**Supplemental Materials**

**How Taking Photos Increases Enjoyment of Experiences**

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**Supplementary Studies Mentioned in the General Discussion**

The goal of these studies was to independently manipulate the number of photos taken in order to more closely examine whether number of photos taken had an effect on engagement and enjoyment. Similar to the studies reported in the manuscript (i.e., studies 3, 4, 5, and 7), both of these studies use our lab paradigm to simulate an actual experience, which allows us to manipulate different features of the photo environment, such as the number of photos participants can take. As in the studies reported in the main part of the paper, these supplementary studies include a no photo condition and a photo condition where participants could freely take as many photos as they wanted. In addition, we added two other conditions: one where participants were told they could take up to 10 pictures, and another one where they were told they could take up to 30 pictures. The two supplementary studies are reported below, and differ in what stimuli they use for the main experience.

**Supplementary Study 1: Whale Watching**

**Method**

One hundred and sixteen students (53% female, mean age = 20.3) at a West Coast university participated in a multi-study session for which they received course credit. Participants experienced a 4 minutes 59 seconds long video of Orca whales circling a seal that is stuck on a floating piece of ice, and were asked to imagine they were actually there going through the experience themselves. As in our other studies, we first used a short (38-second) first-person video of a safari to familiarize participants with the interface. Participants were then randomly assigned to one of four conditions (no photos, 10 photo budget, 30 photo budget, unlimited photos), as described above. During the initial video, none of the participants in the photo-taking conditions faced any photo-taking restrictions.

Following the whale watching experience, participants reported how much they enjoyed this experience (1 = “not at all” to 7 = “very much”) and the extent to which they felt part of the experience (0 = “I felt I was not at all part of the experience” to 100 = “I felt I was entirely part of the experience”).

**Results**

**Number of Photos Taken.** As intended, number of photos taken varied between photo-taking conditions (*F*(2, 82) = 6.30, *p* = 0.003, partial ω2 = 0.11). Compared to the 10 photo condition (*M* = 8.24, *SD* = 1.68, CI[2.25, 14.23][[1]](#footnote-1)), participants took more photos in the 30 photo condition (*M* = 18.03, *SD* = 10.00, CI [12.33, 23.73], *F*(1, 82) = 5.54, *p* = .021, partial ω2 = 0.05) and in the unlimited photo condition (*M* = 23.75, *SD* = 28.27, CI [17.16, 30.34], *F*(1, 82) = 12.01, *p* < .001, partial ω2 = 0.12), but the latter two conditions did not differ significantly from each other (*F*(1, 82) = 1.71, *p* = .195).

**Enjoyment and Engagement.** Across all photo-taking conditions *(M* = 4.32, *SD* = 1.75, CI [3.95, 4.69]), enjoyment was higher compared to not taking photos (*M* = 3.32, *SD* = 1.66, CI[2.71, 3.94], *F*(1, 112) = 7.84, *p* = .006, partial ω2 = 0.06). Individual contrasts further showed that, compared to not taking photos, taking an unlimited number of photos (*M* = 4.67, *SD* = 1.79,CI [3.97, 5.37], *F*(1, 112) = 8.18, *p* = .005, partial ω2 = 0.06) and taking no more than 30 photos (*M* = 4.25, *SD* = 2.00, CI [3.64, 4.86], *F*(1, 112) = 4.53, *p* = .036, partial ω2 = 0.03) led to significantly higher enjoyment, while taking 10 photos led to marginally higher enjoyment (*M* = 4.10, *SD* = 1.40, CI[3.47, 4.74], *F*(1, 112) = 3.06, *p* = .083, partial ω2 = 0.02). All photo-taking conditions led to similar levels of enjoyment (all *p*s > .2).

None of the conditions differed in reported engagement (*F*(3, 112) = 0.80, *p* = .498).

**Supplementary Study 2: Scuba Diving**

This study used the same design and measures as the study reported above, but a different focal stimulus: a first-hand scuba diving video.

**Method**

Two hundred and two students (58% female, mean age = 21.2) at a Northeastern university participated in a multi-study session for which they were paid $10. Participants experienced a 3 minutes 41 seconds long video of a scuba diving adventure, in which several divers explore a small coral reef.

**Results**

**Number of Photos Taken.** As intended, number of photos taken varied between photo-taking conditions (*F*(2, 143) = 30.22, *p* < .0001, partial ω2 = 0.29). Compared to the 10 photo condition (*M* = 9.10, *SD* = 1.58, CI [4.26; 13.95]), participants took more photos in the 30 photo condition (*M* = 19.60, *SD* = 6.55, CI [15.027; 24.173], *F*(1, 143) = 9.70, *p* = .002, partial ω2 = 0.06) and unlimited photo condition (*M* = 37.00, *SD* = 31.10, CI[31.77; 42.23], *F*(1, 143) = 59.79, *p* < .0001, partial ω2 = 0.29). Further, participants in the unlimited photo condition took more photos than those in the 30 photo condition (*F*(1, 143) = 24.49, *p* < .0001, partial ω2 = 0.14).

**Enjoyment and Engagement.** Across all photo-taking conditions *(M* = 4.79, *SD* = 1.48, CI [4.56, 5.03]), enjoyment was higher compared to not taking photos (*M* = 4.02, *SD* = 1.50, CI[3.61, 4.43], *F*(1, 198) = 10.47, *p* = .001, partial ω2 = 0.05). Individual contrasts also showed that taking no more than 10 photos (*M* = 4.67, *SD* = 1.45, CI[4.27, 5.08], *F*(1, 198) = 4.97, *p* = .027, partial ω2 = 0.02), taking no more than 30 photos (*M* = 4.82, *SD* = 1.42, CI[4.43, 5.21], *F*(1, 198) = 7.75, *p* = .006, partial ω2 = 0.03), and taking an unlimited number of photos (*M* = 4.91, *SD* = 1.60,CI [4.46, 5.35], *F*(1, 198) = 8.30, *p* = .004, partial ω2 = 0.04) all significantly heightened enjoyment relative to not taking any photos. All photo-taking conditions led to similar levels of enjoyment (all *p*s > .4).

Results for engagement followed a similar pattern. Across all photo-taking conditions *(M* = 53.88, *SD* = 24.70, CI[49.91, 57.85]) engagement was higher compared to not taking photos (*M* = 41.27, *SD* = 24.96, CI[34.44, 48.12], *F*(1, 198) = 10.15, *p* = .002, partial ω2 = 0.04). Individual contrasts also showed that, compared to not taking photos, taking no more than 10 photos (*M* = 51.58, *SD* = 26.03, CI [44.79, 58.36], *F*(1, 198) = 4.44, *p* = .036, partial ω2 = 0.02), taking no more than 30 photos (*M* = 53.34, *SD* = 24.41, CI[46.80, 59.88], *F*(1, 198) = 6.31, *p* = .013, partial ω2 = 0.03), and taking an unlimited number of photos (*M* = 57.37, *SD* = 23.60,CI[49.91, 64.83], *F*(1, 198) = 9.82, *p* = .002, partial ω2 = 0.04) all significantly heightened engagement. Photo-taking conditions did not differ in their levels of engagement (all *p*s > .2).

**Mediation analysis.** We conducted a bootstrap analysis, using photo-taking condition as the independent variable (*No Photo* = 0; *Photo* =1), engagement as the mediator, and enjoyment as the dependent variable. The 95% confidence intervals did not include zero, indicating that engagement mediates the effect of photo-taking on enjoyment (Indirect Effect = 0.46, SE = 0.16, 95% CI [0.17; 0.80]), supporting the proposed engagement-based mechanism. Controlling for engagement, the direct effect of photo-taking on enjoyment was no longer significant (Direct Effect = 0.31, *SE* = 0.20, 95% CI [-0.07, 0.70]), suggesting full mediation.

**Discussion**

Results from the supplementary studies clearly replicate the main finding in the paper across two additional stimuli and provide additional empirical support for the proposed effect: compared to not taking photos, taking photos heightens enjoyment and engagement during an experience. Further, these studies successfully manipulate the number of photos participants take and find that enjoyment and engagement are similar across all photo-taking conditions. Overall the evidence from these studies suggests that there may not be an influence (positive or negative) of taking more photos on enjoyment, at least within the range observed.

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**Supplementary Analysis of the Effect of Number of Photos Taken Across All Studies**

In order to examine the effect of number of photos taken on enjoyment with as much power as possible, we combined the data from all nine fully reported studies in the paper. As in the meta-analysis, we focused on the conditions that were intended to test our primary hypothesis: the comparison between actually taking photos and not taking photos. Hence, we did not include conditions that were intended to further examine the process or to show where the positive effect of photo-taking would not hold. This means that we excluded the planning condition of study 5, the interference conditions of study 7, the builder conditions of study 8, and the negative conditions of study 9. The remaining conditions included 1,456 participants. Recall that due to recording problems in study 7, we are missing the number of photos taken for 17 people in the photo condition, leaving us with an effective sample size of 1,439 (723 in the photo conditions and 716 in the no photo conditions).

Because studies 1 and 2 used a 15-point scale to measure enjoyment, while the other studies used a 7-point scale, we z-scored enjoyment for each study. Subsequently, we estimated enjoyment as a function of study, photo condition, and number of photos nested in condition. Effects did not vary systematically across studies (*F*(8, 1427) = 0.08, *p* > .9). In line with the analyses of the individual studies reported in the paper, we find a strong effect of our manipulation (*F*(1, 1427) = 21.35, *p* <.0001), such that those in the photo condition (*M* = 0.205, *SD* = 0.925) enjoyed their experience more than those in the no photo and control conditions (*M* = -0.206, *SD* = 1.022). The effect of number of photos taken nested in photo conditions was marginally significant (*F*(2, 1427) = 2.47, *p =* .085), such that a larger number of photos taken in the photo condition was associated with greater enjoyment (*b* = 0.004, SE = 0.002, *t* = 1.88, *p* = .06).

Note that in studies 2 and 8 participants in the no photo conditions could and did take some photos (16 out of 716 people); hence, the model also estimated a positive, yet not significant, coefficient of number of photos taken for the no photo conditions (*b* = 0.039, SE = 0.036, *t* = 1.10, *p* = .274).

Results are similar when regressing enjoyment z-scores simply on study, condition, and number of photos taken, that is, not accounting for the nesting of number of photos taken in condition. The results indicate no effect of study (*F*(8, 1428) = 0.11, *p* > .9), a strong effect of photo-taking condition (*F*(1, 1428) = 20.59, *p* <.0001), and a significant effect of number of photos taken (*F*(1, 1428) = 3.96, *p* = .047; *b* = 0.004, *SE* =0.002).

Adding a quadratic term for number of photos taken to the regression model yields comparable results for study (*F*(1, 1427) = 0.15, *p* > .9) and photo-taking condition (*F*(1, 1427) = 9.42, *p* = .002), but does not reveal a significant effect of number of photos taken (*F*(1, 1427) = 2.58, *p* = .109) or its quadratic term (*F*(1, 1427) = 0.68, *p* = .409).

For completeness, we also incorporated into these analyses the data from our two supplementary studies (Supplementary Studies 1 and 2) that manipulated number of photos that could be taken. Adding these 318 observations (236 in the photo condition, 82 in the no photo condition) strengthens the findings reported above. Using the original model with number of photos taken nested within condition, we find a significant effect of number of photos taken (*F*(1, 1743) = 6.07, *p =* .002), such that a larger number of photos taken in the photo condition was associated with greater enjoyment (*b* = 0.006, SE = 0.002, *t* = 3.27, *p* = .001). Again, effects did not vary systematically across studies (*F*(10, 1743) = 0.32, *p* > .9), and we find a strong effect of our photo-taking manipulation (*F*(1, 1743) = 23.94, *p* <.0001), such that those in the photo conditions (*M* = 0.189, *SD* = 0.938) enjoyed their experience more than those in the no photo conditions (*M* = -0.225, *SD* = 1.02).

A model that did not consider the nested nature of the design found similar results for the effect of study (*F*(10, 1744) = 0.35, *p* > .9), photo-taking condition (*F*(1, 1744) = 23.29, *p* <.0001), and number of photos taken (*F*(1, 1744) = 11.30, *p =* .001; *b* = 0.006, SE = 0.002, *t* = 3.36, *p* = .001). Finally, estimating the same model but adding a quadratic terms for number of photos taken, yields significant effects of photo-taking condition (*F*(1, 1743) = 13.52, *p* <.0001) and number of photos taken (*F*(1, 1743) = 3.98, *p* = .046), but not of study (*F*(10, 1743) = 0.36, *p* > .9) or the quadratic term for number of photos taken (*F*(1, 1743) = 0.21, *p* = .65).

Across these different analyses, we find some evidence that number of photos taken is significantly associated with enjoyment. Note, however, that in all specifications estimated, the relationship between number of photos taken and enjoyment is positive, not negative as an interference explanation would predict.

1. Note, in the 10 photo budget condition, participants were only able to take 10 photos; however, the ANOVA does not take that limit into account and predicts confidence intervals outside the observed range. [↑](#footnote-ref-1)