

Does a Strong Sense of Agency Make You Take More Risks?

Ezgi Yalciner¹ & Brianna Beck¹

¹School of Psychology, University of Kent, Canterbury, United Kingdom

ezgiyalciner94@gmail.com, B.C.Beck@kent.ac.uk

Introduction

Taking risks constitutes an important part of our daily life. Prior research suggested that the perception of control encourages people to underestimate risks and engage in more risk-taking behavior. However, control is a broad and complex construct, and the processes that trigger the association between control and risk are still unclear. Our study investigated the relationship between risk-taking and the sense of agency (SoA)—a sense of causal control over sensory outcomes through one's own voluntary actions.

Method

Participants

A total of 50 University of Kent students aged between 18 and 34 ($M = 20.88$, $SD = 3.20$) were participated (41 females; 9 males).

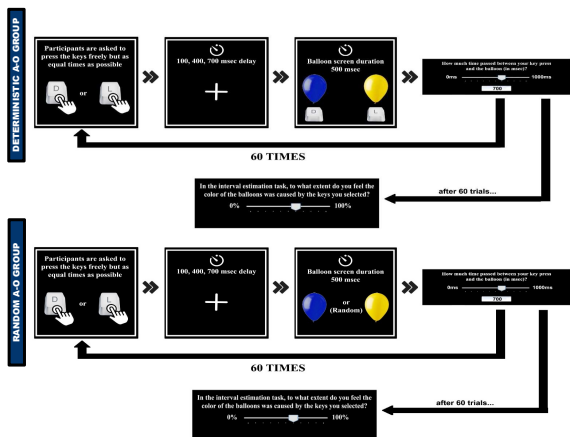
Research Design

- Between subject design was used in the research and the participants were randomly divided into two groups namely the Deterministic Action-Outcome (A-O) Group ($N = 25$) and the Random A-O Group ($N = 25$).
- The independent variable was obtaining either a Deterministic A-O training or Random A-O training. The intention was to produce a stronger SoA in the Deterministic A-O Group, compared with the Random A-O Group.
- The dependent variable was risk-taking behavior measured by the number of balloon pumps in the Balloon Analogue Risk Task (BART; Lejuez et al., 2002) in terms of the Deterministic A-O Group and the Random A-O Group.
- For the interval estimation measure, the dependent variable was participants' estimations of the length of the interval in the intentional binding question in terms of their groups.

Procedure

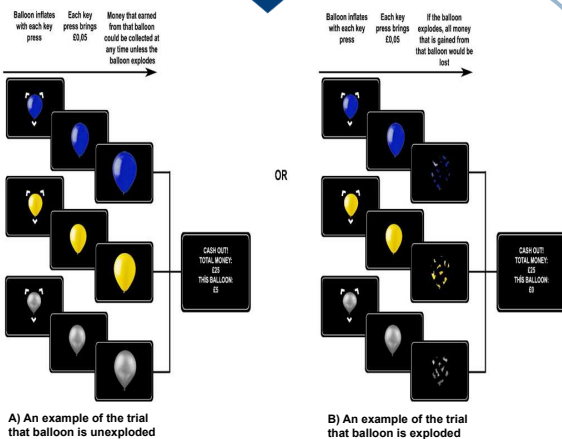
- Before passing to the computer-based phases, all participants completed the Barratt Impulsiveness Scale (BIS-11; Patton, Stanford, & Barratt, 1995) to check the similarity of the participants' impulsivity levels at baseline.

Phase 1 - Interval Estimation Task



- In phase 1, SoA was manipulated in an A-O interval estimation task by varying A-O contingency (i.e., which balloon color appeared on the screen after one of two keys was pressed). One group saw completely deterministic outcomes, whereas the other saw random outcomes. We measured participants' explicit control ratings as a manipulation check.

Phase 2 - The Balloon Analogue Risk Task



- In phase 2, participants performed the BART with balloon colors they saw in phase 1 (blue and yellow), as well as a new balloon color (grey).
- The grey balloon was included in the experiment as a neutral balloon color to determine whether the effect of SoA generalizes beyond the particular key-color associations formed.

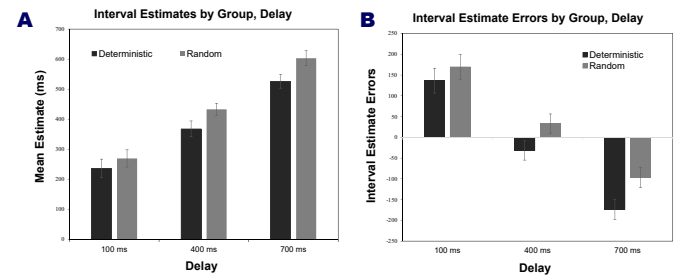
Results

Barratt Impulsiveness Scale (BIS-11)

There was no statistically significant difference between the impulsivity levels of Deterministic A-O Group participants ($M = 63.52$, $SD = 8.39$) and Random A-O Group participants ($M = 63.16$, $SD = 6.69$) ($t(48) = .17$, $p = .867$, $d = .05$) before their participation in the experiment.

Phase 1-Interval Estimation Task

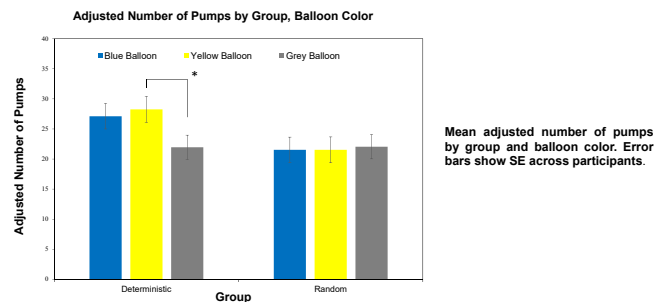
- The main effect of Group was determined to be significant $F(1, 48) = 4.30$, $p = .043$, $\eta_p^2 = .08$. Deterministic A-O Group participants, -- the participants who reported a high amount of SoA on the explicit SoA measurement question -- estimated shorter intervals than the actual time ($M = -22.98$ ms) compared to Random A-O Group participants ($M = 35.35$ ms) in intentional binding reports -- the implicit measurement of SoA.
- The main effect of the delay was highly significant $F(1.18, 56.67) = 101.56$, $p < .001$, $\eta_p^2 = .68$. Regardless of group difference, participants tended to overestimate the delay of 100 ms ($M = 153.10$ ms) and underestimate the delay of 700 ms ($M = -135.28$ ms). They also estimated a very close interval to actual delay for the delay of 400 ms ($M = 0.73$ ms).



Graphs are (A) mean interval estimates and (B) interval estimate errors (estimated interval – actual interval) by group and delay in Interval Estimation Task. Error bars display Standard Error (SE) across participants.

Phase 2 - The Balloon Analogue Risk Task (BART)

- There was a significant main effect of balloon color, $F(1.66, 79.79) = 3.66$, $p = .038$, $\eta_p^2 = .07$. The adjusted pump scores of the participants were higher for the blue balloon ($M = 24.32$, $SD = 1.49$) and yellow balloon ($M = 24.89$, $SD = 1.52$) than the grey balloon ($M = 22.00$, $SD = 1.42$).
- The analysis showed a highly significant Group x Balloon Color interaction, $F(1.66, 79.79) = 5.17$, $p = .011$, $\eta_p^2 = .10$. While the main effect of balloon color was significant for Deterministic A-O Group, $F(1.48, 35.46) = 5.63$, $p = .026$, $\eta_p^2 = .19$, it was not significant for Random A-O Group, $F(2, 48) = .15$, $p = 1.000$, $\eta_p^2 = .01$.
- For the Deterministic A-O Group, although the adjusted pump scores for the blue balloon were higher than the grey balloon, this difference was not significant ($p = .12$).



Mean adjusted number of pumps by group and balloon color. Error bars show SE across participants.

As a Result While the Deterministic A-O Group that was manipulated by the sense of agency took more risk on blue and yellow balloons, the Random A-O Group that was not manipulated generally tended to take less risk than the Deterministic A-O Group participants for all balloon colors.

Discussion

- Our study found that a simple SoA manipulation—A-O contingency—can affect subsequent risk-taking in a task with real-world consequences. Importantly, this effect was context-dependent (i.e., specific to balloon colors seen in phase 1). While previous risk-taking studies usually investigated high-level perceptions of control, our study shows that low-level SoA enhancements also increase risk-taking. This finding identifies SoA as a key determinant of behavioral control.

Future Directions

- The relationship between the effect of gender on SoA and risk-taking could not be investigated in our study. Gender impact can add as a new determinant to the relationship between the SoA and risk-taking in future studies.
- We used two separate tasks for SoA manipulation and risk-taking. Although significant results showed that the SoA effect was reflected in the BART, the SoA effect could be more clearly observed if risk-taking and SoA were assessed within the same task.