**Chapter 3: Study 2 Methods**

**Sample size.**

The minimum needed sample size was determined using an a priori power analysis. The study design was a 3x5 between-subjects experimental design. This resulted in 15 total conditions. A power analysis was conducted to determine the sample size needed to achieve a minimum 80% chance of detecting significant main effects and interaction effects. Power analyses were conducted in R using the `pwr.f2.test` function. For the estimated effect sizes, I used Cohen’s conventions for a small effect, which is an *f*2 of .02 (or an *R*2 of .02) (Cohen, 1988). I used this estimated effect size because an intervention with any smaller of an effect may have less important practical applications.

I performed three separate power analyses for the main effect of norm condition, the main effect of framing condition, and the interaction effect between the two. The interaction effect produced the largest needed sample size. To achieve 80% power for detecting a significant interaction effect between framing and norm condition, the study requires 765 participants, which is approximately 51 participants per condition. This sample size achieves approximately 89% power for detecting a significant main effect of norm-intervention condition and approximately 94% power for detecting a significant main effect of framing condition.

The minimum sample size of 765 participants was reached on May 10, 2023. The stopping rule was to end data collection on June 4, 2023, which was determined based on the timeline for completing the doctoral program requirements. A final sample size of 1,133 participants was collected by this date. For small effect sizes (*f*2 = .02, *R*2 = .02), this final sample size achieves 93% power for detecting a significant interaction effect, 97% power for detecting a significant overall effect of norm condition, and 99% power for detecting a significant overall effect of framing condition.

**Participants.**

Data collection took place between November 2022 and June 2023. Participants were recruited from the University of Oregon Psychology/Linguistics Human Subjects Pool (*n* = 850), the University of Oregon Marketing Subjects Pool (*n* = 276), and the general University of Oregon student population (*n* = 7). The current study’s methods were granted IRB approval by University of Oregon’s Research Compliance Services (IRB ID: 04292020.037).

Participants’ demographics are provided in Table 3.1 below and are based on the data prior to multiple imputation. This only affected the sample size used to report statistics on age (*n* = 1,033) and parents’ education (*n* = 1,131). The other demographic variables had complete data available (*n* = 1,133). The participants in the sample tended to be around 20 years old (*M* = 19.87), identify with being a woman (59%), identify as White (64%), have parents with a college or master’s degree (65%), and identify as somewhat or very liberal (54%).

**Table 3.1**

*Descriptive Statistics for Demographic Variables*

| Age | | Gender | | Ethnicity | | Parents’ Education | | Political Orientation | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *n* | 1033 | *n* | 1133 | *n* | 1133 | *n* | 1131 | *n* | 1133 |
| *M* | 19.87 | Woman | 59% | White | 64% | College degree | 34% | Somewhat liberal | 32% |
| *SD* | 1.95 | Man | 37% | Mixed Ethnicity | 11% | Master’s degree | 31% | Very liberal | 22% |
| *Min* | 18 | Non-binary | 2% | Asian | 10% | Some college | 12% | Neither liberal nor conservative | 18% |
| *Max* | 50 | Preferred not to identify | 2% | Hispanic or Latinx | 9% | Doctorate | 10% | Slightly liberal | 12% |
| IQR | 2 |  |  | Black or African American | 3% | High school or GED | 9% | Slightly conservative | 6% |
|  |  |  |  | Other | 1% | Middle school or some high school | 3% | Somewhat conservative | 5% |
|  |  |  |  | Pacific Islander | 1% |  |  | Other | 3% |
|  |  |  |  | American Indian or Alaska Native | 0.4% |  |  | Very conservative | 2% |

**Procedure and Measures.**

Participants completed this study online via the Qualtrics survey platform. First, participants read an informed consent document that described the nature of the study, the estimated completion time, and the voluntary nature of participating. They were also told the compensation for participating, which was 0.5 SONA credits for participants from the human subject pools and a $5 Amazon gift card for participants from the general UO student population. Because fictional information was presented to participants as fact to create the perception of new consumption-related norms, they were also informed that they would be unaware of or misled regarding the nature or purposes of the research at some point during the study and that an in-depth explanation of where deception occurred would be given at the end. Participants were invited to continue the study if they were at least 18 years old and agreed with the statements in the informed consent document.

Participants were then randomly assigned to one of the following framing conditions which contextualized the behavior of reducing brand-new clothing item purchases as either pro-environmental, self-enhancing, or neither:

***Pro-environmental framing*.** “In this study, we are interested in understanding people's clothing-buying habits. Please read the following excerpt related to people's clothing purchases: Our clothing-purchasing habits have a direct effect on the environment. The clothing industry produces substantial greenhouse gas emissions (GHGs) during the manufacturing process. The emission of GHGs into the earth's atmosphere is the main factor contributing to the ongoing climate change crisis. A few of the consequences of climate change include: the Earth becoming, on average, hotter, sea levels rising, and more frequent severe weather events (e.g., droughts, heat waves, flooding). Consumers choosing to reduce the number of brand-new clothing items that they purchase is one way that individuals can help to slow climate change processes. A reduction in new clothing purchases could help to decrease greenhouse gas emissions by decreasing the demand for new clothing manufacturing.**”**

***Self-enhancing framing*. “**In this study, we are interested in understanding people's clothing-buying habits. Please read the following excerpt related to people's clothing purchases: Clothing retailers in the US have reported a drop in the sales of brand-new clothing items and wanted to know whether this was accompanied by a change in people's attitudes. In 2021, researchers conducted a national survey among people living in the United States to investigate people's views on purchasing and wearing brand-new clothing items. One of the findings from this study was that, on average, people living in the US reported that they feel unimpressed by seeing other people wear brand-new clothing items. Rather, survey responders reported that they view people more positively who rarely buy brand-new clothing items, or when they do buy clothing, purchase it from secondhand shops.”

***Control framing condition*.** “In this study, we are interested in understanding people's clothing-buying habits. Pleas press ‘next page’ to read information about people’s clothing-buying habits and answer questions regarding your own clothing-buying habits.”

After reading one of the three framing conditions, participants were then randomly assigned to read one of the following five normative messages:

***Control norm condition***. “A survey was recently conducted among University of Oregon students to understand what UO students' views are on purchasing and wearing brand-new clothing items. We are interested in collecting follow-up data to this previous study. Please press 'next page' to answer questions regarding your own clothing-buying views and behaviors.”

***Descriptive norm condition***. “A survey was recently conducted among University of Oregon students to understand what UO students' views are on purchasing and wearing brand-new clothing items. When asked about their views on people's clothing-buying habits, a majority of University of Oregon students who responded reported that they themselves have reduced the number of brand-new clothing items that they purchase as of late. Based on responses, it appears to be more typical amongst UO students to purchase clothing from secondhand shops rather than brand-new.”

***Convention condition***. “A survey was recently conducted among University of Oregon students to understand what UO students' views are on purchasing and wearing brand-new clothing items. When asked about their views on people's clothing-buying habits, most of the students who responded reported some amount of awareness that local community landfills often end up being overfilled with clothing. Managing this waste can create a drain on the economic resources of individuals and communities. A majority of University of Oregon students who responded reported that they themselves have reduced the number of brand-new clothing items that they purchase as of late so as to contribute to reducing the amount of clothing that goes to landfills. This practice can help save individuals and communities money on waste management. Based on responses, it appears to be more typical amongst UO students to purchase clothing from secondhand shops because this also helps to reduce the amount of clothing that ends up in landfills.”

***Social norm condition***. “A survey was recently conducted among University of Oregon students to understand what UO students' views are on purchasing and wearing brand-new clothing items. When asked about their views on people's clothing-buying habits, a majority of University of Oregon students who responded reported that they believe that people should reduce the number of brand-new clothing items that they purchase and that failing to do so would be a "faux pas" (i.e., a social slip-up). Students also reported believing that it is unnecessary to buy brand-new clothing in order to make a good impression on others at special occasions (e.g., for work, a wedding, a job interview, etc.). Based on responses, it appears to be more typical amongst UO students to purchase clothing from secondhand shops because students want to avoid being judged by their peers and feeling guilty for buying brand-new clothing items.”

***Moral norm condition***. “A survey was recently conducted among University of Oregon students to understand what UO students' views are on purchasing and wearing brand-new clothing items. When asked about their views on people's clothing-buying habits, a majority of University of Oregon students who responded reported that they believe that people should reduce the number of brand-new clothing items that they purchase because it is the right thing to do. Based on responses, it appears that most UO students believe that it is more ethical to purchase clothing from secondhand shops. Responders reported thinking that buying clothing from secondhand shops is good for the environment and good for supporting ethically-run local businesses.”

Participants were also measured on several covariates, including personal values, in-group identification, interest in clothing, and socially desirable responding. For participants recruited from the Psychology/Linguistics Human Subjects Pool, these measures were included in the pre-screening, which meant participants were measured on these covariates prior to their participation in the main intervention phase of this study. For participants recruited from the Marketing Human Subjects Pool and the general student population, participants responded to these measures after completing the intervention phase of the study.

***Personal Values*.** To assess personal values, I used the values scale from Steg et al. (2012), which assesses values on four different dimensions: biospheric, altruistic, egoistic, and hedonic. On this measure, participants were asked to indicate how important a set of 16 values are to them as “guiding principles in their lives” on a scale from 1 (*opposed to my principles*) to 7 (*extremely important*). The items assessing each value dimension are: biospheric (respective the earth, unity with nature, protecting the environment, preventing pollution), altruistic (equality, a world at peace, social justice, helpful), egoistic (social power, wealth, authority, influential, ambitious), and hedonic (pleasures, enjoying life, gratification for oneself).

Aggregated scores were created for biospheric, altruistic, egoistic, and hedonic values by averaging the items on each subscale. Each of the subscales had acceptable to good internal consistency (αBiospheric = 0.88, αAltruistic = 0.78, αEgoistic = 0.72) except for hedonic values, which had a Cronbach’s alpha that was slightly below acceptable standards (αHedonic = 0.67). However, dropping any items from the hedonic values subscale only worsened internal consistency so it remained composed of the original four items.

***In-group Identification*.** The degree to which participants identify with University of Oregon students was measured using a 14-item ingroup identification scale from Leach et al. (2008). Responses are on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*). This survey assesses five aspects of in-group identification, including solidarity (e.g., “I feel solidarity with other University of Oregon students”), satisfaction (e.g., “I am glad to be a University of Oregon student”), centrality (e.g., “The fact that I am a University of Oregon student is an important part of my identity”), individual self-stereotyping (e.g., “I have a lot in common with the average University of Oregon student”), and in-group homogeneity (e.g., “University of Oregon students are very similar to each other”). An overall ingroup identification score was created by calculating the average across all items. This scale had excellent internal consistency (α = 0.91).

***Interest in Clothing*.** To control for individual differences in participants’ general interest in clothing, the 20-item Clothing Interest Inventory was included (Schrank, 1973). This measure includes items that assess the degree to which participants are interested in clothing (e.g., “I enjoy clothes like some people do such things as books, music, and movies”) and fashion (e.g., “I have no interest in keeping up with the latest fashion trends” (*reverse-coded*)). Responses are given on a 1 (*definitely false*) to 5 (*definitely true*) scale. Scores were aggregated by taking the average across all items. This scale had excellent internal consistency (α = 0.92).

***Socially Desirable Responding*.** To control for individual differences in participants’ tendency to give socially desirable responses, participants completed the Balanced Inventory of Desirable Responding Short Form (Hart et al., 2015). The short form improves upon the length and language of the original 40-item BIDR while still replicating the original scale’s two-factor structure with acceptable fit and reliability. The measure includes 16 items assessing impression management (e.g., “When I hear people talking privately, I avoid listening”) and self-deceptive enhancement (e.g., “I never regret my decisions”). Responses are given on a 1 (*strongly disagree*) to 7 (*strongly agree*) scale. Aggregated scores were calculated for impression management and self-deceptive enhancement by averaging the items on each subscale. Both subscales scored slightly below acceptable on internal consistency (αSelf-Deceptive = 0.67, αImpression = 0.65). However, there were no items that when dropped would improve the internal consistency of either subscale.

Participants were measured on two outcome variables, including pro-environmental clothing consumption intentions and pro-environmental clothing consumption behaviors.

***Pro-environmental Clothing Consumption*** ***Intentions***. The first outcome variable measured participants’ intentions to reduce their new clothing item purchases over the next five years. This 8-item survey was developed for the current study. It assesses the degree to which people intend to not buy new clothing in the future, as well as the degree to which people intend to buy secondhand clothing instead of brand-new clothing. The instructions informed participants that each statement was with regards to the prospective clothing purchases that the participant may make in the next five years. All eight items are listed below:

In the next five years…

1. I will purchase very few brand-new clothing items.

2. I will purchase many brand-new clothing items. (*reverse-code*)

3. I will only purchase a brand-new clothing item if it is something that I need for basic functioning.

4. I don’t plan on changing the number of brand-new clothing items that I typically buy. (*reverse-code*)

5. When I purchase a clothing item, I will get it from a secondhand shop rather than brand new.

6. When I purchase a clothing item, I will get it brand-new instead of from a secondhand shop. (*reverse-code*)

7. When I need a new clothing item for a special occasion, I will look for it at a secondhand shop instead of buying it brand new.

8. When I need a new clothing item, I will go straight to buying it brand-new and not look for it at a secondhand shop first. (*reverse-code*)

An aggregate consumer intentions score was calculated by taking the average of these eight items. Overall, the measure had good internal consistency (α= 0.84).

***Pro-environmental Clothing Consumption Behaviors*.** Participants were presented with the choice to enter themselves into a raffle for the chance to win either 1) a $50 gift card to spend on new clothing items, or 2) a $50 gift card to spend on secondhand clothing items.

**Chapter 4: Study 2 Planned Analyses**

A pre-registration for this study’s planned analyses was submitted on Open Science Framework (<https://osf.io/8f3b2>) prior to investigation of the data. All analysis code can be found on GitHub (<https://github.com/sluopsy/Analysis_Github>).

Prior to the main analyses, the data will be investigated for outliers. As stated in my pre-registration, the data will be examined for any obvious outliers that are the result of data entry errors using visualizations and descriptive statistics. If any data errors are identified, there will be an attempt to correct them to their intended value. If it is not possible to infer with great confidence what their intended value is, the data error will be removed.

Also prior to conducting the study’s main analyses, I will use multiple imputation to handle missing data. Multiple imputation is a technique for predicting missing values using the other variables in one’s study. This is done a researcher-specified number of times to create several “imputed” data sets with their own unique errors. Then, the study’s analyses are conducted on each of these imputed data sets and the results are aggregated across them using rules for pooling parameter estimates (e.g., the pooled estimate for a regression coefficient for a particular predictor is the average estimated regression coefficient for that predictor across all imputed models) (van Buuren, 2018). This method of handling missing data has been found to produce less bias in parameter estimates and better power compared to listwise deletion (Peeters et al., 2015). Its implementation has been increasingly encouraged by researchers in the psychology community (Enders, 2017; Van Ginkel et al., 2020; Woods et al., 2023).

One complexity when implementing multiple imputation occurs when one needs to include interaction effects in the imputation model because they are of interest in the substantive model(s). A comparison of methods for conducting multiple imputation with the presence of interaction effects found that a method called *Substantive Model Compatible Fully Conditional Specification* (SMC-FCS) multiple imputation produced the least biased parameter estimates (van Buuren, 2018). SMC-FCS multiple imputation avoids incompatibilities between one’s imputation and substantive models (which can occur when interaction effects are not accounted for in the imputation model) by “specifying a joint model for outcome and covariates for which the conditional distribution of outcome given covariates matches the substantive model and then using the imputation model implied by this joint model” (Bartlett et al., 2015). SCM-FCS multiple imputation will be implemented for this analysis using the `smcfcs` function in R.

Following multiple imputation, I will conduct a linear regression analysis using the `lm` function in R to examine the effects of the study’s key predictors on consumer intentions. The categorical predictors in this model will include framing condition, norm condition, the framing by norm interaction effect, and gender. These categorical predictors will be coded using orthogonal contrast codes. The continuous predictors in the model will include biospheric values, altruistic values, egoistic values, hedonic values, in-group identification, self-deceptive enhancement, impression management, interest in clothing, and age. These continuous predictors will be mean centered. The three-way interactions (and also two-way interactions) between framing condition, norm condition, and each of the four values subscales will also be included, as well as the three-way interaction (and two-way interactions) between in-group identification, framing condition, and norm condition. An identical model using a logistic regression analysis and consumer behaviors as the outcome variable will also be conducted using the `glm` function in R.

Hypothesis 1 stated that pro-environmental clothing consumption intentions and behaviors will be higher in the self-enhancing framing condition than in the pro-environmental or control framing conditions. To examine this hypothesis, I will look at the overall effect of framing condition in the model. Then, I will conduct simple effects analyses using the `emmeans` function in R to compare the estimated marginal means (EMMs) for each level of framing condition to one another in order to examine the direction, significance, and effect size of each comparison. Hypothesis 1 will be supported if the EMM for the self-enhancing condition is significantly higher than the EMM for the pro-environmental and control framing conditions.

Hypothesis 2 stated that pro-environmental clothing consumption intentions and behaviors will be higher in each of the norm-intervention conditions compared to the control norm condition. To examine this hypothesis, I will look at the overall effect of norm condition in the model. Then, I will conduct simple effects analyses to compare the EMMs for each norm-intervention condition (descriptive, convention, social, and moral) to the control norm condition in order to examine the direction, significance, and effect size of each comparison. Hypothesis 2 will be supported if the EMMs for each norm condition are significantly higher than the EMM for the control norm condition.

Hypothesis 3 stated that there will be an interaction between framing and norm condition such that the effect of each norm-intervention condition will be stronger when preceded by the self-enhancing framing compared to the pro-environmental or control framing. To examine this hypothesis, I will use simple effects analyses to compare the effect of each norm-intervention condition within each framing condition where the effect of each norm-intervention condition is defined as the amount that pro-environmental clothing consumption intentions/behaviors change when going from the control norm condition to one of the norm-intervention conditions. Hypothesis 3 will be supported if the effects of each norm-intervention condition are more consistently significant (in the anticipated direction) and produce larger effect sizes in the self-enhancing framing condition than in the pro-environmental or control framing conditions.

Hypothesis 4 stated that there will be a three-way interaction between each of the values subscales (biospheric, altruistic, egoistic, hedonic), framing condition, and norm-intervention condition such that when a pro-environmental or control framing is used, values will moderate the effect of each norm-intervention condition, but when a self-enhancing framing is used, values will not moderate the effect of norm-intervention condition. To analyze this hypothesis, I will examine the effect of each norm-intervention condition separately for people low (-1SD) and high (+1SD) on each values dimension within each framing condition. Hypothesis 4 will be supported if there is more consistently a significant, and larger, difference in the effect of each norm-condition between people low and high on each values dimension in the pro-environmental and control framing conditions than in the self-enhancing framing condition.

Hypothesis 5 states that in-group identification will moderate the effect of each norm-intervention condition on pro-environmental clothing consumption intentions and behaviors such that the effect of each norm-intervention condition will be stronger when people are high, versus low, on in-group identification. To analyze this hypothesis, I will examine the effect of each norm-intervention condition separately for people low (-1SD) and high (+1SD) on in-group identification. Hypothesis 5 will be supported if the effects of each norm-intervention condition are more consistently significant (in the anticipated direction) and produce larger effect sizes for people high, compared to low, on in-group identification.

Exploratory research question 1 is whether there will be a three-way interaction between in-group identification, framing condition, and norm-intervention condition. To examine this research question, I will follow up the analysis described for hypothesis 4 by examining the effects of each norm-intervention condition for people high, versus low, on in-group identification separately within each framing condition to examine whether the effects of each norm-intervention condition vary depending on the framing context.

Exploratory research question 2 is a question of which combination of framing condition and norm-intervention condition produces the strongest improvements in people’s pro-environmental clothing consumption intentions and behaviors compared to the combination of the control framing and control norm condition. To examine this research question, I will compare the estimated marginal means for every combination of pro-environmental and self-enhancing framing with each norm-intervention condition to the control norm/control framing condition. Given the exploratory nature of the final two research questions and the number of contrasts involved in each, I will apply Sidak’s post-hoc correction to the *p*-values and 95%CIs resulting from these comparisons.