# Method

## *Participants*

Our participants were 412 students enrolled in Psychology 1000 at the University of Missouri – Columbia. Our participants were primarily white (76%), female (66%), and freshmen (74%); further demographic information can be found in [Table here]. Participants received course credit for participation in the study.

## *Procedure*

Participants were randomly assigned to one of two conditions representing different exposure to health benefits information. Our two conditions were an intervention (n=217) and control condition (n=195). Study 2 used a 2 (pre-post) x 2(condition) mixed-subjects design, where condition was a between-subjects factor and participants were assigned to one of the two conditions. Time was a within-subjects factor with the primary outcome, support for UHC, measured before and after participants completed the exercise.

The intervention condition consisted of a web-application adapted from the Choosing Healthplans All Together (CHAT) paradigm used in our ‘active’ paradigm for Study 1. Participants allocated limited resources to levels and categories of coverage to build an explicit health benefit plan. Due to limited resources not all categories can be fully covered, leading to forced trade-offs. The content of the exercise in Study 2 remains the same, but it is delivered by using a web-application instead of pencil and paper; See Appendix [LETTER HERE] for Study 2 experimental materials.

The control condition consisted of informational brochures and pamphlets obtained from the World Health Organization and World Bank containing accurate information on the benefits of UHC. Study 2 used a 2 (pre-post) x 2(condition) mixed-subjects design, where each participant was only assigned to a single condition but were all asked to provide their support for UHC both before and after the experimental condition.

## *Measures*

The primary outcome was the support for UHC scale, adapted from Shen & Labouff (2013), measured both pre and post-test. The items included in the scale were the same as in Study 1. For Study 2, each item was measured on a 100-point sliding scale from 0 (strongly disagree) to 100 (strongly agree), instead of the 7 point Likert scale used in Study 1.

Our secondary outcomes were our proposed mediating factors, perceived equality, and comprehensibility, measured both pre and post-test. Perceived equality was a single item measure adapted from Netemeyer, Boles, and McMurrian (1996) (‘Universal Health Care provides fair and equitable care to all US citizens, regardless of employment status’). Our measure of comprehensibility was adapted from the perceived complexity measure developed by Mulken, Pair, and Forceville (2010). This scale comprised of two items measuring comprehensibility, which are averaged together (‘Universal Health Care is straightforward, ‘Universal Health Care is easy to understand’).

Our tertiary outcomes were our potential moderating factors, subjective and objective numeracy. Objective numeracy was measured using the Rasch Numeracy Scale, created by Weller et al. (2013). This measure consists of 8 items, all math problems of varying complexity, requiring some amount of algebra, percentiles, and table reading skill. This measure was scored from 0 to 8, with the sum of all correct answers to the individual items as the subject’s objective numeracy score. The Cronbach’s alpha for these items is 0.71. An example item is “If it takes five machines 5 minutes to make five widgets, how long would it take 100 machines to make 100 widgets?”. Subjective numeracy was measured using the Subjective Numeracy Scale created by Fagerlin et al. (2007). This measure is a simple average consisting of eight items, with the seventh item reverse scored. Each item was selected using a likert scale that went from 1 (generally poor with numbers) to 7 (generally prefer numbers). The Cronbach’s alpha for these items is 0.84. An example item is “How good are you at calculating a 15% tip?”. Additionally, we did not initially collect data on subjective and objective numeracy until part-way through the data collection. Thus, the first 68 subjects do not have this data recorded.

Participants were then asked whether they paid for their own health insurance and if they have been uninsured, and the active intervention condition was asked if they would be happy having the plan they built as their own health insurance. Each of these three items was measured as a ‘yes’ or ‘no’ response. Additionally, there was a free-response question asking about the subjects’ thoughts about the exercise they just completed. Finally, we also measured demographic information, including gender identity, age, race/ethnicity, and year in school.

## *Power and Statistical Analyses*

We planned to recruit 176 participants. Sample size was determined a-priori using G-power with the following parameters: greater than 90% power to determine a significant large-sized effect (Cohen’s *f* =0.10) at an alpha level of .05, for a linear multiple regression. Our support for UHC outcome was treated as a continuous variable. We examined the effects of experimental condition (CHAT exercise and ‘standard messaging’ control), time of intervention (pre vs. post), subjective numeracy, and objective numeracy on our outcome variable by conducting a series of analysis of variance tests. We examined the main effect and the 2-way interactions of condition x time, time x numeracy, and condition x numeracy of our four predictors. Additionally, we also tested models with random and fixed intercepts, with participants being treated as the random effect. Fixed effects comprised of the effect of the experimental condition, and time of intervention (pre vs post). All tests were conducted in R and were considered statistically significant when *P* < .05. How to write about mediational tests?

## Study 2 Hypothesis:

Hypothesis 1 – The experimental groups will differ in support for UHC.

H1a: Participants in the intervention condition will have greater increases in support for UHC compared to those in the control condition.

Hypothesis 2 – Differences in support for UHC due to experimental group assignment are partially mediated through other factors.

H2a: Differences in support for UHC due to our intervention are partially mediated through perceived equity.

H2b: Differences in support for UHC due to our intervention are partially mediated through comprehensibility.

Hypothesis 3 – Differences in support for UHC due to experimental group assignment are moderated by participant numeracy.

H3a: Differences in support for UHC due to experimental group assignment are moderated by subjective numeracy.

H3b: Differences in support for UHC due to experimental group assignment are moderated by objective numeracy.

# Results

Descriptive statistics are summarized in [Table here]. Hypothesis 1a was analyzed using a linear mixed model fitted to our support for UHC outcome measure. Cronbach’s alpha for the items in this measure was 0.85. In opposition to H1a, we did not observe a statistically significant linear main effect for our experimental intervention, *t*(410) = -1.55 ,*p* = .122. We did observe a statistically significant linear main effect of time, *t*(410) = 6.09 ,*p* < .001. Support for UHC increased 1.903 points from pre-intervention to post-intervention. Finally, we also saw a statistically significant two-way interaction between the linear effect of time and condition, *t*(410) = -4.662 ,*p* < .001. Support for UHC was reduced by 2.06 points from pre-intervention to post-intervention in our intervention condition compared to our control condition.

## *Proposed Mediational Effects*

Hypothesis 2a and 2b were analyzed using two linear models and a bootstrapping procedure to test potential mediation. The first linear model tests the effect of our independent variable onto our proposed mediator, the second linear model tests the effect of our mediator on our support for UHC outcome measure, and our bootstrapping procedure allows for us to estimate the indirect effect of our independent variable on our outcome, through our mediator. Cronbach’s alpha for the items in our measure of perceived equity was 0.92. In support of H2a, the effect of our explicit HBP on support for UHC was partially mediated via the perceived equality of the HBP. We observed a statistically significant effect of experimental condition on our proposed mediating variable, perceived equality, *t*(820) = -3.551 ,*p* < .001. Perceived equality decreased 10.49 points in our intervention condition compared to our control condition. Furthermore, we observed a statistically significant effect of perceived equality on our outcome variable, support for UHC, *t*(821) = 18.243 ,*p* < .001. Support for UHC increased by .424 points for every point of increase in perceived equality. We tested the significance of our indirect effect by using bootstrapping procedures. After computing 1000 bootstrapped samples, our estimate for our indirect effect was -2.72 (95% CI = -4.43, -1.03), thus our average causal mediation effect is significant (*p* = 0.002). In opposition of H2b, the effect of our explicit HBP on support for UHC was not mediated by the comprehensibility of the HBP. This is since we do not see a significant effect of experimental condition on our proposed mediating variable, comprehensibility, *t*(820) = -0.805 , *p* =0.421.

We chose to parameterize our proposed mediational relationship using a path diagram, as seen in [Figure here]. Again, in support of H1a, we see that there is a mediational relationship between condition and UHC through the effect of perceived equity. Increased perceived equity increases support for UHC, and the control condition both has greater support for UHC, as well as greater perceived equity.

## *Moderating Effect of Numeracy*

To test H3a and H3b linear regression was used to analyze if there was a significant interaction between the effect of numeracy and condition on support for UHC. In opposition of H3b, the effect of subjective numeracy on support for UHC in [Table here], we see that there is no direct effect, *t*(624) = 1.551 ,*p* = .121, or significant interaction with experimental condition, *t*(624) = -0.867 ,*p* = .386, of subjective numeracy on support for UHC. Given the lack of direct effect and interaction, we were unable to find evidence of a moderating effect of subjective numeracy on support for UHC.

In support of H3a, the effect of objective numeracy on support for UHC in [Table here], we see a direct effect of objective numeracy on support for UHC, *t*(684) = 2.904 ,*p* = 0.004. Support for UHC increases by 1.43 points for each point of increase on the Rasch Numeracy Scale. Furthermore, we also see a significant interaction between the effect of objective numeracy and the condition, *t*(624)= 3.99 ,*p* < .001. In our intervention condition, support for UHC increases by an additional 2.78 points for each point of increase on the Rasch Numeracy Scale. Objective, but not subjective, numeracy has a significant effect on support for UHC, with an even greater effect for subjects in our intervention condition.

Analysing our free-response question, we found very similar responses to those in Study 1, but with some significant differences. Primarily, none of the participants in either condition seemed to have difficulty with the new digital-only experimental material or confusion about the instructions for the activity. This represents a significant improvement from Study 1. Several participants however reported difficulty regarding the decision making required in the task itself. Some examples include:

“it was much more difficult than I thought it was going to be; I had to compromise points in some places to be able to get at least basic coverage in other areas”

“It’s hard for me to think about people having to pick and choose which parts of healthcare they’ll have access to when they’re all important. It makes me wish healthcare would be reformed for the good of everyone and not just those who can afford it.”

Additionally, replicating what we found in Study 1, many participants found the activity particularly interesting and fun. Given that the purpose of the intervention is to increase engagement, this is a positive outcome. An example of these responses:

“Interesting that my answers changed. I would be interested in seeing someone against Universal Health Care make a study, too.”

“Enjoyed it, overall I believe that there should be Universal Health Care, but I did not realize how complicated it was. This exercise showed me how complicated it will be if the US decides to go through with something like this.”