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INDUCED SELF-COMPASSION AND THE EFFECT ON RATIONAL
DECISION-MAKING AND BIASES

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Abstract

The present research studied the relationship between induced self-compassion and the possible increase of rational decision-making as well as the potential resilience towards confirmation bias and the framing effect. The results of the study could not demonstrate a significant difference between the participants induced with self-compassion ($n=88$) and any increase of rational decision-making or less prevalence of either confirmation bias or the framing effect. However, a difference between female and males could be identified between the participants induced with self-esteem (control group, $n = 98$), where the participants identifying as male demonstrated more rational decision-making. Possible explanations of these findings are discussed, and future research suggested.

Keywords: Self-compassion, Rational decision-making, The framing effect, Confirmation bias

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1. Introduction

In a time where we have large volumes and variety of information but also increased uncertainty there has been hope raised about the ability to make decisions based on evidence and facts, also known as rational decision-making (Power, Cyphert and Roth 2019). Decision-making is a popular research topic (Milkman, Chugh and Bazerman 2009) but has scarcely been investigated in relation to self-compassion. Self-compassion has been practiced for a long time within Buddhism and movements inspired by Buddhism, but it is only until recent it has been subject to academic research (Neff 2003). Even more so the existing research has mostly focused on self-compassion as a personality trait and not on induced self-compassion (Allen and Leary 2010). Furthermore, to be able to make a rational decision one cannot be influenced by bias (Welsh and Begg 2017) and self-compassion has been shown to decrease bias (Kang, Grey and Dovidio 2014; Braun et al 2020). However, not in relation to decision-making. Thus, after reviewing the literature this study aims to investigate the relationship between induced self-compassion and the possible increase of rational decision-making and if it can decrease biases.

2. Literature review

2.1. Self-compassion

Self-compassion is the act of being understanding and kind toward oneself in moments of failure or pain. Instead of perceiving one's experiences as an isolated event exercising self-compassion allows you to see it as a part of a larger human experience. Furthermore, instead of over-identifying with painful feelings and thoughts, self-compassion allows individuals to process them in mindful awareness. Briefly, self-compassion can be conceptualized in terms of three primary characteristics: self-kindness, common humanity, and mindfulness (Neff 2003). Studies show that people who are high in self-compassion have better mental health, report more life satisfaction,

have a higher positive affect, and responds better to negative events than individuals that are low in self-compassion (Allen and Leary 2010; Neff 2003; Neff, Kirkpatrick and Rude 2007)

2.2. Decision-making

Decision-making plays a role in all aspects of life, from small everyday decisions to the ones that change your life. Decision-making is the process of first defining alternatives with various events into consideration with the aim to realize, and later choose the best alternative in relation to one's lifestyle and personal values (Harris 1998). When it comes to larger decisions, the monetary, health and life consequences can be devastating for an individual if the wrong decision is made. Bad decision-making can also damage businesses and some research suggests that as much as half of the decisions in organizations have poor outcomes (Nutt 1999). Decisions with negative outcomes can be traced back to the decision-making process where alternatives were not properly defined, or the right information was not gathered (Hammond, Keeney and Raiffa 1998). However, the mistakes can also stem from the intrinsic biases of the individual making the decision (Tversky and Kahneman 2003).

2.3. The effect of self-compassion on decreased bias and improved rational decision-making

One way to understand how people make decisions is through a trait-based tendency to ascribe to certain styles of decision-making. Under this framework, researchers have identified five decision-making styles. There is intuitional decision-making style where individuals use their emotions and intuitions; rational decision-making is when the evaluations of alternatives are rational; dependent decision-making style is when others advice and inducements are in focus; avoidant decision-making is the avoidance of making decisions and the fifth one is hasty/spontaneous decision-making style and is the tendency to want to terminate a decision (Scott and Bruce 1995). The

characterization of the five different decision-making styles has been related to coping (Alacreu-Crespo et al. 2019) and resembles the five different coping strategies: problem-solving, positive cognitive restructuring, seeking-support, escape and avoidance, and distraction. The coping strategy positive cognitive restructuring involves coming up with different explanations that are positive and rational to replace the distortion that might have been adopted over time and see life events in a more positive light (Skinner et al. 2003). This coping strategy is similar to the rational decision-making style. Earlier research has explored whether induced self-compassion could influence positive cognitive restructuring. The results of the study found that by being induced with self-compassion the participants allowed themselves to acknowledge that they made mistakes but were able to see it as a common experience and therefore not feel bad about it. The participants induced with self-compassion positively reconstructed their thinking and become more rational to a larger extent than those who were not induced with self-compassion (Leary et al. 2007). Therefore, induced self-compassion could also have the same positive effect on rational decision-making.

The rational decision-making process emphasizes objectivity and rationality and requires more time and effort than other decision-making styles (Heracleous 1994). When making rational decisions individuals tend to be logical and systematic and double-check sources of information to ensure one has the right facts before making the decision. In addition, the decisions take careful thought, and several different options are considered (Scott and Bruce 1995). Furthermore, bias infects all human thought and leads to irrational decisions, thinking and behaviour (Schwartz 2017). To be able to make a rational decision one cannot be influenced by biases. There are several different types of biases that all could affect decision-making, and more than 100 decision-making biases have been recognized in the literature (Ehrlinger and Kim 2016). However, for the purpose

of this study two of the most common cognitive biases that might influence rational decision-making referred to in research, managerial books and by experts will be explored. These are confirmation bias and the framing effect (Bazerman 2002; Martino et al. 2009; Welsh and Begg 2017).

When individuals recognize the broader human perspective of their experience which is one part of self-compassion, they prevent the trap of over-identification. When individuals acknowledge their pain whilst engaging in self-compassion, they avoid repressing their feelings and thoughts (Neff, Hsieh and Dejjitterat 2005). Hence, engendering self-compassion could increase the use of rational decision-making as one becomes more aware and therefore more capable of distinguishing their emotions and possible biases. Individuals high in self-compassion can override an immediate response that is not consistent with one's goals and they may also have the ability to override automatic preconscious responses (Phillips, Hine and Marks 2017) as well as engaging in cognitive reflection and the greater cognitive reflection an individual has the less the person is susceptible to biases (Welsh and Begg 2017). Furthermore, self-compassionate people appear to make enhanced decisions regarding goal pursuit as they better can observe their behaviour and goals in a non-judgmental and straightforward way (Neff, Hsieh and Dejjitterat 2005) which is more rational and might indicate that factors like bias are less present.

Research has shown that those who are better able to distinguish between their feelings have a better ability to control the possible biases derived by their feelings and therefore achieve higher decision-making performance (Seo and Barret 2007). Kang, Grey and Dovidio (2014) showed decreased implicit bias against stigmatized groups when people practiced loving-kindness meditation. Moreover, being high in self-compassion may confer some resiliency to weight bias

and shame (Braun et al. 2020). To make a rational decision without biases one needs to activate System 2 which is slow and rational thinking, requires deliberate and conscious thought, and takes more effort (Kahneman 2011, p. 12-17). Self-compassion could have a positive effect on the activation of System 2 as it increases individuals' awareness (Neff 2003) as well as increases self-improvement motivation such as the willingness to spend more time on a task (Chen and Breines 2012). Individuals with high self-compassion are more resilient, curious and more likely to explore which is beneficial in rational decision-making (Bluth and Eisenlohr-Moul 2017). Individuals that are resilient are less likely to resort to cognitive bias as their resilience makes them more flexible (Peng et al. 2017). To reach a rational decision without bias one needs self-control to resist easier alternatives (Hare, Camerer and Rangel 2009) and self-control is positively correlated with self-compassion (Morely et al. 2016). Furthermore, awareness has been highlighted to diminish cognitive bias by putting in thought, and self-questioning individuals are better at discovering potential bias. In addition to being aware, individuals need the motivation to take initiatives and actions to debias their decisions (Shepperd, Mair and Jørgensen 2018).

2.4. Self-compassion effect on the framing effect

Individuals usually lack the skills, resources and knowledge necessary to make rational decisions and make an indifferent judgement no matter how a problem is described, which the economics notion of rational behaviour requires (Cheng and Wu 2010). In fact, individuals can be largely influenced by the way information is presented or framed which is known as the framing effect or the framing bias. The framing effect is when an individual's decision is influenced more by the presentation of loss and gains rather than the actual information. Equivalent information can be evaluated differently depending on what features are highlighted and therefore less favourable decision framed in a positive light may be made instead of an objectively better one but cast in a

less favourable light. A rational decision requires that the preference between different options should not change when it reverses in frame. However, individuals are preceptive to framing of decisions which gives a skewed view of the relative desirability to different options depending on how they are framed (Tversky and Kahneman 1985, p.25-26). The framing effect has been proven in several studies (see Levin, Schneider and Gaeth 1998) and even economists that are expected to be more resistant to these effects answered differently depending on how questions were framed (Gächter et al. 2009).

Earlier research has suggested that highly charged feelings can increase the susceptibility to the framing effect and lead to poorer decision-making (Bruyneel et al. 2009; Miu and Crisan 2011). When managing negative affect, one's self-regulatory strength is reduced which undermines the ability to consider options and implicitly use emotions as information and therefore influence how people weigh their alternatives (Schwarz and Clore 2003). Self-regulation regulates the emotions associated with decisions frames and increases cognitive reappraisal which reduces individuals' susceptibility to the framing effect (Miu and Crisan 2011). Optimism is an important factor in self-regulating behaviour (Scheier and Carver 2003) and self-compassion is positively correlated with optimism (Neff, Kirkpatrick and Rude 2007). Therefore, self-compassion might decrease the prevalence of the framing effect when making decisions. Furthermore, the framing bias has been associated with lack of attention and would arise less frequently if individuals were more aware and thought more about their choices (Sieck and Yates 1997). As mentioned, self-compassion increases awareness (Neff 2003) and might therefore be beneficial to debias the framing effect.

2.5. Self-compassion effect on confirmation bias

The objective search for information is an important factor in rational decision-making. Confirmation bias stands as a threat to making a rational decision because the information search is not objective but rather the search for information is intending to confirm an existing belief (Jones and Sugden 2001). Confirmation bias derives from the fact that individuals want to confirm prior beliefs, expectations, or desired conclusions and therefore impact how individuals gather, interpret, and recall information. In non-routine choices, where rational decision-making is more prominent, the likelihood of bad outcomes increases with confirmation bias because the advantages and disadvantages of different alternatives are not evaluated objectively, and certain warning signs may be overlooked (Jonas et al. 2001). For example, individuals have shown to favour information to support their expectations in negotiations (Pinkley, Griffith and Northcraft 1995) and in criminal investigations (O'brien and Ellsworth 2006).

A famous example of an elicitation method that seems to decrease confirmation bias is the “consider the opposite” approach. This approach seems to reduce individuals’ tendency to find and interpret information that strengthens their prior beliefs (Anderson 1982; Hirt and Markman 1995). As self-compassion entails individuals seeing events in a larger perspective it might also be beneficial in counterfactual thinking. Self-compassion creates greater receptivity to varied information. In turn, this facilitates the recombination of new approaches and ideas that allows for more integrative thinking around decisions (Miller et al. 2012). There is a positive relationship between critical thinking and mindfulness. Critical thinking is a cognitive process that includes evaluating and analysing information and evidence without bias and prior knowledge (Noone, Bunting and Hogan 2016). Self-compassion provides stability and emotional resilience as well as a clear-sighted way of seeing oneself in moments of perceived inadequacy and failure (Neff 2011)

which could reduce an individual's willingness to strengthen a prior belief and therefore decrease confirmation bias.

Hypotheses

H₁: Induced self-compassion increases the use of rational decision-making by decreasing the framing effect

H₂: Induced self-compassion increases the use of rational decision-making by decreasing confirmation bias

H₃: Induced self-compassion increases the use of rational decision-making and decreases bias

3. Methodology

3.1. Participants

Participants were recruited using two ways: 1) Snowball convenience sampling where the participants were recruited from friends and family as well as distributed on platforms such as Facebook and LinkedIn and 2) participation via the lab for course credit. There was no significant difference between the groups of the two sampling methods regarding gender composition ($p = 0.74$) or the manipulation check ($p = 0.29$). However, the groups recruited with the snowball convenience sampling were older ($p < 0.001$) and spent more time on the tasks ($p < 0.001$). Therefore, additional analysis was made to investigate if the group recruited via the lab had a significant difference in performance on the tasks. No significant difference could be detected between the two sampling groups considering confirmation bias ($p = 0.55$) and the framing effect ($p = 0.20$). However, the participants recruited by snowball convenience were significantly better at the CRT task ($p = 0.002$). This was further explored and there were no differences between the two recruitment groups in how the individuals in the self-esteem versus self-compassion group

performed ($p = 0.20$). Since there were no substantive differences between the samples in key variables like manipulation check and performance between the self-compassion and self-esteem group on the rational decision-making tasks both samples were combined for analyses, see appendix for a review of the analysis. After screening the participants for if they wrote a negative event and answered either the self-compassion or self-esteem prompts as well as the adherence measures the final number of participants were 186, with 98 participants being induced with self-esteem and 88 with self-compassion. Seventy-three percent of the participants identified as female, twenty-five as male and the remaining two percent as non-binary or preferred not to say. Furthermore, the participants were mostly students (60%) and under 35 years of age (91%). 77 participants were Nova School of Business and Economics students and were given 0,2 in course credits for completing the survey.

3.2. Procedure

The participants were told that the purpose of the study was to investigate how different ways of responding to a negative life event might affect one's decision-making. The first step of the survey asked all respondents to describe a negative event in their past and respond to questions about it. They were asked to provide details concerning what led up to the event, who was present, what happened, and how they behaved and felt at the time of the event. When the participants had written about the event, they were randomly assigned to conditions where they either were induced with self-compassion or with self-esteem.

In the self-compassion condition, the participants answered three questions that were designed to make them reflect about the negative event in a self-compassionate manner based on earlier research by Neff (2003). The first question focused on the common humanity part of self-

compassion and instructed participants to write down a list of ways other people also experience similar events. To induce self-kindness on the event the second question asked the participants to write a paragraph conveying kindness, understanding and concern to themselves, similar to how they would have expressed concern to a friend who had felt the same experience. The third prompt asked the participants to describe their feelings about the event in an unemotional and objective way to induce a mindful perspective.

In the control condition, the participants were asked to respond to three questions meant to lead them to feel good about themselves and induce self-esteem. The first prompt asked the participants to describe their positive characteristics and therefore indicate that they are valuable and competent. The second question instructed the participants to write a section that explained that what happened was not completely their fault and to interpret the event in a way aimed to have them feel better about themselves. Finally, the third item prompted them to write about why the event does not indicate anything about the kind of person they are (Leary et al. 2007; Breines and Chen 2012). Participants then completed a manipulation check and were asked to what extent they felt self-compassion (i.e. warmth, kindness and understanding towards themselves) on a 5-point Likert scale (1 = “None at all”, 5 = “A great deal”). The 3 items were averaged to form a self-compassion score ($\alpha = 0.87$). After the participants were induced with either self-compassion or self-esteem, they were asked to answer questions and solve problems to test their rational decision-making as well as the effect biases had on their decisions. The participants completed several decision-making tasks and scales, including the Cognitive reflection test, Wason’s four-card tasks, a version of the Asian disease problem as well as a self-assessment of their rational decision-making style. Finally, the respondents were asked to answer demographic questions regarding their gender, education

level, employment status and age. After submitting the survey, they were debriefed about the purpose of the study and the different inductions, and they were provided a link where they could sign up for the results.

3.3. Framing bias

The scenario used in this framing bias stimuli referred to a new treatment that could cure leukaemia and was first developed by Mahoney et al (2011)¹. Participants were randomly presented with a question regarding a new leukaemia treatment set in a positive frame (i.e. patients saved from the treatment) or presented with the same question but set in a negative frame (i.e. patients dead despite the treatment). In the positive frame, the individuals were asked to choose between treatment A that would save half of the people with leukaemia or treatment B that had a 50% chance of saving half of the people with leukaemia. In the negative frame, the choice of treatment A would lead to half of the people with leukaemia would die and for treatment B there was a 50% chance that half of the people with leukaemia would die. In these differently framed scenarios, respondents tend to choose the riskier option in the positive frame which is treatment A that has a definite number of lives saved but are more risk-averse in the negative frame and therefore to a larger extent are expected to choose treatment B (Mahoney et al 2011; Diederich, Wyszynski and Ritov 2018). Both versions are available in the appendix. For this bias task, the proportion of choice depending on the frame of the self-compassion-positive frame, self-compassion - negative frame, self-esteem - positive frame, self-esteem - negative frame groups were analysed. In this task the participants

¹ Given the current state of the world with the Covid-19 pandemic the framing effect was tested using an alternative version of the popular “Asian disease problem” developed by Khaneman and Tversky (1981).

were assigned 0 if they were exposed to the positive frame and 1 if it was the negative frame. If the participants chose Treatment A they were assigned a 0 and for Treatment B they were given 1.

3.4. Confirmation bias

To investigate confirmation bias a revised version of the original Wason's rule discovery task (1960) was used, known as the "Four-Card Task" (Wason and Jason-Laird 1972). The participants were exposed to a picture of four cards, two with letters A and D respectively and two with numbers 4 and 7 respectively. They were asked to answer the following question *"Suppose each card has a number on one side and a letter on the other. Which of these cards are worth turning over if you want to know whether the following statement is false? 'If a card has a vowel on one side, then it has an even number on the other side'"*. The correct answer is to turn the cards A and 7 because the only way to falsify the statement is by finding a vowel and an odd number. D and 4 are irrelevant since these cards cannot combine a vowel and an odd number. If D and/or 4 were included in the participants answers it is a sign of confirmation bias and therefore they get a score of 1. If the answer only contains A and/or 7 the participants get a score of 0 as no confirmation bias can be detected.

3.5. Cognitive reflection test for assessing rational decision-making

The participants were exposed to the Cognitive reflection test (CRT) which is designed to have the participants engage in deeper reflection that leads to the correct answer and override a prepotent response alternative that is incorrect (Frederick 2005). It requires the participant to employ rational thinking to process the information correctly. It was suitable in this study as it distinguishes the intuitive decision-makers as the CRT problems are built to generate an incorrect intuitive response. Furthermore, the CRT is an especially potent and unique predictor of performance on tasks from

the bias literature (Toplak, West and Stanovich 2011). Since these types of questions have increased in popularity in books and classrooms, Toplak, West and Stanovich (2014) successfully added further questions that all strongly correlated with the original version and are a strong independent predictor of rational thinking performance. The four CRT questions used in this study and the respective answers can be found in the appendix. The CRT has previously been used to investigate impulsivity in rational decision-making by Jelihovschi, Cardoso and Linhares (2018). For every correct answer on the CRT questions the participants received 1 point and 0 points were given if the answer was incorrect. The points per participants were summarized to a total score (ranging from 0-4 points) which reflected rational decision-making.

3.6. Self-reported rational decision-making

In addition to the three tests, the participants were asked to self-assess themselves how they made their decisions in previous blocks. As rational decision-making is set as a personality trait it has scarcely been used in earlier academic experiments. The questions to measure rational decision-making style was modified based on the measure developed by Scott and Bruce (1995). The original scale consisted of 25 items assessing the five dimensions of decision-making using a 5-point Likert scale (1 = “Strongly disagree” 5 = “Strongly agree”). Sample items for rational decision-making were: *“I double-check my information sources to be sure I have the right facts”* (dimension #1), *“I make decisions in a logical and systematic way”* (dimension #2). The scale proved to be highly reliable and valid to assess the different decision styles. The items were averaged to form a scale for rational decision making ($\alpha = 0.67$). Furthermore, based on earlier research on the rational decision-maker two additional questions were added (Jelihovschi, Cardoso and Linhares 2018), all questions are given in the appendix. The items to measure self-reported rational decision-making was averaged to form a score.

3.7. Time taken to complete tasks

The time the participants spend on solving the problems was measured as a way of determining if they had a rational decision process. In total, time taken was measured three times, for the framing task, confirmation bias task and cognitive reflection task respectively. The time measurements were also summarized to create a variable for total time spent on the three tasks.

4. Results

Manipulation check. For the manipulation check regarding self-reported level of self-compassion (Likert scale 1-5) no significant difference could be detected after filling in the prompts, $F(1, 184) = 2.72, p = 0.101$, between the self-compassion ($M = 3.45, S = 1.03$) and the self-esteem ($M = 3.68, S = 0.87$) group. Regardless an analysis between the two groups were conducted as the manipulation check was not exhaustive which will be discussed in the limitations.

4.1. Rational decision-making and bias tasks

The framing effect: In the first task aimed at measuring the framing effect 83% of the participants choose treatment A in the self-esteem group and 64% in the self-compassion group when the questions were in a positive frame. In the negative frame, 60% choose treatment A in the self-esteem group and in the self-compassion group it was the same percent as before, 64%. To test whether the two groups had a significant difference in how they changed, or not changed, their answers depending on which frame they were exposed to a simple moderation analysis was conducted using Model 1 in the PROCESS macro in SPSS (Hayes 2018). The outcome variable was choice of treatment (A or B), the predictor was either negative or positive frame and the induction was the moderator. To prevent potential high multicollinearity with the interaction term

the variables were mean centered. There was a significant main effect between frame and choice of treatment, $\beta = 0.70, p = 0.04, 95\% \text{ CI } [0.04, 1.34]$. As the negative frame was set as 1 (and positive frame as 0) this results can be explained as when the framing was negative (“increases”) the chances of choosing treatment B, set as 1, increased as the slope is positive. The interaction between frame and induction was not significant $\beta = -0.87, p = 0.18, 95\% \text{ CI } [-2.17, 0.41]$. Therefore, the results indicate that the induction of self-compassion/self-esteem does not moderate a significant difference between how individuals answer depending on which frame they were exposed to.

Confirmation bias: In the second task, measuring confirmation bias 65% out of all participants showed confirmation bias by turning the cards D and/or 4. If the participants choice included D and/or 4, it was a sign of confirmation bias and they were assigned a score of 1, no matter the composition of the cards chosen. The other 35% disconfirmed the statement and did not show confirmation bias by only turning the cards A and/or 7 and therefore were assigned a score of 0. The results indicated a difference, close to significance, $F(1, 183) = 3.55, p = 0.06$ such that participants induced with self-compassion demonstrated less confirmation bias ($M = 0.58, S = 0.50$) compared with the participants induced with self-esteem ($M = 0.71, S = 0.46$).

CRT: For the third and final task a univariate analysis of variance was carried out to investigate if the participants induced with self-compassion scored higher on the CRT questions and therefore presented higher levels of rational decision-making. There were no significant difference in scores on the CRT test between the self-compassion ($M = 2.30, S = 1.20$) and the self-esteem ($M = 2.24, S = 1.24$) group, $F(1, 182) = 0.96, p = 0.76$.

4.2. Additional analyses

In addition to the hypothesized, the rational decision-making style and time spent on task was investigated between the two groups. Previous research has stated that individuals that are induced with self-compassion are more inclined to spend time on a task. However, this study could not confirm this statement as the difference between the self-compassion ($M = 425$ seconds, $SD = 244$ seconds) and self-esteem ($M = 485$ seconds, $SD = 325$ seconds) group was not significant in total seconds spent on the three tasks, $F(1, 184) = 1.972, p = 0.16$, or any one of the task individually. Regarding the self-assessed rational decision-making style, the Cronbach alpha was not acceptable ($\alpha = 0.64$). The question regarding if the participant executed any additional information search showed poorer interrelatedness and was therefore removed. When removed the internal reliability was acceptable ($\alpha = 0.70$). However, there were no difference, $F(1, 183) = 0.00, p < 0.99$, between the self-compassion ($M = 3.03, S = 0.60$) and self-esteem ($M = 3.03, S = 0.66$) group in how they scored themselves on rational decision-making style during the experiment.

When further examining differences in CRT scores between male and female gender, a 2 (condition: self-compassion vs self-esteem) x 2 (gender: male vs female) univariate ANOVA was conducted. The ANOVA did not yield a significant main effect on condition, $F(3,177) = 1.90, p = 0.17$. However, there was a significant interactional effect on CRT scores between gender and condition $F(3, 177) = 6.41, p = 0.01$. Simple effect analysis showed differences in performance on the CRT questions where men ($M = 3.00, S = 1.08$) performed better than women ($M = 1.95, S = 1.27$) when induced with self-esteem, but no gender differences between men ($M = 2.16, S = 0.94$) and women ($M = 2.19, S = 1.35$) who were induced with self-compassion. See Figure 1.

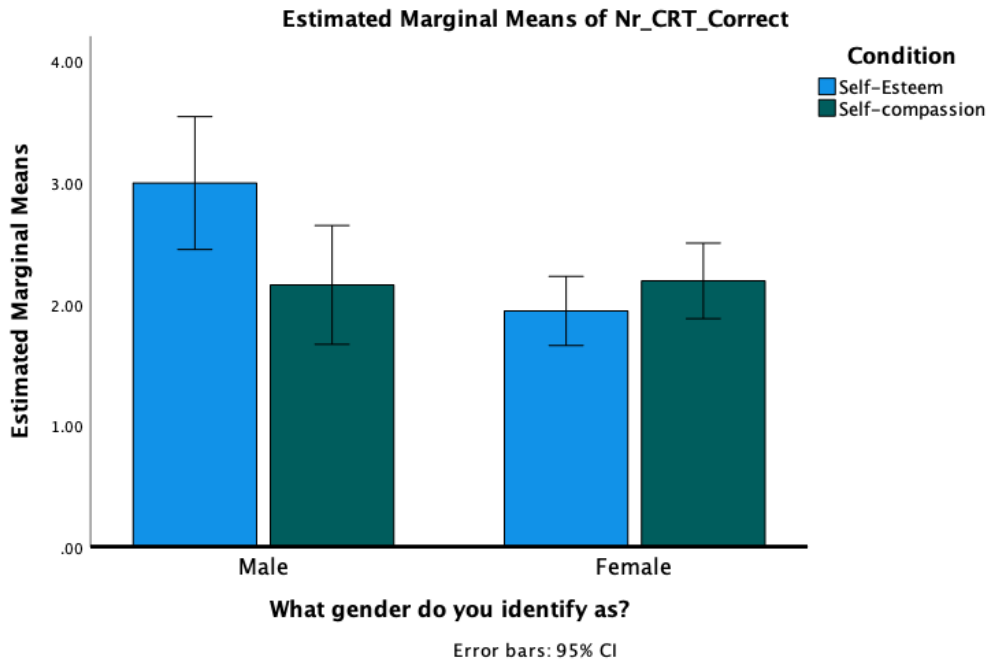


Figure 1: Results from the 2 (condition: self-compassion vs self-esteem) * 2 (gender: male vs female) ANOVA comparing the mean scores on the four CRT questions where men induced with self-esteem perform significantly better than women induced with self-esteem ($p = 0.01$).

To compare to what degree the participants were resilient to confirmation bias between the two groups and gender another 2 (condition: self-compassion vs self-esteem) x 2 (gender: male vs female) univariate ANOVA was conducted. There was no significant main effect between the conditions, $F(3, 178) = 0.61, p = 0.43$, or any significant interactional effect between the conditions and gender, $F(3, 178) = 1.61, p = 0.21$. However, looking at the distributions a large difference can be noted in the group of individuals identifying as female where the female participants induced with self-esteem ($M = 0.73, S = 0.45$) showed more confirmation bias than those induced with self-compassion ($M = 0.56, S = 0.50$).

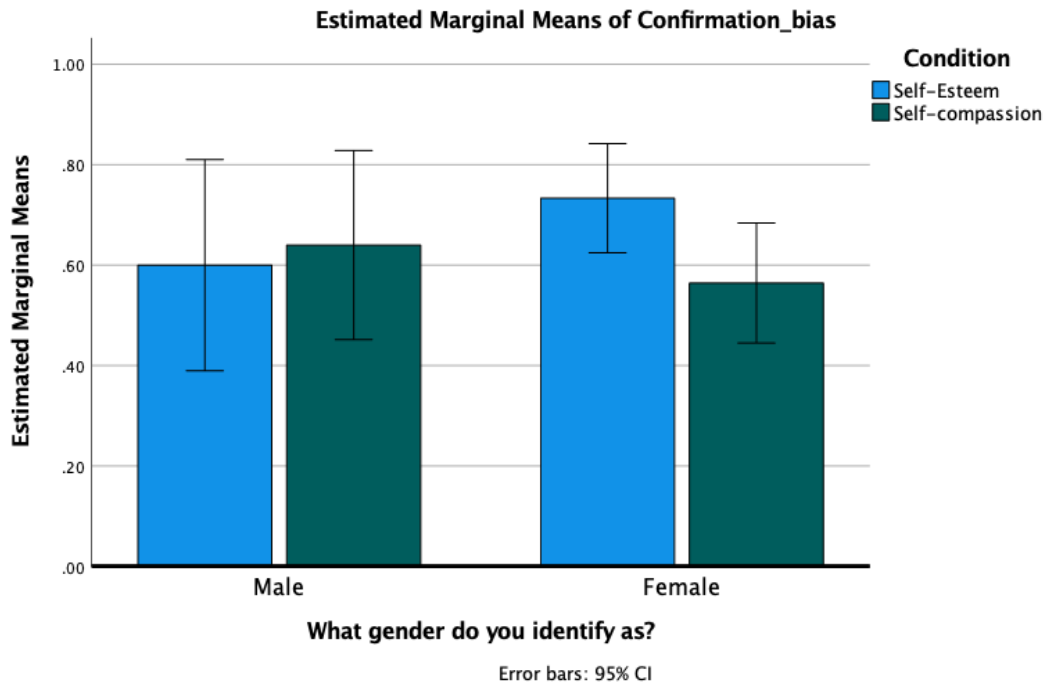


Figure 2: Results from the 2 (condition: self-compassion vs self-esteem) *2 (gender: male vs female) ANOVA comparing the level of confirmation bias. No significant main ($p = 0.43$) or interaction ($p = 0.21$) effect was detected but a large difference between the groups in the female subject pool where females induced with self-compassion demonstrated less confirmation bias.

5. Discussion

Investigating whether compassion has a positive effect on decision-making is beneficial both in private and for business since it is a large part of our everyday life. While there are good theoretical reasons to believe that self-compassion promotes more rational decision-making and decreases the prevalence of bias, the construct has not yet been examined. Therefore, this study aimed to contribute to this field and investigate whether induced self-compassion increases the use of rational decision-making and decreases biases. Across the three different experiments, this study did not find support for increased rational decision-making when induced with self-compassion or

support the hypothesis that induced self-compassion would decrease the prevalence of bias. However, the results showed a close to significant difference in the tasks related to confirmation bias where the individuals induced with self-compassion showed less confirmation bias. Furthermore, when investigating the distributions between the groups and choice of treatment on the framing effect tasks there is an indication that the participants induced with self-compassion were more resilient towards the framing effect.

5.1. H₁: Induced self-compassion increases the use of rational decision-making by decreasing the framing effect

This study could not present a significant difference between the self-compassion and self-esteem groups in terms of how they changed their preferred treatment depending on which frame they were exposed to, therefore H₁ was rejected. However, looking at the distributions of the answers there is an indication that the self-compassion group was more resistant to the framing effect than the self-esteem group. Interestingly enough, the distributions amid how participants chose between the two treatments were the same for the self-compassion group which indicates that they were resistant to the framing. The self-esteem group was not as resistant and showed more framing effect since a larger share did not choose treatment A in the negative frame versus that they did in the positive frame. One possible explanation for the non-significant results could depend on the sample size. Since this test created an additional two groups, which in total made it four, the number of people for every group was smaller. Therefore, it would be interesting for future research to investigate with a larger sample size whether there is a significant difference in how resilient individuals induced with self-compassion are against the framing effect. Finally, this study increases the evidence of using an alternative version of the popular “Asian disease problem” as the framing effect was prevalent in the entire sample.

5.2. H₂: Induced self-compassion increases the use of rational decision-making by decreasing confirmation bias

The results of the Wason's cards rule task indicated that individuals induced with self-compassion are more resilient towards confirmation bias. However, this difference was not significant and therefore H₂ was rejected. The length of the survey might have had a negative effect on the results as the participants could have been tired and frustrated and answers to questions positioned later in a survey are less reliable as they are shorter, more uniform and faster (Galesic and Bosnjak 2009). Furthermore, this study highlighted a difference in confirmation bias, where females induced with self-compassion showed less confirmation bias than females induced with self-esteem. One reason for this might be that the induction had a larger effect on the level of self-compassion for the female participants than the male because men generally are more self-compassionate than women (Yarnell et al. 2015). On the other hand, this difference might be vivid amongst the female participants because the subject pool was larger ($n = 137$) than male ($n = 45$). Future research could investigate if self-compassion induction has a larger effect on females as well as investigating only confirmation bias where the time between the induction and the task would be shorter.

5.3. H₃: Induced self-compassion increases the use of rational decision-making and decreases bias

Contrary to H₃ no difference between the two groups and the use of rational decision-making was identified and therefore H₃ was rejected. An explanation for this finding could be dependent on the fact that the CRT questions were put last in the survey and the self-compassion induction may have faded away as time passed during the study. In this study, the two first experiments showed indications of difference between the two groups but the third and last one did not. Therefore, it

would be interesting to investigate whether this is because of the placement of the experiment, and hence because of lack of reliability, or because lack of effect for that variable. In addition, the participants spent approximately 10-50 minutes on the survey, and it was told to take them about 20 minutes. Accordingly, some participants might have been frustrated at the end of the survey considering it took longer than expected. Finally, the four CRT questions might have been a reason why there was no differences between the groups. One explanation could be that the CRT questions have become popular enough that individuals are used to that type of questions, and that the subject pools may be polluted. However, the mean probability of answering one question correctly on the four CRT questions is 0.24 (Toplak et al. 2014) which is higher than this study. Therefore, it probably did not affect the results. In addition, even though the choice of using the four CRT questions instead of the original three CRT questions is amply justified, using all seven would be better as it is a better predictor for several rational decision-making tasks (Toplak et al. 2014). Therefore, it would be interesting to only measure rational decision-making using all seven CRT questions as well as having a shorter time between the CRT questions and the self-compassion inducement, making the test more reliable.

The study did find a significant difference between men and women on CRT performance when induced with self-esteem. This was an unexpected finding that could have had an effect on why the individuals in the self-compassion induction did not perform better on the CRT than the self-esteem group as hypothesized. Current research on self-esteem is insufficient in explaining these findings. There is plenty of support for the statement that men have more self-esteem than women (Zuckerman, Li and Hall 2016). Nevertheless, there are opposite opinions on whether self-esteem has a positive or negative effect on performance. Some researchers claim that self-esteem has a moderately positive effect on academic performance but no difference between men and women

(Rosli et al. 2012; Arshad, Zaidi and Mahmood 2015). On the other hand, some researcher states that self-esteem appears to have no effect in improving job or academic performance (Neff 2009) and studies have generally been unsuccessful in finding that self-esteem increases task performance and neglected the downsides of self-esteem (Baumeister et al. 2003). The finding in this study could be a stepping-stone for further research on how self-esteem can increase performance for men and why this increase in performance is not vivid for women.

5.4. Limitations

The first limitation that needs to be addressed based on this study is the fact that there was no significant difference in how the two groups answered the question regarding what extent they felt self-compassion. The induction was replicated from earlier research (Leary et al 2007; Breines and Chen 2012) that successfully induced self-compassion and self-esteem in the two groups based on the different prompts they were asked to describe after writing about a negative event. They used Neff (2003) self-compassion scale that is much more extensive than the questions asked in this study (24 vs 3) and might be why they could see significant differences. Furthermore, the self-compassion scale includes several different aspects of self-compassion such as common humanity and mindfulness. The scale used in this study was focused on the self-kindness part of self-compassion. It might be that the prompt for self-esteem induce self-kindness in individuals but not the other aspects of self-compassion. As the survey already was quite extensive for the participants and to not lose the effect of the induction the decision was made to have a shorter version of the self-compassion scale which in hindsight may have been the reason that there was no difference between the two groups. Nonetheless, future research should test the validity of the design to induce self-compassion.

This study could not confirm a relationship between induced self-compassion and an increase in rational decision-making style. First, the reasoning being that the Cronbach alpha was not acceptable when including the variable “conducted additional information search” was that the respondents were asked to not google any answer and since the questionnaire was conducted online there were limited ways for the respondents to conduct additional information search without it breaking the instructions. Second, a reason might be that as rational decision-making is set as a trait it cannot be changed to a larger extent.

This study was the first in investigating if induced self-compassion could have an effect on decreasing biases. However, a limitation of the present study includes the focus on only two biases: confirmation bias and the framing effect. As the results indicated that there could be a difference between the groups in both the prevalence of confirmation bias and the framing effect it would be interesting to research if induced self-compassion influences any of the other biases mentioned in the research literature such as overconfidence and anchoring (Bazerman 2002; Martino et al. 2009; Welsh and Begg 2017).

Finally, this study has had a focus on rational decision-making. As previously mentioned, there are several types of decision-making, and these are preferred under certain conditions (Julmi 2019). Although this study has put rational decision-making in a preferable light some critics claim that striving for rational decisions is unrealistic given that it requires more time and effort. Furthermore, studies have shown that individual’s cognitive mechanism can be successful without them being traditionally rational (Gigerenzer and Goldstein 1996) and that ignoring parts of information can lead to more accurate judgments in contrast to adding and weighing all the options in instances where there are small samples or for low predictability (Gigerenzer and Gaissmaier 2011).

6. Conclusion

The aim of this study was to investigate whether induced self-compassion could positively influence the use of rational decision-making and decrease the prevalence of bias in individuals. By inducing self-compassion or self-esteem in individuals and measuring their performance on a version of the “Asian disease problem” to measure the framing effect, Wason’s four-card task to measure confirmation bias and the CRT to measure rational decision-making, this study could not establish a significant difference between the two groups on any of the tasks. However, in the framing effect and confirmation bias task the differences were close to significant where the participants induced with self-compassion demonstrated more resilience against the framing effect and confirmation bias. Furthermore, when including gender in the analysis of rational decision-making a significant difference could be detected where men induced with self-esteem performed significantly better than women induced with self-esteem. A limitation with the present study was that no significant difference could be detected between the self-compassion and self-esteem group in the manipulation check regarding their self-reported level of self-compassion. The design for the induction was replicated from earlier research but the manipulation check was a shorted version of Neffs (2003) self-compassion scale and only measured the self-kindness part of self-compassion. Based on the findings of this study it is recommended that future research investigates whether induced self-compassion could decrease the prevalence of the framing effect and confirmation bias with a larger sample pool as well as shorter time between the induction and the tasks. Furthermore, it would be interesting to investigate why men induced with self-esteem perform better than women induced with self-esteem as current research is insufficient in explaining this finding. Finally, future research should test the validity of the design to induce self-compassion.

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Appendix

Methodology: Framing questions (Mahoney et al. 2011)

Positive frame:

“The Organisation of European Cancer Institutes has two possible treatments for leukemia which could become standard treatments across several countries. Treatment A: Of every 10,000 people who get leukemia, 5000 will be saved. Treatment B: 1/2 chance that 10,000 of every 10,000 who get leukemia will be saved and 1/2 chance that no people of every 10,000 who get leukemia will be saved. There are adequate resources to implement only one treatment program. Which of the two treatments (A or B) would you favor for implementation?”

Negative frame:

“The Organisation of European Cancer Institutes has two possible treatments for leukemia which could become standard treatments across several countries. Treatment A: Of every 10,000 people who get leukemia, 5000 will die. Treatment B: 1/2 chance that no people of every 10,000 who get leukemia will die and 1/2 chance that 10,000 of every 10,000 who get leukemia will die. There are adequate resources to implement only one treatment program. Which of the two treatments (A or B) would you favor for implementation?”

Methodology: CRT questions (Toplak et al. 2014)

(4) *“If John can drink one barrel of water in 6 days, and Mary can drink one barrel of water in 12 days, how long would it take them to drink one barrel of water together (in days)?*

[correct answer = 4 days; intuitive answer = 9 days]

(5) *“Jerry received both the 15th highest and the 15th lowest mark in the class. How many students are in the class (nr of students)?”* [correct answer = 29 students; intuitive answer = 30 students]

(6) *“A man buys a pig for \$60, sells it for \$70, buys it back for \$80, and sells it finally for \$90. How much has he made (in dollars)?”*, [correct answer = \$20; intuitive answer = \$10]

(7) *“Simon decided to invest \$8000 in the stock market one day early in 2008. Six months after he invested, on July 17, the stocks he had purchased were down 50%. Fortunately for Simon, from July 17 to October 17, the stocks he had purchased went up 75%. At this point Simon has: a. broken even in the stock market, b. is ahead of where he began, c. has lost money)?”*, [correct answer = c, the value is now \$7000; intuitive answer = b].

Methodology: Rational decision-making traits (Scott and Bruce 1995)

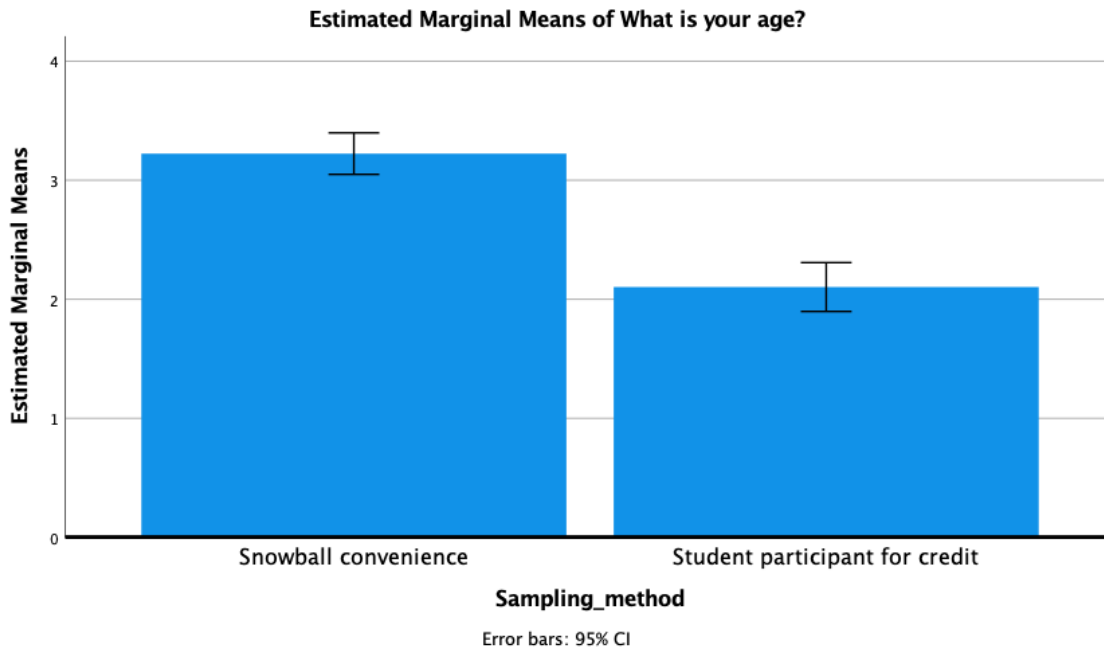
“How much did you engage in the following activities when solving the previous questions?”:

- *“Considered various answers”*
- *“Engaged in careful thought”*,
- *“Used logic and systematics”*
- *“Executed additional information search”*

The following two statements were added (Jelihovschi, Cardoso and Linhares 2018)

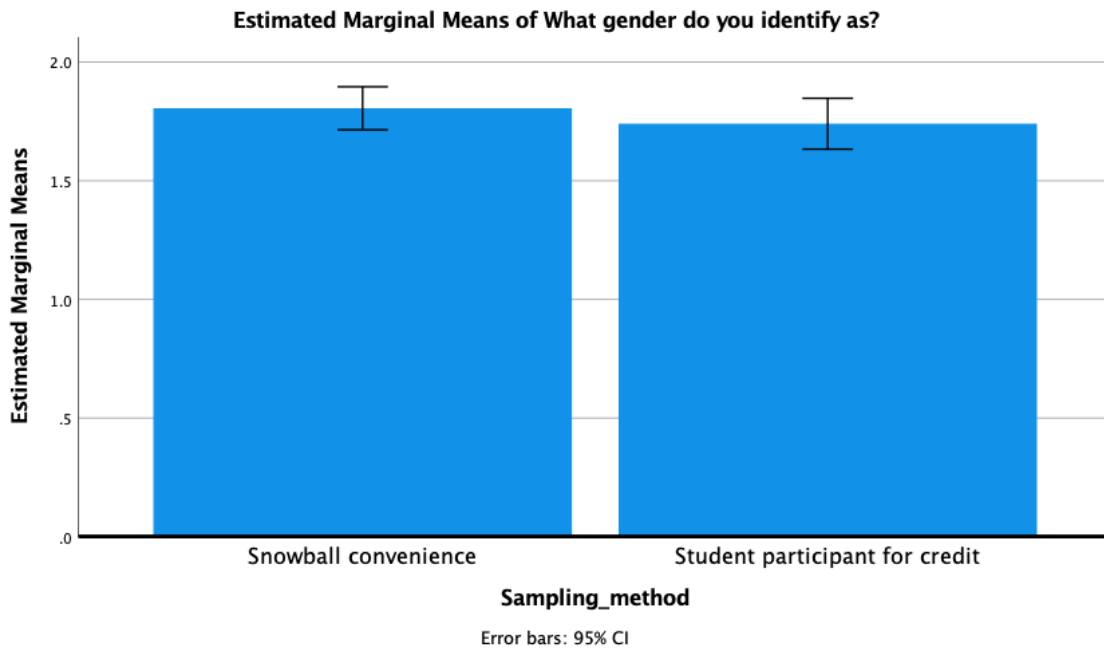
- *“Changed answer during the process”*
- *“Performed calculations”*

Results: Control sampling methods on age



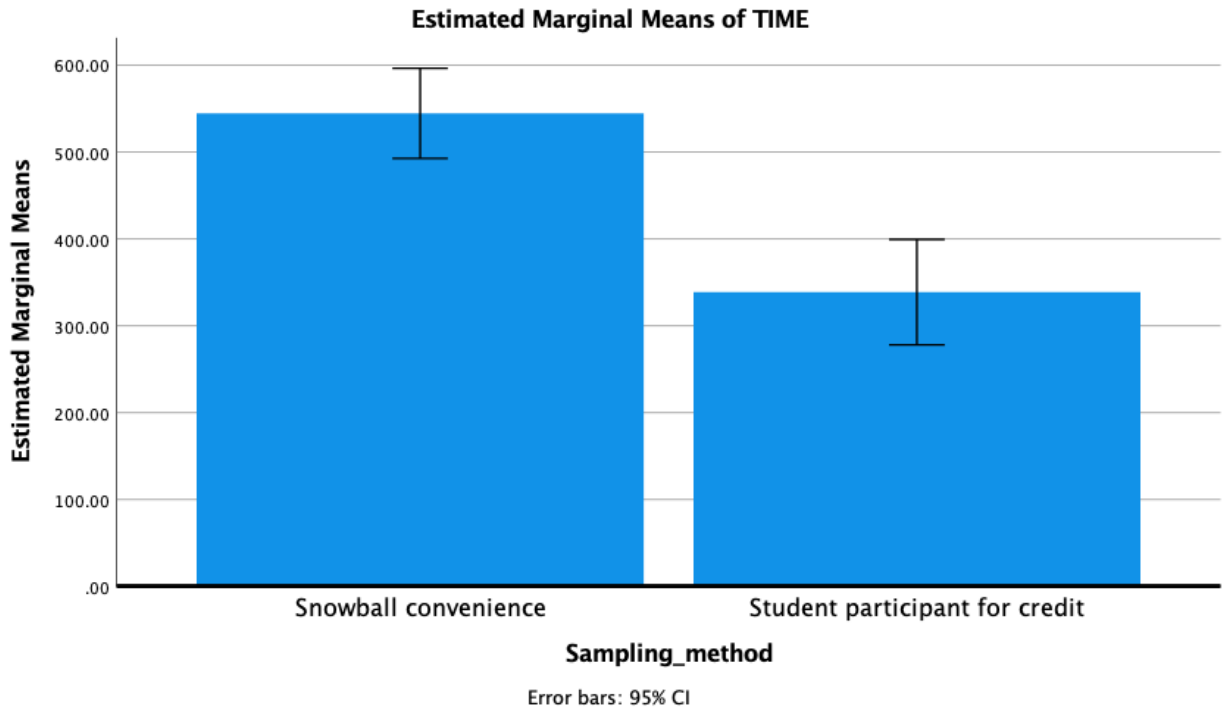
An univariate analysis of variance demonstrated a significant difference in age where the participants recruited with snowball convenience ($M = 3.22$, $S = 1.17$) were older than the student that participated for credit ($M = 2.1$, $S = 0.31$), $F(1,182) = 56.21$, $p < 0.001$.

Results: Control sampling methods on gender



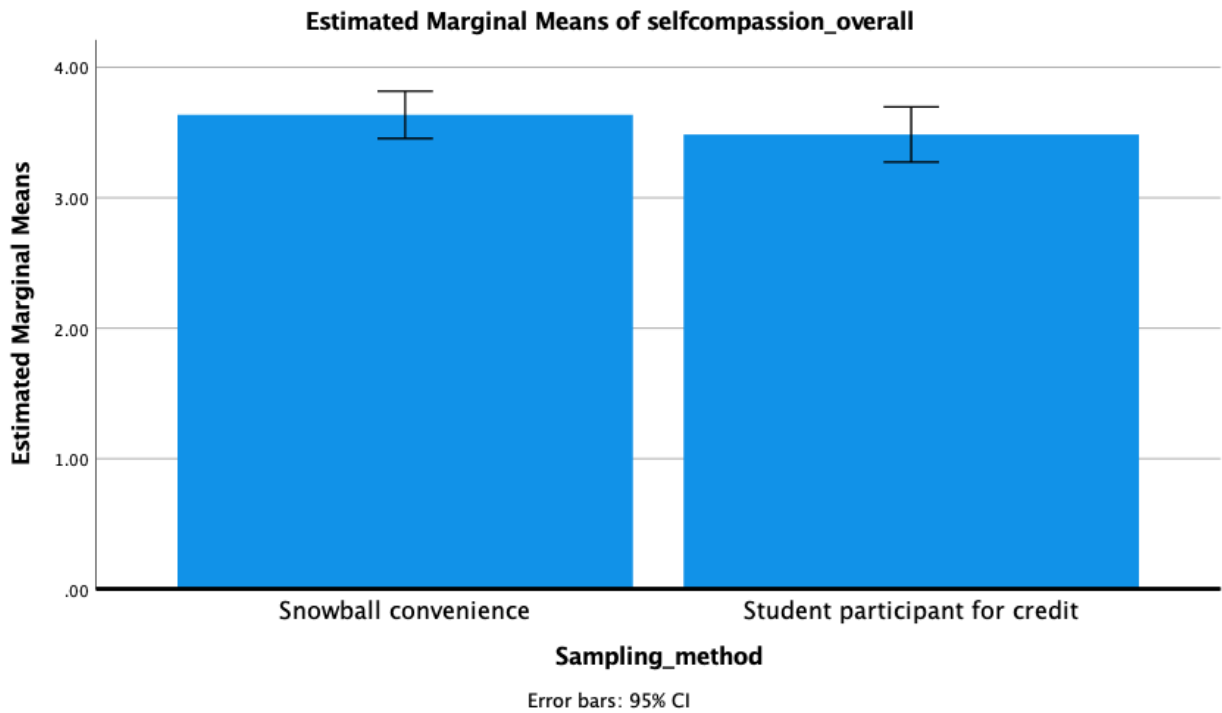
An univariate analysis of variance did not demonstrate a significant difference in gender between the participants recruited with snowball convenience ($M = 1.81, S = 1.74$) or the students that participated for credit ($M = 1.74, S = 0.44$), $F(1,183) = 0.19, p = 0.36$.

Results: Control sampling methods on time spent



An univariate analysis of variance demonstrated a significant difference in time spent on the decisions task where the participants recruited with snowball convenience ($M = 545, S = 332$) spent more time on task than the students that participated for credit ($M = 339, S = 162$), $F(1,185) = 25.88, p = 0.001$.

Results: Control sampling methods on manipulation check

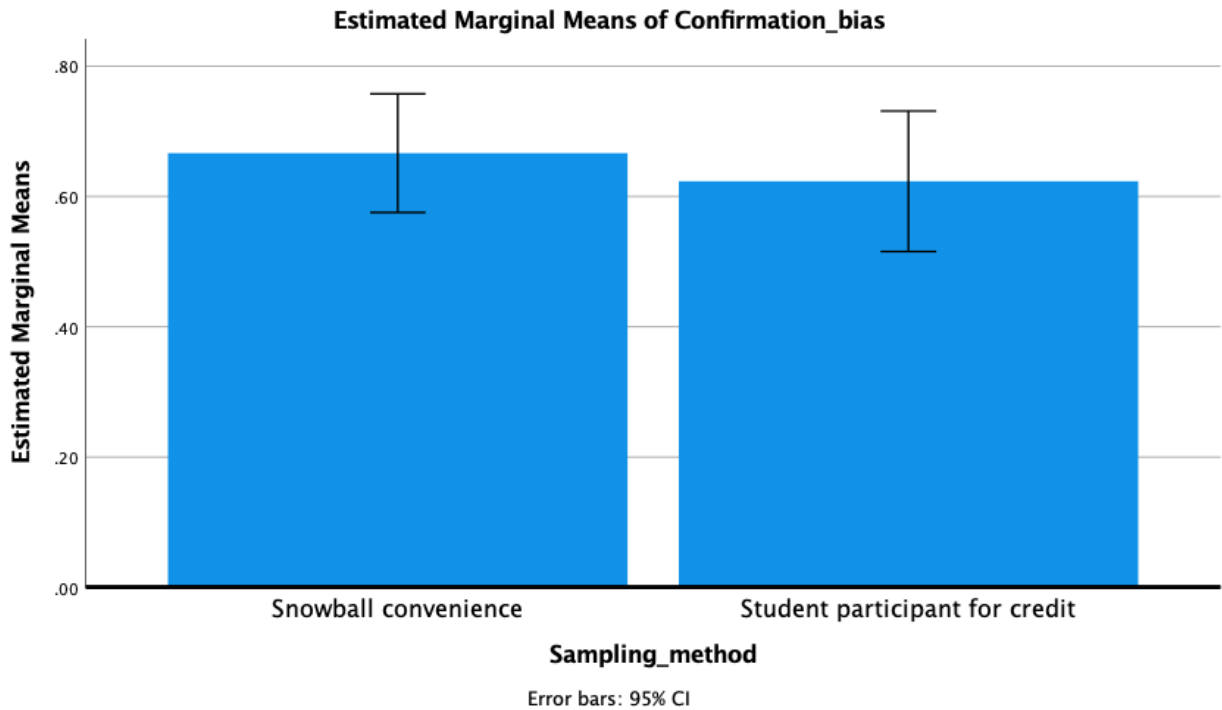


An univariate analysis of variance did not demonstrate a significant difference in manipulation check between the participants recruited with snowball convenience ($M = 3.64$, $S = 1.00$) or the students that participated for credit ($M = 3.49$, $S = 0.88$), $F(1,185) = 1.14$, $p = 0.29$.

Results: Control sampling methods on the framing effect

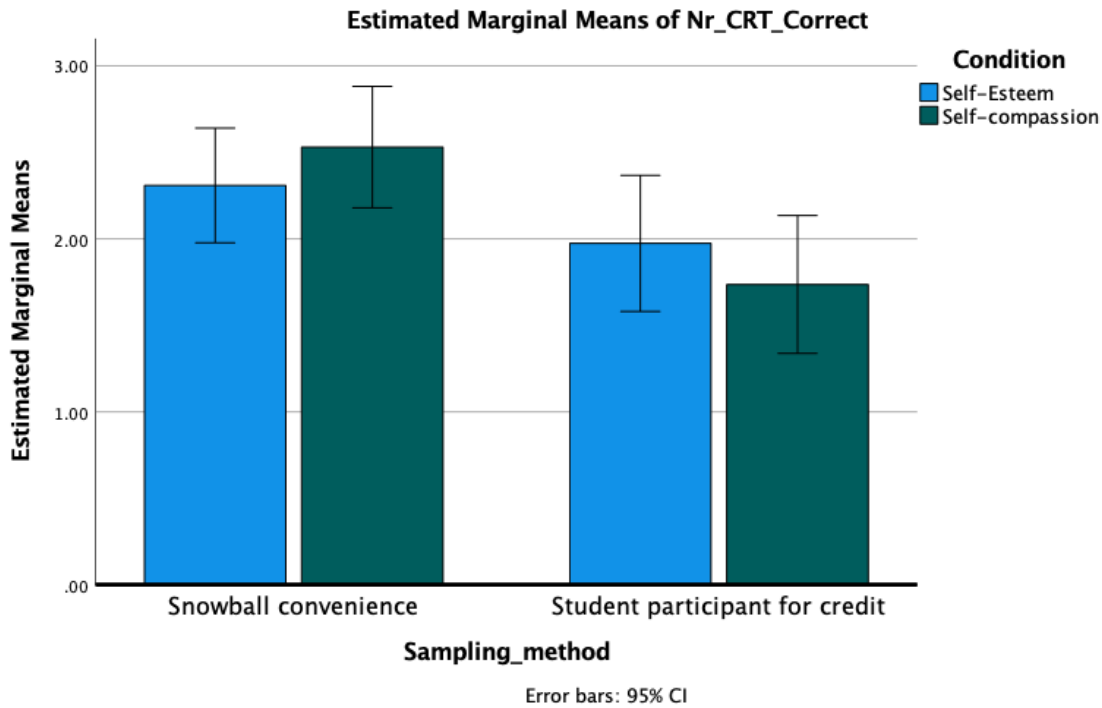
To test whether there was a significant difference between the sampling methods and if there as a significant difference in how they individuals induced with self-compassion or self-esteem changed, or not changed, their answers depending on frame a moderation analysis was conducted using Model 1 in the PROCESS macro in SPSS (Hayes 2018). The outcome variable was choice of treatment (A or B), the predictor was either negative or positive frame, the induction was the moderator, and the sampling method was set as a covariate. The results demonstrates that even with sampling method set as a covariate the induction does not moderate a significant difference between how individuals answer depending on frame, interaction effect = 0.85, 95%, CI (-.44, 2.15), $p = 0.20$.

Results: Control sampling methods on confirmation bias



An univariate analysis of variance did not demonstrate a significant difference in level of confirmation bias between the participants recruited with snowball convenience ($M = 0.67$, $S = 0.47$) or the students that participated for credit ($M = 0.62$, $S = 0.49$), $F(1,183) = 0.37$, $p = 0.55$.

Results: Control sampling methods on CRT performance



A two-way ANOVA was executed to examine the effect of sampling method and condition on self-assessed self-compassion. There was a significant main effect where the participants recruited with snowball convenience ($M = 2.42$, $S = 1.28$) had a higher score on the CRT than the students that participated for credit ($M = 1.86$, $S = 1.67$), $F(1,180) = 9.58$, $p = 0.002$. However, there were not a significant interaction between the effects of sampling method and condition on the performance on the CRT task, $F(1,180) = 1.55$, $p = 0.21$.