid or take revenge on the offender, and increase in positive emotions, thoughts and attitudes (Berry et al., 2001; Enright et al., 1998).

Evidence shows that the benevolence element of forgiveness and the lack of negative feelings (resentment) element of forgiveness indicate that both aspects significantly impact health. Benevolence, which involves positive feelings towards the offender, has been shown to contribute to better mental health outcomes. For example, individuals who practice benevolent forgiveness report lower levels of depression and anxiety, as well as higher levels of life satisfaction and psychological well-being (Toussaint et al., 2016; Hirsch et al., 2011; Lin et al., 2004; Ryan and Kumar. 2005). Forgiveness has been identified as an important predictor of both mental and physical health (Toussaint et al., 2016).

The lack of negative feelings or resentment is another principle of forgiveness that impacts health. Research has shown that holding onto resentment and negative feelings

towards an offender is associated with increased stress and higher blood pressure (Lawler et al., 2005). Letting go of these negative emotions has been linked to better physical and mental health outcomes. Reed and Enright (2006) suggest that forgiveness can influence emotional regulation, reducing anxiety, depression and PTSD symptoms, increasing self-esteem and healthy decision making.

Both elements of forgiveness—benevolence and the absence of resentment—are therefore essential for enhancing psychical and mental health. By fostering a sense of compassion and releasing negative emotions, it can lead to health benefits that contribute to both psychical and mental health.

Forgiveness is referred to as an emotion-focused coping style that helps manage negative psychological and emotional experiences that is elicited by interpersonal conflict (Strelan & Covic, 2006; Worthington & Scherer, 2004). According to this perspective, forgiveness represents just one of several strategies individuals can use to cope. Nonetheless, it has been proposed as one of the healthier approaches for navigating adversity (Worthington & Scherer, 2004). Reed and Enright (2006) suggest that forgiveness can influence emotional regulation, reducing anxiety, depression and PTSD symptoms, increasing self-esteem and healthy decision making.

Revenge

When a person decides to forgive the offender, they overcome two other possible responses to the hurt they have experienced: avoidance and revenge (McCullough et al., 1998). Forgiveness involves a shift in motivation, decreasing the desire to avoid or seek revenge against the offender while increasing the motivation to act benevolently towards the offender (McCullough & Witvliet, 2002). Lack of forgiveness can lead to negative emotions like resentment. Resentment is characterized by sustained feelings of anger towards the transgressor, stemming from the perception of being wronged (Smith & Kim, 2007).

Resentment serves as a precursor to revenge. When individuals ruminate on their grievances and maintain strong resentment, their motivation for revenge is more likely to increase (Barcaccia et al., 2017). Revenge can be defined as a retaliatory act motivated by the perception of intentional harm, particularly when it involves feelings of humiliation and diminished sense of personal worth (Elshout et al., 2015). This progression from resentment to revenge can be seen as a coping mechanism to find relief from the negative emotions associated with the transgression (McCullough et al., 2001). However, seeking revenge led to an increase of negative emotions such as depression, anxiety, and anger (Barcaccia et al., 2017; Barcaccia et al., 2020). Moreover, some individuals might be more vengeful than other people, and are less likely to forgive someone after an interpersonal transgression (McCullough et al., 2001). Individuals with high dispositional anger are more vengeful than those with low dispositional anger (Sindermann et al., 2018). The reason for this is that anger impairs one's ability to self-regulate emotions, leading to an activation of the behavioral approach system (BAS) (Rajchert & Winiewski, 2016). This activation drives individuals towards goal-oriented behaviors, which, in the context of anger, often manifest as vengeful actions (Rajchert & Winiewski, 2016). Consequently, increased difficulty in managing emotions under the influence of anger raises the likelihood of vengeful behaviors (Chester & DeWall, 2018). Therefore, while forgiveness and revenge are related responses to perceived harm, they tap into different emotional and motivational processes.

Humanization

A construct that is related to benevolence is humanization. Dehumanization refers to the psychological process by which individuals are perceived as lacking or having diminished human traits (e.g., empathy), emotions (e.g., compassion), and needs (e.g., belonging) (Haslam, 2006; Leyens et al., 2007; Schroeder & Epley, 2020). Dehumanization operates by creating a mental and emotional distance between oneself and others, negative attitudes and

justifying harmful behaviors towards the outgroup, as they are seen as less deserving of moral consideration and empathy (Kelman, 1973). This process is particularly evident in contexts of intergroup conflict, where outgroup members are often viewed as less than human, making it easier and justifiable to inflict harm upon them (Leyens et al., 2000).

Awe and its role in forgiveness-related responses

Awe refers to an emotional response to stimuli that are perceived as vast, transcendent, overwhelming, and are often accompanied by a sense of wonder and need for accommodation (Keltner & Haidt, 2003). Awe is felt in contexts that expand one's frame of reference (e.g., when observing an expansive natural landscape or contemplating the vastness of time) and simultaneously elicit a need to restructure one's mental representations (Keltner & Haidt, 2003).

Keltner and Haidt (2003) propose that awe-inducing stimuli are characterized by two features: perceptual vastness and need for accommodation. Vastness refers to anything that is perceived as bigger than the self, or frame of reference. Even though the term “vastness” is often a matter of physical size, it can also describe social size like authority or power. The most important part is that the stimulus expands the person's typical frame of reference in some aspect (Shiota et al., 2007).

When expanding one's frame of reference, cognitive accommodation is necessary. Accommodation pertains to the Piagetian process of adapting mental structures that cannot incorporate a new experience (Piaget & Inhelder, 1972). According to this process, people make sense of the world through mental representation of their experience or schemas (Piaget, 1970; Siegler, 1991). Assimilation happens when stimuli are interpreted as additional cases of existing schemas (Piaget, 1975). Awe challenges the mental representations or schemas when an experience that is very vast does not fit into an existing schema (Piaget, 1980). This can be confusing and frightening: they can make a person feel small and powerless. Feelings of

enlightenment can occur when the mental structures expand to accommodate the new experiences (Kelner and Haidt, 2003).

Awe's impact on reducing revenge motivation and increasing benevolent forgiveness and humanization

Experiences of awe can diminish the emphasis of the self and individual interests, and focus more on broader entities, such as social collectives. Awe often involves a sense of smallness or insignificance in the face of something vast. This can diminish the emphasis on the self, making individuals focus less on personal grievances and more open to forgiving others (Kelner and Haidt, 2003). By shifting attention away from the self, awe can help individuals manage negative psychological and emotional experience, facilitating forgiveness.

Research supports the idea that awe inductions can lead to a sense of being part of a greater whole and increased prosocial behavior, such as generosity and cooperation (Piff et al., 2015). These prosocial behaviors are closely linked to forgiveness, as individuals who feel connected to others are more likely to forgive (Karremans et al., 2005).

Campbell et al. (2004) found that individuals who reported diminished feelings of self-importance were more selfless in their relationships. This selflessness can contribute to forgiveness by reducing the desire for retaliation and promoting understanding and compassion towards the offender. Furthermore, self-transcendence values, which emphasize diminished self-importance and heightened attention to others, are positively associated with prosocial tendencies and empathy (Boer & Fisher, 2013). Empathy is a key component of forgiveness, as it allows individuals to understand the perspective of the offender and let go of negative emotions. These findings suggest that when individuals focus on something larger than themselves over their own self-interest, it fosters greater prosocial behavior. When experiences of awe can increase prosocial tendencies, it should thus increase feelings of forgiveness.

Awe diminishes aggression (Ying et al., 2016) and encourages prioritizing group interests (Lucht & Van Schie, 2023). Reduced aggression lowers the motivation to seek revenge (Denson et al., 2011), while prioritizing group interests could foster forgiveness, due to the dissolution of the self. There is evidence that the experience of awe can lead to dissolution of the self, that is a diminished sense of individual identity and blurred boundaries between oneself and the external world (Nour et al., 2016). This dissolution of the self can make it easier to forgive, as it reduces the focus on personal grievances and enhances the perception of shared humanity. Additionally, awe creates a sense of connectedness, with something greater than oneself, such as nature, other people or a collective experience (Keltner & Haidt, 2003), which can foster forgiveness by promoting feelings of unity and blurring psychological distance between the individual and the offender.

As previously stated, dehumanization is evident in contexts of intergroup conflict, where outgroup members are often viewed as less than human, making it easier and justifiable to inflict harm upon them (Leyens et al., 2000). Awe has been shown to counteract these feelings by eliciting a sense of connectedness and diminishing self-focus. This expanded sense of self can make it difficult to maintain firm distinctions between ingroups and outgroups. Experiences of awe can blur the boundaries between the self and others, leading to more inclusive and emphatic view of humanity (Keltner & Haidt, 2003; Piff et al., 2015). Moreover, awe can encourage prosocial behaviors, such as generosity and cooperation (Piff et al., 2015), which can further increase humanization. By enhancing feelings of humility and interconnectedness, awe can reduce the psychological distance between groups and promote a recognition of shared humanity.

Liao et al. (2024) is one of the few studies directly examining the relationship between awe and forgiveness. This study found that induced awe significantly increased the tendency to forgive, mediated by the sense of the small-self elicited by awe. While the study provided

initial evidence on the association between forgiveness and awe, it did not explore the negative (resentment) elements of forgiveness.

In sum, experiencing awe can lead to generosity, cooperation, and a diminished focus on personal gain, promoting pro-social behaviors and a sense of connectedness. This pro-social influence of awe may play a role in facilitating forgiveness and strengthening interpersonal relationships.

Interventions

Interventions using awe have shown promising results, particularly in enhancing prosocial behavior and overall well-being. Research by Liao et al. (2024) found that induced awe significantly increased the tendency to forgive, mediated by the sense of small-self elicited by awe, by introducing participants to hypothetical interpersonal offensive situations and two economic interaction situations (the Ultimatum Game and the Prisoner's Dilemma Game).

Additionally, research by Sturm et al. (2022), investigated the emotional benefit of an "awe walk" intervention. Participants who took the so-called "awe-walk" experienced greater awe during their walks and showed an increasingly "small self" in their reports. They reported being happier and having more prosocial positive emotions, such as increased compassion and enhanced empathy, during their walk. Outside of the walking context, participants also reported greater prosocial positive emotions in daily life and a decrease in stress over time. This suggests that interventions designed to elicit awe could be beneficial for fostering prosocial behavior and enhancing overall well-being by utilizing the emotional and psychological effects of awe.

Furthermore, Van Cappellen and Saraglou (2012) investigated how awe activated religious and spiritual feelings and influenced behavioral intentions. They found that experiencing awe can increase spiritual and religious feelings, which can lead to increased

prosocial behaviors and intentions, like helping others and engaging in community activities. These findings suggest that awe can enhance social connectedness and empathy, which are important for forgiveness (Piff et al., 2015). When individuals feel connected to a larger whole and experience a diminished sense of self, they are more likely to engage in prosocial behaviors, including those relevant to forgiveness.

At last, the process of forgiveness can reduce negative emotions and repair interpersonal fractures (Burnette et al., 2009), helping to restore close interpersonal relationships. This restoration of interpersonal relationships subsequently enhances mental health and well-being (Canevello & Crocker, 2010).

The current study

Liao et al. (2024) found a positive association between awe and interpersonal forgiveness, where induced awe significantly increased the tendency to forgive. This study aims to extend these findings by examining additional constructs of revenge motivation and humanization.

Research suggests that eliciting awe via a nature video causes participants to feel more connected to people in general and elicit positive prosocial emotions (Van Cappellen & Saroglou, 2012). Previous studies have primarily focused on the general prosocial effects of awe, like generosity and cooperation (Piff et al., 2015). However, it remains unclear whether these effects extend to other constructs like forgiveness, revenge, and humanization.

Addressing these gaps in literature can expand our understanding of how awe influences social dynamics. The goal of this research is to investigate whether inducing awe is associated with increased forgiveness, decreased revenge feelings, and increased humanization of others. To address these gaps, this study operationalizes the constructs of awe, forgiveness, revenge and dehumanization through experimental manipulation and self-report measures. Participants were exposed to awe-inducing stimuli (nature and space videos) and a neutral control video

on candle making. The nature and space videos were chosen to explore whether different types of awe (earthly versus cosmic) have distinct effects on these constructs. We hypothesize that (H1) awe is positively associated with forgiveness, meaning that participants who experience awe will be more willing to forgive an offender; (H2) awe is negatively associated with revenge, indicating that participants who experience awe will be less inclined to seek revenge; and (H3) awe is positively associated with humanization, suggesting that experiencing awe will increase the tendency to humanize others.

Method

Participants and design

For this research study 64¹ first year psychology bachelor students at the University of Groningen participated in a lab study. This sample allowed a power of .099 to detect (small) effect size effects of *Cohen's d* = 0.1, a power of 0.40 to detect (medium) effect size effects of *Cohen's d* = .25, and a power of .80 to detect (large) effect size effects of *Cohen's d* = .40 (Faul et al., 2007). The sample size for this study consisted of 17 males, 45 females, and one reported being non-binary. The ages ranged between 18 and 26 ($M = 20.08$, $SD = 2.02$). Each participants received 1.0 SONA credit as compensation for their participation. Recruitment criteria included having someone in their lives they have not forgiven, still being bothered by the experience, and the experience not being too intense or traumatic.

This study is a between-subjects experimental design with three conditions: a space awe induction, a nature awe induction, and a neutral control. Participants were randomly assigned to one of these three conditions. The type of video shown served as the independent variable, while the levels of forgiveness, revenge, and humanization were the dependent variables.

Procedure

This study was approved by the Ethical Committee for Social and Behavioral Science of the University of Groningen. Participants were recruited via SONA, an internal participant database of the University of Groningen. All questions were presented in English. Participants provided informed consent before participating in the study, and the data collection and data analysis were conducted in accordance with General Data Protection Regulation.

Upon arrival, participants provided informed consent and completed demographic questions, including age, gender, nationality, fluency in English, and SONA number, so we

can assign their credit after participating. Participants were then asked to write about an interpersonal transgression that was still bothersome to them, but not traumatic of nature. They were given three minutes to write about what happened and their associated thoughts and feelings. Participants were encouraged to explore their deepest emotions and thoughts about this life experience.

After participants wrote for three minutes, we asked them if they would still like to continue with the study, or if they want to stop. The rationale for this question was to ensure participants were not too emotionally overwhelmed after writing. In order for them not to feel pressured into continuing, because of needed SONA credits, we still granted credit in case they did not want to continue the study. We also asked participants to indicate how bothered they are by the situation after writing about it. This is to determine if the writing influenced their affect states.

Followed by the writing task, participants were randomized into of three video conditions: an awe-inducing video about space and galaxies, an awe-induction about nature, or a neutral relaxation video on candle making. After watching the videos, participants were asked to complete the dependent variable measures.

After completing the dependent variable measures, the participants were asked to complete some additional measures that are not relevant for this thesis. At the conclusion of the study, participants were debriefed and explained the purpose of the study and we addressed any questions they might have.

Measures

Forgiveness

To measure feelings of forgiveness, specifically focusing on the benevolence aspect of forgiveness, participants were asked to answer statements regarding the person who wronged

¹ We had to delete one participant from the dataset, as they had indicated that they were not serious in their

them, on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Participants indicated how much they “wish for good things to happen to the person who wronged me”, “hope the person who wronged me is treated fairly by others in the future”, “have compassion for the person who wronged me”, “wish well for the person who wronged me”, and “If I encountered the person who wronged me, I would feel at peace” (Rye et al., 2001).

Revenge motivation

To assess revenge, we used the revenge items on the Transgression-Related Interpersonal Motivations Inventory (McCullough et al., 1998). The items were: “I would like to make the person who wronged me pay for their actions”, “I wish something bad would happen to the person who wronged me”, “I want the person who wronged me to get what he/she deserves. (That is, something bad)”, “I would like to get even with the person who wronged me”, “I want to see the person who wronged me be hurt and miserable”. Participants used a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Humanization

To assess humanization of others, we used the items on the Perceived Dehumanization Scale (Bastian & Haslam, 2010). The items were: “I feel like the person who wronged me is an object, not a human”, “I feel like the person who wronged me is mechanical and cold, like a robot”, and “I feel like the person who wronged me is superficial, like that person has no depth”. Participants used a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Video induction

Participants were randomly assigned to one of three video conditions designed to evoke different emotional states: space awe video, focusing on space and galaxies, a nature awe induction focusing on earth’s oceans, mountains and nature, and a neutral relaxation

responses.

condition on candle making. Each video lasted three minutes and included appropriate music to keep their focus to the video. A manipulation check ensured the videos successfully induced the intended awe-experience. Affect state measures were included to account for potential differences in participants' emotional responses to the videos.

Manipulation check and affect state

The manipulation check assessed whether the awe inductions successfully elicited awe. The items were: "The video was powerful and awe inspiring", and "The video elicited a feeling of wonder in me", with $\alpha = 0.84$. Participants' affective states were measured before the writing task, after the writing task, and after the awe-inducing video to determine if there were differences between the groups and to account for any potential effects on the dependent variables. This ensured that any observed effects on forgiveness, revenge, and dehumanization were due to the intended manipulation of awe. These items were: "Right now, I feel upset", "Right now, I feel pleasant", "Right now, I feel nervous", "Right now, I feel happy", with $\alpha = 0.33$.

Statistical analysis

The hypotheses were tested using a series of one-way ANOVAs to examine the effects of the video conditions on forgiveness, revenge motivation, and humanization. Post hoc tests were conducted to identify specific differences between the conditions. Manipulation checks were analyzed to confirm the effectiveness of the awe induction. The influence of the videos on state affect was examined using ANCOVAs.

Results

Preliminary Analyses

We first checked whether the assumptions for ANOVA were met (i.e., normality, equality of variances, and independence of observations). The Shapiro-Wilk test was used to assess normality, and the results indicated that the normality assumption was met for forgiveness, $p = 0.424$, 0.079 , 0.215 , and revenge motivation, $p = 0.232$, 0.310 , 0.330 , but was violated for dehumanization in the condition space awe, $p < 0.001$. Levene's test for equality of variances was performed for forgiveness and revenge and the results stated that this assumption was met for forgiveness, $p = 0.064$, 0.096 , 0.097 , and 0.073 for mean, median, median with adjusted df, and trimmed mean, respectively, and revenge motivation $p = 0.925$, 0.961 , 0.961 , 0.925 for mean, median, median with adjusted df, and trimmed mean, respectively.

Given the violation of the normality assumption for humanization, nonparametric tests were used for this variable. Specifically, the Kruskal-Wallis test was used for this variable.

We then conducted preliminary analyses where we inspected the means, standard deviations, and reliability scales for the variables, as shown in Table 1. Participants were assigned to one of three conditions: Control group ($n = 22$), Nature awe ($n = 20$), and Space awe ($n = 22$).

Table 1

Descriptive Statistics and Reliability for Forgiveness, Revenge, and Humanization

Variables	<i>N</i>	<i>M</i>	<i>SD</i>	<i>α</i>
Forgiveness	64	3.56	.82	.81
Revenge	64	2.14	.78	.80
Humanization	64	2.07	.93	.71

The correlation matrix in Table 2 shows significant relationships between the variables. Forgiveness is significantly negatively correlated with both revenge ($r = -.65, p < .001$) and dehumanization ($r = -.50, p < .001$). Furthermore, forgiveness shows a significant positive correlation with awe ($r = .31, p < .001$). Revenge is positively correlated with dehumanization ($r = .36, p < .01$) and negatively correlated with awe ($r = -.25, p < .05$).

Table 2

Correlation Matrix for Forgiveness, Revenge, Humanization, Awe, Positive Affect, and Negative Affect

Variables	1.	2.	3.	4.	5.	6.
1. Forgiveness	-					
2. Revenge	-.65**	-				
3. Dehumanization	-.50**	.36**	-			
4. Awe	.31*	-.25*	-.13	-		
5. Positive Affect	.023	-.02	.03	.416**	-	
6. Negative Affect	.13	-.11	-.20	.06	-.13	-

** $p < 0.01$ * $p < 0.05$

Writing influence

The mean value of being currently bothered by the incident was $M = 43.48$ ($SD = 23.98$), with a range of 3.0 to 90.0. The influence of writing about the incident on affect demonstrated that, post-writing positive emotion significantly increased, $t(63) = 6.824, p < .001$. The effect size was large, with *Cohen's d* = 2.41. This result indicates a significant positive effect of the writing exercise on increasing positive affect. However, post-writing negative emotion did not show a significant change, $t(63) = 1.293, p = .201$, suggesting no significant that the writing exercise did not significantly impact negative affect. The effect size was medium, with *Cohen's d* = 1.35.

Manipulation check

We conducted a manipulation check to see if the videos elicited awe ($\alpha = 0.84$). Descriptive statistics are presented in Table 3. Levene's test for homogeneity of variances indicated that the assumption of equal variances was violated, $F(2,61) = 4.499, p = 0.015$. consequently, we performed Welch's ANOVA, which is robust to violations of this assumption. The influence on the videos on state affect was examined with ANCOVAs, controlling for the baseline measure. Controlling for baseline positive affect, the results showed that the video condition did not have a significant effect on post-video positive affect, $F(2,60) = 1.89, p = .16$. Controlling for baseline negative affect, the results showed that the video condition did not have a significant effect on post-video negative affect, $F(2, 60) = 1.07, p = .35$.

Table 3

Descriptive Statistics for Video-related Awe Across Conditions

Condition	<i>N</i>	<i>Mean</i>	<i>SD</i>	95% Confidence Interval
Control	22	1.66	0.70	[1.35, 1.97]
Nature awe	20	3.05	1.06	[2.55, 3.55]
Space awe	22	3.16	0.28	[2.57, 3.75]
Total	64	2.61	0.16	[2.30, 2.92]

The results of Welch's ANOVA indicated a significant effect of condition on awe scores, *Welch's* $F(2,37.25) = 18.446, p < 0.001$, suggesting that the type of video shown had a

significant impact on awe scores.

Based on the post hoc comparisons for the manipulation check, the results revealed significant differences between the conditions. Specifically, the control condition significantly differed from both the nature awe condition and the space awe condition. Compared to the control, the nature awe condition (*Cohen's d* = 1.56), and the space awe condition (*Cohen's d* = 1.42) elicited more awe when viewing the videos. The nature and space awe conditions did not differ significantly in the extent to which they elicited awe.

Hypotheses testing

To test the hypothesis that awe influences forgiveness, we conducted a one-way ANOVA to compare the forgiveness scores across the three conditions (control, nature awe, and space awe). Descriptive statistics are presented in Table 4. The ANOVA results showed that there was no significant effect of condition on forgiveness scores, ($F(2,61)=0.799$, $p = .455$, $\eta^2 = .026$), indicating that there were no significant differences in forgiveness scores across the three conditions. Therefore, the hypothesis that awe influences forgiveness was not supported by the data.

Table 4

Descriptive Statistics by Condition

Condition	N	Forgiveness Mean (SD)	Revenge Mean (SD)	Dehumanization Mean (SD)
Control	22	3.39 (0.69)	2.15 (0.81)	2.39 (0.98)
Nature awe	20	3.60 (0.70)	2.16 (0.76)	2.08 (0.76)
Space awe	22	3.70 (1.03)	2.13 (0.81)	1.74 (0.95)

The one-way ANOVA conducted to compare the effect of the three conditions (control, nature awe, and space awe) on revenge motivation scores revealed no significant differences between the groups, $F(2, 61) = 0.009$, $p = .991$, $\eta^2 = .000$. This result indicates that

the type of video shown did not have a significant impact on participants' motivation to seek revenge.

A Kruskal-Wallis H test showed a statistically significant difference in humanization scores between the different conditions ($\chi^2(2) = 6.154, p = .046$). The control group had the highest mean rank ($M = 38.66$), followed by the nature awe group ($M = 33.85$), and the space awe group had the lowest mean rank ($M = 25.11$). This suggests that participants in the control condition experienced more dehumanization compared to those in the nature awe and space awe conditions.

Post hoc pairwise comparisons using the Mann-Whitney U test were conducted to determine which groups differed. The comparisons revealed that the difference in humanization scores between the control and nature awe conditions was not statistically significant ($U = 179.000, p = .298$). The difference in humanization scores between the control and space awe conditions was statistically significant ($U = 147.500, p = .023$). The difference in humanization scores between the nature awe and space awe conditions was not statistically significant ($U = 152.000, p = .080$).

These results suggest that there is a significant effect of the space awe condition compared to the control condition on humanization scores. Participants in the space awe condition showed significantly lower dehumanization scores than participants in the control condition, indicating that exposure to awe-inspiring space content might increase feelings of humanization.

Discussion

The present study aimed to examine the impact of awe on forgiveness, revenge, and humanization among participants who were exposed to different awe-inducing stimuli. The results provide mixed support for the hypotheses, suggesting significant findings in some variables but not all.

Firstly, the hypothesis that awe leads to greater forgiveness was not supported, as the results showed no significant effect on condition on forgiveness scores. Similarly, the analysis for revenge scores also showed no significant difference between the conditions, indicating that the type of video shown did not significantly affect participants' feelings of revenge. In contrast, the analysis for humanization scores showed a statistically significant effect on the awe condition. Post hoc pairwise comparisons indicated that the difference between the control and space awe condition was significant. Participants in the control condition reported higher levels of dehumanization compared to those in the space awe condition. The differences between the control and nature awe conditions and between the nature awe and space awe conditions were not statistically significant. These findings suggest that while awe did not significantly influence forgiveness or revenge, exposure to awe-inspiring space content significantly increased feelings of humanization.

Experiencing awe can reduce self-focus and enhances feelings of connectedness to something greater than oneself (Keltner & Haidt, 2003), which counteracts the cognitive processes underlying dehumanization. Awe encourages individuals to see beyond their personal grievances and recognize the shared humanity of others, making it difficult to maintain rigid distinctions between self and others (Piff et al., 2015). By promoting a sense of small self and connectedness, awe helps dissolve barriers between ingroups and outgroups, fostering a more inclusive and human perspective, which is particularly relevant for humanization.

The hypothesis that awe is positively associated with forgiveness was not supported by the findings of this study, which contradicts with those of Liao et al. (2024), who found a positive association between awe and interpersonal forgiveness, mediated by the sense of small self elicited by awe. Liao et al. (2024) employed videos to induce awe, happy, and neutral emotions, then evaluated the effects of induced awe on the small-self and interpersonal forgiveness in hypothetical interpersonal offensive situations and two economic interaction situations. Similarly, our study employed videos to induce awe, but then assessed forgiveness through self-report questionnaires. The methodological differences, including the use of interactive economic games versus self-report measures, could account for the differing results.

Similar to forgiveness, the hypothesis that awe is negatively associated with revenge motivation was not supported. This lack of significant findings for both forgiveness and revenge motivations suggests that the emotional states elicited by the awe videos in our study did not influence these specific outcomes. Research supports the idea that awe inductions can lead to a sense of being part of a greater whole and can enhance prosocial behaviors (Piff et al., 2015). The lack of significant findings could be due to several factors. One of the most important being power; the current study was vastly underpowered. The sample size of 64 participants was insufficient to detect small or medium effect sizes with adequate statistical power. Future research should aim to recruit larger samples to ensure sufficient power for detecting smaller but potentially meaningful effects.

Another possible reason is the specific characteristics of the sample of this study. The participants in this study were first-year psychology students, who may differ from the general population or other demographic groups. Therefore, the homogeneity of the sample might have limited the variability in responses, making it harder to find significant effects.

Another factor is the method of measuring the dependent variables. This study relied

on self-reported measures for the dependent variables. In contrast, the study by Liao et al. (2024) used interactive economic games such as the Ultimatum Game and the Prisoner's Dilemma Game, as well as hypothetical interpersonal offensive situations to evaluate forgiveness. These methods provide a more dynamic and interactive assessment of forgiveness-related behaviors, potentially capturing significant findings that self-reported questionnaires might miss. Future research should consider incorporating a combination of self-reported measures and interactive tasks to provide a more comprehensive assessment of forgiveness and related constructs.

Furthermore, this lack of significant findings for both forgiveness and revenge motivations suggest that the emotional states elicited by the awe videos are not significantly associated with these specific outcomes. This could be also explained by Shiota et al. (2007) who suggested that effects of awe on prosocial behavior can vary significantly depending on the context and intensity of the stimulus. The laboratory setting of this study might not have provided an environment to evoke the kind of emotional state that awe can induce. Field studies or more naturalistic settings, where participants encounter awe in their everyday lives, might show different results. For example, Van Cappellen and Saroglou (2012) found that awe experienced in a religious or spiritual context had a stronger impact on prosocial behaviors, compared to more secular settings.

The significant reduction in dehumanization scores in the space awe condition highlights the potential of awe-inspiring stimuli to foster social connectedness and reduce negative attitudes towards others. This finding is consistent with research suggesting that awe can diminish self-focus and increase a sense of being part of a larger whole, which in turn can foster prosocial behaviors and increase humanization (Prade & Saroglou, 2016; Yaden et al., 2019). The difference between the space and nature awe conditions might be attributed to the abstract and vast nature of space, which could evoke a stronger sense of self-transcendence

and connectedness compared to more concrete earthly scenes. The overview effect, a phenomenon identified by Frank White, further supports this idea. In the space awe condition, the video begins on Earth and gradually zooms out into the vastness of space, continuing to zoom out further and further. The overview effect relates to the difference between the space and nature awe conditions by illustrating how the vast nature of space evokes a strong sense of self-transcendence and connectedness. People who observe Earth from space experience intense emotions, perceiving themselves and their world in a new light, and return to Earth with a renewed sense of purpose (Yaden et al., 2016).

Implications

The findings of this study have several theoretical and practical implications. Theoretically, the results of this study contribute to the growing literature on the psychological effects of awe. While previous research has focused on the general prosocial effects of awe, such as increased generosity and cooperation (Piff et al., 2015), this study extends this understanding of awe's impact to include forgiveness, revenge motivation, and humanization. The lack of significant findings for forgiveness and revenge motivation suggests that the influence of awe on these constructs may be more complex than previously thought. It highlights the need for further research to understand the specific conditions under which awe might elicit these outcomes.

Practically, the significant decrease in dehumanization in the space awe condition could have important implications for interventions aimed at promoting social harmony and reducing prejudice. Awe-inspiring experiences, particularly those related to the vastness and beauties of space, might be used in educational and therapeutic settings to foster empathy and reduce dehumanization towards others. This could be particularly relevant in contexts where intergroup conflict and prejudice are prevalent.

Furthermore, the findings suggest that different types of awe-inducing stimuli might

have different effects on psychological outcomes. The space awe condition, which emphasizes the vastness of the universe, may be more effective in reducing dehumanization than nature awe. This distinction emphasizes the importance of carefully selecting awe-inducing stimuli in interventions. Future research should explore the mechanisms through which different types of awe influence psychological constructs, which could lead to more targeted and effective interventions.

Limitations and Future Research

This study also had several limitations that should be noted. The first limitation pertains the sample we used. First, the sample size for this study was relatively small, which may limit the generalizability of the findings. Moreover, our sample consisted of only first year psychology students, which also limits the generalizability of the findings. Future research should aim to replicate these results with larger and more diverse samples.

Additionally, the measures used to assess forgiveness, revenge, and dehumanization were self-reported, which can be subject to social desirability bias (Van de Mortel, 2008). Including behavioral measures or reports from peers could provide a more comprehensive assessment of these constructs. Reports from peers or family members who observe the participants' behaviors in natural settings could offer valuable perspectives. For instance, Penn et al. (1998) used peer ratings to assess sociability among inpatients with severe psychiatric disorders. Peer ratings showed promising validity as a measure of social functioning among inpatients with severe psychiatric disorders.

Future research could explore the potential of virtual reality (VR) to induce awe, a method that has shown promise in various studies. Virtual reality offers a unique capability to create immersive and controlled environments that elicit strong emotional responses, making it a promising tool for studying awe (Chirico et al., 2018; Quesnel & Riecke, 2018). For instance, Chirico et al. (2018) found that VR-induced awe diminished the sense of self and

increased feelings of connectedness to others, with participants reporting higher levels of awe compared to traditional flat-screen experiences. Similarly, Quesnel and Riecke (2018) showed that VR simulations of natural environments, like forests and starry skies, effectively induced awe, leading to increased prosocial behaviors and positive mood changes. Using virtual reality to induce awe in future research can enhance the understanding of awe's psychological and social impacts and enhance the conditions for inducing awe.

Conclusion

In conclusion, while the hypotheses that awe influences forgiveness and revenge motivation were not supported, the finding that space awe significantly increases humanization shows that awe-inspiring stimuli can foster social connectedness and reduce negative attitudes towards others. This study contributes to the growing literature on the psychological effects of awe, particularly regarding forgiveness, revenge motivation, and humanization, and highlights the need for further research to fully understand its impact on various emotional and social behaviors.

References

- Barcaccia, B., Schneider, B. H., Pallini, S., & Baiocco, R. (2017). Bullying and the detrimental role of un-forgiveness in adolescents' wellbeing. *Psicothema*, *29*, 217–222. <https://doi.org/10.7334/psicothema2016.251>.
- Barcaccia, B., Salvati, M., Pallini, S., Saliari, A. M., Baiocco, R., & Vecchio, G. M. (2020). The bitter taste of revenge: Negative affect, depression and anxiety. *Current Psychology*, in press. <https://doi.org/10.1007/s12144-020-00643-1>.
- Bastian, B., & Haslam, N. (2010). Excluded from humanity: The dehumanizing effects of social ostracism. *Journal of Experimental Social Psychology*, *46*(1), 107–113. <https://doi-org.proxy-ub.rug.nl/10.1016/j.jesp.2009.06.022>
- Berry, J. W., Worthington, E. L., Jr., Parrott, L. III, O'Connor, L. E., & Wade, N. G. (2001). Dispositional forgivingness: Development and construct validity of the Transgression Narrative Test of Forgivingness (TNTF). *Personality and Social Psychology Bulletin*, *27*(10), 1277–1290. <https://doi.org/10.1177/01461672012710004>
- Boer, D., & Fischer, R. (2013). How and when do personal values guide our attitudes and sociality? Explaining cross-cultural variability in attitude-value linkages. *Psychological Bulletin*, *139*, 1113–1147. <http://dx.doi.org/10.1037/a0031347>
- Burnette, J. L., Davis, D. E., Green, J. D., Worthington, E. L., Jr., & Bradfield, E. (2009). Insecure attachment and depressive symptoms: The mediating role of rumination, empathy, and forgiveness. *Personality and Individual Differences*, *46*(3), 276–280. <https://doi-org.proxy-ub.rug.nl/10.1016/j.paid.2008.10.016>
- Campbell, W. K., Bonacci, A. M., Shelton, J., Exline, J. J., & Bushman, B. J. (2004). Psychological entitlement: Interpersonal consequences and validation of a self-report measure. *Journal of Personality Assessment*, *83*, 29–45. http://dx.doi.org/10.1207/s15327752jpa8301_04

- Canevello, A., & Crocker, J. (2010). Creating good relationships: Responsiveness, relationship quality, and interpersonal goals. *Journal of Personality and Social Psychology, 99*(1), 78–106. <https://doi-org.proxy-ub.rug.nl/10.1037/a0018186>
- Chester, D. S., & DeWall, C. N. (2018). Personality correlates of revengeseeking: Multidimensional links to physical aggression, impulsivity, and aggressive pleasure. *Aggressive Behavior, 44*, 235–245. <https://doi.org/10.1002/ab.21746>
- Chirico, A., Ferrise, F., Cordella, L., & Gaggioli, A. (2018). Designing awe in virtual reality: An experimental study. *Frontiers in Psychology, 8*. <https://doi-org.proxy-ub.rug.nl/10.3389/fpsyg.2017.02351>
- Denson, T. F., Pedersen, W. C., Friese, M., Hahm, A., & Roberts, L. (2011). Understanding impulsive aggression: Angry rumination and reduced self-control capacity are mechanisms underlying the provocation-aggression relationship. *Personality and Social Psychology Bulletin, 37*(6), 850–862. <https://doi-org.proxy-ub.rug.nl/10.1177/0146167211401420>
- Elshout, M., Nelissen, R. M. A., & van Beest, I. (2015). Vengeance is self-focused: Comparing vengeful to anger-driven responses. *Cognition and Emotion, 29*, 1239–1255. <https://doi.org/10.1080/02699931.2014.976181>.
- Enright, R. D., Freedman, S., & Rique, J. (1998). The psychology of interpersonal forgiveness. In R. D. Enright & J. North (Eds.), *Exploring forgiveness*. (pp. 46–62). University of Wisconsin Press.
- Faul, F., Erdfelder, E., Lang, A.-G. & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*, 175–191.
- Frijda, N. H. (1986). *The emotions*. Cambridge University Press

- Haslam, N. (2006). Dehumanization: An integrative review. *Personality and Social Psychology Review, 10*(3), 252–264. https://doi-org.proxy-ub.rug.nl/10.1207/s15327957pspr1003_4
- Hight, T. L. (1998). Interpersonal forgiving in close relationships: II. Theoretical elaboration and measurement. *Journal of personality and social psychology, 75*, 1586–1603. <https://doi.org/10.1037/0022-3514.75.6.1586>.
- Hirsch, J. K., Webb, J. R., & Jeglic, E. L. (2011). Forgiveness, depression, and suicidal behavior among a diverse sample of college students. *Journal of Clinical Psychology, 67*(9), 896–906. <https://doi-org.proxy-ub.rug.nl/10.1002/jclp.20812>
- Karremans, J. C., Van Lange, P. A. M., Ouwerkerk, J. W., & Kluwer, E. S. (2003). When forgiving enhances psychological well-being: The role of interpersonal commitment. *Journal of Personality and Social Psychology, 84*(5), 1011–1026. <https://doi-org.proxy-ub.rug.nl/10.1037/0022-3514.84.5.1011>
- Kelman, H. C. (1973). Violence without moral restraint: Reflections on the dehumanization of victims and victimizers. *Journal of Social Issues, 29*(4), 25–61. <https://doi-org.proxy-ub.rug.nl/10.1111/j.1540-4560.1973.tb00102.x>
- Keltner, D., & Haidt, J. (2003). Approaching awe, a moral, spiritual, and aesthetic emotion. *Cognition and Emotion, 17*(2), 297–314. <https://doi-org.proxy-ub.rug.nl/10.1080/026999303022297>
- Lawler, K. A., Younger, J. W., Piferi, R. L., Jobe, R. L., Edmondson, K. A., & Jones, W. H. (2005). The Unique Effects of Forgiveness on Health: An Exploration of Pathways. *Journal of Behavioral Medicine, 28*(2), 157–167. <https://doi-org.proxy-ub.rug.nl/10.1007/s10865-005-3665-2>
- Lazarus, R. S. (1991). *Emotion and adaptation*. Oxford University Press.

- LeDoux, J. E. (1996). *The emotional brain: The mysterious underpinnings of emotional life*. Simon & Schuster
- Leyens, J., Demoulin, S., Vaes, J., Gaunt, R., & Paladino, M. P. (2007). Infra-humanization: The wall of group differences. *Social Issues and Policy Review*, *1*(1), 139–172. <https://doi-org.proxy-ub.rug.nl/10.1111/j.1751-2409.2007.00006.x>
- Leyens, J.-P., Paladino, P. M., Rodriguez-Torres, R., Vaes, J., Demoulin, S., Rodriguez-Perez, A., & Gaunt, R. (2000). The emotional side of prejudice: The attribution of secondary emotions to ingroups and outgroups. *Personality and Social Psychology Review*, *4*(2), 186–197. https://doi-org.proxy-ub.rug.nl/10.1207/S15327957PSPR0402_06
- Liao, S., Liu, Y., & Yuan, B. (2024). The effects of awe on interpersonal forgiveness: the mediating role of small-self. *Frontiers in psychology*, *15*, 1336068. <https://doi.org/10.3389/fpsyg.2024.1336068>
- Lin, W.-F., Mack, D., Enright, R. D., Krahn, D., & Baskin, T. W. (2004). Effects of Forgiveness Therapy on Anger, Mood, and Vulnerability to Substance Use Among Inpatient Substance-Dependent Clients. *Journal of Consulting and Clinical Psychology*, *72*(6), 1114–1121. <https://doi-org.proxy-ub.rug.nl/10.1037/0022-006X.72.6.1114>
- Lucht, A., & van Schie, H. T. (2024). The evolutionary function of awe: A review and integrated model of seven theoretical perspectives. *Emotion Review*, *16*(1), 46–63. <https://doi.org/10.1177/17540739231197199>
- McCullough, M. E., Bellah, C. G., Kilpatrick, S. D., & Johnson, J. L. (2001). Vengefulness: Relationships with forgiveness, rumination, well-being, and the Big Five. *Personality and Social Psychology Bulletin*, *27*(5), 601–610. <https://doi-org.proxy-ub.rug.nl/10.1177/0146167201275008>

- McCullough, M. E., Bono, G., & Root, L. M. (2005). Religion and Forgiveness. In R. F. Paloutzian & C. L. Park (Eds.), *Handbook of the psychology of religion and spirituality* (pp. 394–411). The Guilford Press.
- McCullough, M. E., Rachal, K. C., Sandage, S. J., Worthington, E. L., Brown, S. W., & McCullough, M. E., & Witvliet, C. V. O. (2002). The psychology of forgiveness. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 446–458). New York: Oxford University Press.
- Mortel, V.D., & Thea, F.G. (2008). Faking it: Social desirability response bias in self-report research. *Australian Journal of Advanced Nursing*, 25, 40-48.
- Nour, M. M., Evans, L., Nutt, D., & Carhart-Harris, R. L. (2016). Ego-Dissolution and Psychedelics: Validation of the Ego-Dissolution Inventory (EDI). *Frontiers in human neuroscience*, 10, 269. <https://doi.org/10.3389/fnhum.2016.00269>
- Penn, D. L., Reed, D., Sullivan, M., & Spaulding, W. (1998). Use of peer ratings to assess sociability among inpatients with severe psychiatric disorders. *Psychiatric Services*, 49(11), 1440–1444. <https://doi-org.proxy-ub.rug.nl/10.1176/ps.49.11.1440>
- Piaget, J., Inhelder, B. (1972). *The psychology of the child*. New York: Basic Books.
- Piaget, J. (1975). *The equilibration of cognitive structures: The central problem of intellectual development*. Chicago: University of Chicago Press.
- Piaget, J. (1980). Schemes of Action and Language Learning. In M. PiattelliPalmarini (Ed.), *Language and Learning: The Debate Between Jean Piaget and Noam Chomsky* (pp. 23–34). Cambridge, MA: Harvard University Press.
- Piff, P. K., Dietze, P., Feinberg, M., Stancato, D. M., & Keltner, D. (2015). Awe, the small self, and prosocial behavior. *Journal of Personality and Social Psychology*, 108(6), 883–899. <https://doi.org/10.1037/pspi0000018>

- Prade, C., & Saroglou, V. (2016). Awe's effects on generosity and helping. *The Journal of Positive Psychology, 11*(5), 522–530. <https://doi-org.proxy-ub.rug.nl/10.1080/17439760.2015.1127992>
- Quesnel, D., & Riecke, B. E. (2018). Are you awed yet? How virtual reality gives us awe and goose bumps. *Frontiers in Psychology, 9*. <https://doi-org.proxy-ub.rug.nl/10.3389/fpsyg.2018.02158>
- Rachert, J., & Winiewski, M. (2016). The behavioral approach and inhibition systems' role in shaping the displaced and direct aggressive reaction to ostracism and rejection. *Personality and Individual Differences, 88*, 272–279. <https://doi-org.proxy-ub.rug.nl/10.1016/j.paid.2015.09.018>
- Recine, A. C., Werner, J. S., & Recine, L. (2009). Health promotion through forgiveness intervention. *Journal of Holistic Nursing, 27*, 115–123.
- Reed, G. L., & Enright, R. D. (2006). The effects of forgiveness therapy on depression, anxiety, and posttraumatic stress for women after spousal emotional abuse. *Journal of Consulting and Clinical Psychology, 74*(5)
- Ryan, R. B., & Kumar, V. K. (2005). Willingness to forgive: Relationships with mood, anxiety and severity of symptoms. *Mental Health, Religion & Culture, 8*(1), 13–16. <https://doi-org.proxy-ub.rug.nl/10.1080/13674670410001666543>
- Rye, M. S., Loiacono, D. M., Folck, C. D., Olszewski, B. T., Heim, T. A., & Madia, B. P. (2001). Evaluation of the psychometric properties of the Forgiveness Scale. *Personality and Individual Differences, 31*(5), 775-787. [https://doi.org/10.1016/S0191-8869\(00\)00177-1](https://doi.org/10.1016/S0191-8869(00)00177-1)
- Schroeder, J., & Epley, N. (2020). Demeaning: Dehumanizing others by minimizing the importance of their psychological needs. *Journal of Personality and Social Psychology, 119*(4), 765–791. <https://doi-org.proxy-ub.rug.nl/10.1037/pspa0000199>

- Shiota, M. N., Keltner, D., & Mossman, A. (2007). The nature of awe: Elicitors, appraisals, and effects on self-concept. *Cognition and Emotion*, *21*(5), 944–963.
<https://doi-org.proxy-ub.rug.nl/10.1080/02699930600923668>
- Siegler, Robert S. 1991. *Children's Thinking*, 2nd Ed. Englewood Cliffs, NJ: Prentice-Hall, Inc. <https://search-ebscohost-com.proxy-ub.rug.nl/login.aspx?direct=true&db=psyh&AN=1993-97800-000&site=ehost-live&scope=site>.
- Sindermann, C., Luo, R., Zhao, Z., Li, Q., Li, M., Kendrick, K. M., Panksepp, J., & Montag, C. (2018). High ANGER and low agreeableness predict vengefulness in German and Chinese participants. *Personality and Individual Differences*, *121*, 184–192.
<https://doi.org/10.1016/j.paid.2017.09.004>.
- Stellar, J. E., Gordon, A. M., Piff, P. K., Cordaro, D., Anderson, C. L., Bai, Y., Maruskin, L. A., & Keltner, D. (2017). Self-transcendent emotions and their social functions: Compassion, gratitude, and awe bind us to others through prosociality. *Emotion Review*, *9*(3), 200–207. <https://doi-org.proxy-ub.rug.nl/10.1177/1754073916684557>
- Strelan, P., & Covic, T. (2006). A Review of Forgiveness Process Models and a Coping Framework to Guide Future Research. *Journal of Social and Clinical Psychology*, *25*(10), 1059–1085. <https://doi-org.proxy-ub.rug.nl/10.1521/jscp.2006.25.10.1059>
- Sturm, V. E., Datta, S., Roy, A. R. K., Sible, I. J., Kosik, E. L., Veziris, C. R., Chow, T. E., Morris, N. A., Neuhaus, J., Kramer, J. H., Miller, B. L., Holley, S. R., & Keltner, D. (2022). Big smile, small self: Awe walks promote prosocial positive emotions in older adults. *Emotion*, *22*(5), 1044–1058. <https://doi-org.proxy-ub.rug.nl/10.1037/emo0000876>

- Toussaint, L., Shields, G. S., Dorn, G., & Slavich, G. M. (2016). Effects of lifetime stress exposure on mental and physical health in young adulthood: How stress degrades and forgiveness protects health. *Journal of Health Psychology, 21*(6), 1004–1014. <https://doi.org/10.1177/1359105314544132>
- Van Cappellen, P., & Saroglou, V. (2012). Awe activates religious and spiritual feelings and behavioral intentions. *Psychology of Religion and Spirituality, 4*(3), 223–236. <https://doi-org.proxy-ub.rug.nl/10.1037/a0025986>
- Worthington, E. L., Jr., & Drinkard, D. T. (2000). Promoting reconciliation through psychoeducational and therapeutic interventions. *Journal of Marital and Family Therapy, 26*(1), 93–101. <https://doi-org.proxy-ub.rug.nl/10.1111/j.1752-0606.2000.tb00279.x>
- Worthington, E. L., Jr., & Scherer, M. (2004). Forgiveness is an emotion-focused coping strategy that can reduce health risks and promote health resilience: Theory, review, and hypotheses. *Psychology & Health, 19*(3), 385–405. <https://doi-org.proxy-ub.rug.nl/10.1080/0887044042000196674>
- Yaden, D. B., Iwry, J., Slack, K. J., Eichstaedt, J. C., Zhao, Y., Vaillant, G. E., & Newberg, A. B. (2016). The overview effect: Awe and self-transcendent experience in space flight. *Psychology of Consciousness: Theory, Research, and Practice, 3*(1), 1–11. <https://doi-org.proxy-ub.rug.nl/10.1037/cns0000086>
- Yaden, D. B., Kaufman, S. B., Hyde, E., Chirico, A., Gaggioli, A., Zhang, J. W., & Keltner, D. (2019). The development of the Awe Experience Scale (AWE-S): A multifactorial measure for a complex emotion. *The Journal of Positive Psychology, 14*(4), 474–488. <https://doi-org.proxy-ub.rug.nl/10.1080/17439760.2018.1484940>
- Ying, Y., Yang, Z., Bao, T., Liu, Y., and Passmore, H. A. (2016). Elicited awe decreases aggression. *J. Pacific Rim Psychol.* 10, 1–14. doi: 10.1017/prp. 2016.8