ECONOMIC HARDSHIP, ONTOLOGICAL INSECURITY, AND HOUSEHOLD FOOD WASTE

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To my husband, Kourosh, for his endless love, support, and encouragement and to my lovely family who makes my world more meaningful.

ABSTRACT

The experience of downward changes in one's financial situation is common so that most consumers will experience it during their lifetime such as the recent COVID-19 pandemic. Limited research, however, has examined the impact of economic hardship on consumers' food-related behavior. Using a sample of Canadians and Americans (n = 519; Mage = 38.4; SDage = 13.6; 46.2% female; 85% lived alone) I identify that economic hardship significantly and negatively predicts consumer food waste behavior, so economic hardship leads consumers to waste less food. I also find a positive indirect effect wherein economic hardship positively predicts ontological insecurity, the aversive feeling of being overwhelmed and out of control, which in turn positively predicts over-consumption and in turn higher food waste. This preliminary work opens the door to future research exploring a potentially rich avenue of research on the implications of adverse economic events on consumer food choice, consumption, and disposal.

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CHAPTER 1: INTRODUCTION

Adverse economic experiences are common in the marketplace, with most consumers experiencing at least one in their lifetimes (Verick, 2009). The COVID-19 pandemic saw unprecedented global economic strife, as countless industries lurched to a halt (Mogaji, 2020) and 114 million people lost their jobs (World Economic Forum, 2021). The implications of such adverse experiences, including negative changes in one's financial situation (e.g., job loss, furlough, reduced hours, etc.), for food-related behavior present an understudied domain (Chang, Chatterjee, & Kim, 2014). Here, I synthesize the literatures on socioeconomic status and psychological scarcity to explore the relationship between economic hardship and an important downstream consequence of consumers' food choice, preparation, and consumption: food waste behavior.

According to the Food and Agriculture Organization (2013), about one-third of the food produced for human consumption is lost or wasted annually across the stages of production, distribution, sale, and consumption. This food waste also results in the waste of natural resources, energy, capital, and time; and has destructive effects on the environment, society, and economy and threatens global food security (Schanes, Dobernig, & Gözet, 2018). Although food waste occurs throughout the supply chain, 50% takes place in the hands of consumers (Janssen, Nijenhuis-de Vries, Boer, & Kremer, 2017); that is, once consumers have acquired food from a retailer. Thus, new insights on consumer factors influencing food waste present considerable opportunity with both theoretical and practical implications.

CHAPTER 2: THEORY AND HYPOTHESES

The current inquiry takes interest in economic hardship, which I propose is conceptually linked with both chronic financial restriction and situational scarcity mindset. I propose that negative financial events, and in particular economic hardship, will impact consumer food waste behavior with prior research providing reasons to theorize both negative and positive effects.

Prior work on socioeconomic status finds lower income consumers are more conservative about spending their money on food (Porpino, Parente, & Wansink, 2015) and prefer to buy a small volume of food and based on their daily needs (Gustavsson, Cederberg, Sonesson, Van Otterdijk, & Meybeck, 2011), reducing consumption for ephemeral foods, such as fruits and vegetables (Poskute, Nzesi, & Geliebter, 2021) and increasing purchase of long-life grocery products such as pasta, frozen foods, and shelf stable milk (Snuggs & McGregor, 2021). This is akin to rational economics. Thus, those experiencing an enduring state of financial restriction may develop food purchase and management practices which attenuate food waste (H1a). Put formally:

H1a: Economic hardship will be associated with decreased food waste. Specifically, those who experienced a decrease in financial resources in the prior year will waste less food.

In contrast, the self-regulatory model of scarcity suggests that psychological scarcity can activate feelings of being out of control, which can lead consumers to engage in a control-restoration process through their consumption behavior (Cannon, Goldsmith, Roux, & Kirmani, 2019). This model further proposes that the control restoration mechanism can transpire by seeking novelty (e.g., obtaining new types of foods that one may not typically eat), preserving future choice (e.g., choosing a variety of flavors of a given product so that one can chose between them in the future), obtaining large amounts of otherwise scarce resources (e.g., hoarding food; Long & Khoi, 2020; Mullainathan & Shafir, 2014; see Cannon et al., 2019), and over-preparing food to provide

feelings of abundance for oneself and loved ones (Porpino & Wansink, 2015). That is, engaging in over-consumption.

I theorize that experiencing economic hardship will activate a threat to one's own sense of security and control, as Campbell, Inman, Kirmani, and Price (2020) term "ontological [in]security", which will activate consumer behaviors that in turn heighten food waste. For example, over-consumption of particularly perishable items, which recent research found to increase among some consumers during the COVID-19 pandemic (Jaeger, Vidal, Ares, Chheang, & Spinelli, 2021), and which are also more readily subject to waste (Janssen et al., 2017). As such, there is reason to believe that economic hardship may also prompt feelings of insecurity and a lack of control (i.e., ontological insecurity), prompting over-consumption as a means of engaging in control restoration (Cannon et al., 2019), and ultimately generating heightened food waste. Thus, I also theorize a positive relationship between economic hardship and food waste (H1b) through ontological insecurity and in turn over-consumption (H2; see Figure 1). Put formally:

H1b: Economic hardship will be positively associated with food waste behavior. Those who experienced a decrease in financial resources in the prior year will waste more food.

H2: The effect of economic hardship on food waste will be mediated by ontological insecurity and over-consumption. Those who have recently experienced a decrease in financial resources will feel less ontologically secure, and will in turn over-consume, subsequently wasting more food. That is, the relationship between economic hardship and food waste will be mediated by ontological insecurity and over-consumption.

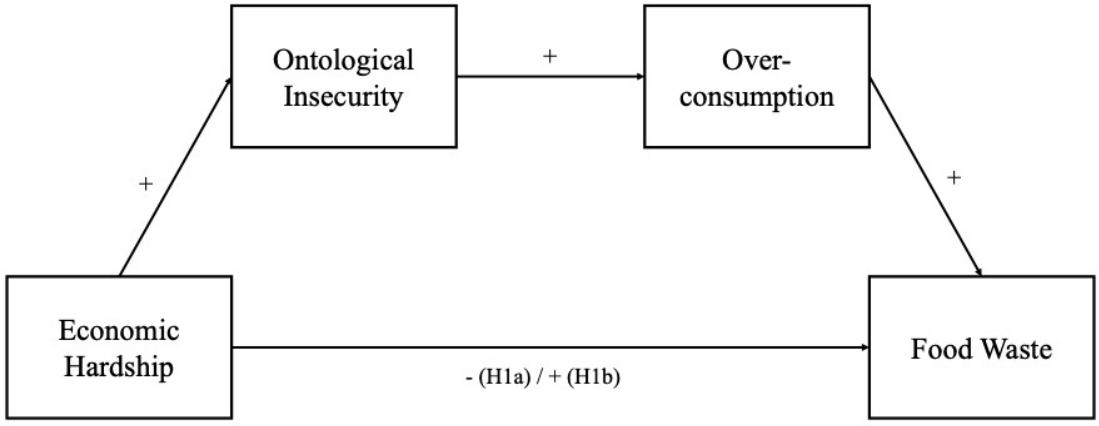

Figure 1: Theoretical Model

CHAPTER 3: METHOD

3.1 PARTICIPANTS AND SAMPLING

Six hundred English-speaking adults who reside in Canada (13%) or the United States (87%) and reported living in 1 or 2-person households[1] and engaging in grocery shopping were recruited from the Prolific Academic (https://www.prolific.co/) platform on March 9, 2021. Participants were invited to take part in the second part of the study one week later, on March 16, 2021. The final sample after exclusions and attrition was comprised of 519[2] respondents (M_{age} = 38.4; SD_{age} = 13.60; 46.2% female; 85% lived alone).

Institutional ethics approval was retained prior to data collection. Data was submitted to the Mendeley Data repository[3].

3.2 MEASURES

All items in the predictor and mediator measures are presented in full in appendix 2.

3.2.1 ECONOMIC HARDSHIP

Economic hardship was measured using five items (Cronbach's alpha = .83), assessed on a 1 (much better) to 7 (much worse) scale (e.g., "Compared to my financial position last year, my financial position this year is" and "In comparison to last year, my ability to spend money freely is") (Sharma & Alter, 2012). A higher (lower) value indicates financial hardship (financial ease).

[1] As household size is related to food waste (Schanes et al., 2018) and larger households may influence the extent to which purchaser mindset influences food waste processes, I constrained the sample to 1 or 2 person households to provide a cleaner test of my theory.

[2] Of the 600 respondents at Time 1, 599 were invited to participate after N=1 failed an attention check at Time 1. 560 completed Time 2 within the 1 week allotted. N=9 respondents were removed for failed attention checks at time 2. N=32 were removed due to reporting living in a household larger than 2 (i.e., who slipped through the prescreen). This resulted in my final sample of 519 respondents.

[3] http://dx.doi.org/10.17632/h38jyfc3kt.1

3.2.2 ONTOLOGICAL INSECURITY

Ontological insecurity was assessed using the "implosion" subscale of the ontological security measure (Marlowe, Nicholson Perry, & Lee, 2020). The 10-item scale (e.g., "I find the world to be overwhelming"; "At times, I feel persecuted by reality"; "Sometimes I am afraid that the world may cause me to lose control of my life" ; Cronbach's alpha = .93) was assessed on a 1 (not at all) to 5 (completely) scale, in line with previous research (Marlowe et al., 2020).

3.2.3 OVER-CONSUMPTION

Over-consumption behavior was assessed using a 4-item scale (Cronbach's alpha=.85) anchored from 1 (not at all) to 6 (extremely). Respondents were asked the importance they placed on each of the following: Having a full pantry; Having a full fridge; Having lots of food on hand; Having a choice of food(s) for yourself. Scales were developed based on the self-regulatory model of scarcity presented by Cannon et al. (2019).

3.2.4 FOOD WASTE BEHAVIOR

Food waste behavior was assessed using a detailed and validated food waste inventory (van Herpen et al., 2019). Respondents indicated which of a set of 24 food categories (e.g., fresh vegetables and salad; fresh fruit; pasta; meat; fish; bread; etc.) they had disposed of in the previous week. For each food type, a unit of measurement was provided to respondents as they assessed their discarded food in each category. For example, fresh fruit was assessed in pieces (i.e., approximately ¼ of a piece of fruit, approximately ½ of a piece of fruit, approximately 1 piece of fruit, 2 to 4 pieces of fruit, and more than 4 pieces of fruit), whereas pasta was assessed by serving spoon (i.e., less than 1 serving spoon; 1 to 2 serving spoons; 3 to 4 serving spoons; 5 to 6 serving spoons; more than 6 serving spoons). Waste was then converted to grams as a common unit, using the estimated grams computed by van Herpen et al. (2019) for each unit. The total grams across

all 24 food categories were then summed to create a "total food waste" metric and utilized as my dependent measure. The complete measure and instructions can be found in van Herpen et al., (2019).

3.3 DEMOGRAPHICS

Respondent age (in years), household size, and gender were collected.

3.4 PROCEDURE

A two-stage study was used to temporally separate predictor and criterion measurement (MacKenzie & Podsakoff, 2012) by one week to reduce the likelihood of common method variance inflating the observed relationships, as measuring them at the same time increases the risk of artifactual covariance that can bias results (Podsakoff et al. 2003). At Time 1, predictor and mediator measures financial hardship, ontological insecurity, over-consumption, and demographic measures were assessed. One week later, respondents were invited to complete a measure on all food disposal (i.e., waste) they had engaged in during the prior week. Respondents were then debriefed and thanked.

3.5 VALIDITY CHECKS

Validity checks were conducted utilizing R Studio [version 1.4.1106 with R version 4.0.4 (2021-02-15)] to evaluate the measurement of financial hardship, ontological security, and over-consumption. Confirmatory factor analysis (CFA) using maximum likelihood estimation obtained adequate fit for the measurement model ($\chi^2(167) = 591.5$, $p < .0001$, CFI = .922, TLI = .912, RMSEA = .071% CI [.065 to .077]). Further details are presented in appendix 2.

3.6 STATISTICAL ANALYSIS

The data were analyzed using SPSS version 26 and the PROCESS version 3.5 macro model 6 to evaluate my theorized model (5000 bootstrap replications) (Hayes, 2018). Confidence

intervals are reported at 95%. The model was specified with economic hardship (X) predicting total food waste (Y) with ontological insecurity (M1) and over-consumption (M2) as serial mediators. No outliers were detected using either the standard deviation (i.e., 3 SD from the mean, Bain & Engelhardt, 1992) or the Mahalanobis distance method (Leys, Klein, Dominicy, & Ley, 2018).

CHAPTER 4: RESULTS

Descriptive statistics, zero-order correlations, and regression coefficients for hypothesis tests are presented in appendix 1. I first evaluated the direct effect of economic hardship on food waste behavior, finding a significant negative effect (effect = -87.15, t = -2.69, p = .007, CI: -150.82 to -23.48). Thus, support was found for H1a that economic hardship is associated with lower food waste. I next evaluated the indirect effect of economic hardship on food waste behavior through ontological insecurity and over-consumption, finding a significant positive indirect effect (effect = 1.61, SE = 1.11, CI: .0131 to 4.239). As theorized, there was a significant positive relationship between economic hardship and ontological insecurity (b = .211, t = 4.90, p < .0001, CI: .108 to .252), a significant positive relationship between ontological insecurity and over-consumption (b = .089, t = 2.02, p = .044, CI: .003 to .195), and a significant positive relationship between over-consumption and food waste (b = .122, t = 2.8, p = .005, CI: 27.95 to 159.38). Thus, H2 was also supported. Notably, the indirect effect was significant while the direct effect also remained significant, indicating partial mediation was occurring.

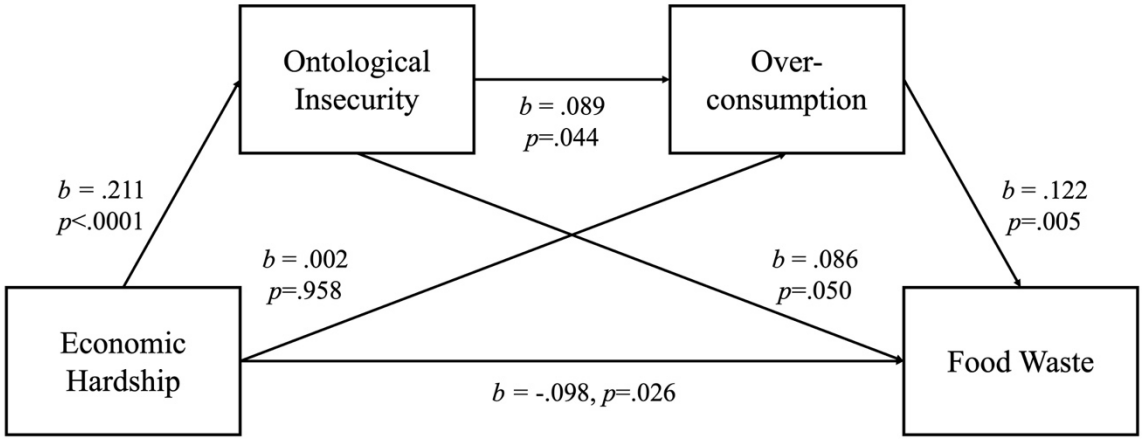

Figure 2: Path Model

CHAPTER 5: DISCUSSION

The present research provides a preliminary test of the complex relationship between negative financial events and consumer food waste behavior. In particular, I find that there is a negative direct effect of economic hardship predicting decreased food waste. There is, however, also a positive indirect effect through ontological insecurity and over-consumption, partially mediating the direct effect. Notably, the magnitude of the indirect effect, while significant, was small compared to that of the direct effect. This preliminary work synthesizes theory on the relationship between socioeconomic status and food waste (e.g., Porpino, 2015) and psychological scarcity and consumer behavior (Cannon et al., 2019; Hamilton et al., 2019), finding support for both perspectives. Importantly, it suggests that the psychological factors influencing food disposal and waste may be a complex landscape ripe for further exploration.

My findings present both theoretical and practical implications. Theoretically, My work suggests that marketplace forces negatively impacting the financial situation of consumers can lessen food waste overall. However, when it does leave consumers feeling out of control and overwhelmed (i.e., ontologically insecure), consumers in turn may seek to regain feelings of control by stocking their pantry, maintaining a full fridge, and generally having a lot of food on hand as a means of coping with this ontological insecurity. Notably, this over-consumption in turn predicts heightened food waste. This addresses the recent call for consumer researchers to examine how marketplace threats like the COVID-19 pandemic shape consumption behavior (Campbell et al., 2020). Future research should continue to explore the psychological factors shaping food disposal behaviors such as food waste, including the myriad ways that psychological scarcity or ontological security may influence such behaviors.

Practically, my work creates opportunities for social marketers and policy-makers to shape food waste behavior. For example, interventions that enable consumers to feel more ontologically *secure* could ameliorate the need to over-consume, which may in turn attenuate food waste. Further, marketing campaigns targeting consumers as they select their food (e.g., by placing ads in grocery shopping apps), to reduce the incidence of over-purchasing or redundant purchases could similarly attenuate food waste behavior. Finally, targeting individuals or areas experiencing negative financial events, either through digital or traditional media, could provide opportunities for targeted interventions. Certainly, consumers experiencing economic hardship may not be best served to spend their increasingly scarce resources on food that they are ultimately more likely to waste. Future research should empirically test these possibilities.

CHAPTER 6: STRENGTHS AND LIMITATIONS

A major strength of the current study is its utilization of a detailed methodology for food waste measurement. Food waste, despite its importance, has presented a predicament for researchers seeking to capture this complex set of disposal behaviors because of how varied food choices and practices are across households (van Herpen et al., 2019).

While my sampling procedure is prevalent in consumer research, and yielded a large international sample, some concerns have been raised about data quality from this source (Smith, Roster, et al., 2016; Aguinis et al., 2020). Peer-reviewed research has found Prolific Academic's recruitment procedures to be suitable to social science research (Palan & Schitter, 2018), and respondents on Prolific Academic have been found to be more appropriate for academic research than other platforms (e.g., MTurk; Peer, Brandimarte, Samat, & Acquisti, 2017). This study temporally separated predictor from criterion measurement to reduce the influence of common method bias (MacKenzie & Podsakoff, 2012) and utilized a bot check and attention checks at both Time 1 and Time 2 to reduce influence of respondent inattention. Nonetheless, sampling concerns and common method variance remain possible limitations of the current research.

CHAPTER 7: CONCLUSION

Financial hardships are rampant in the marketplace such that most consumers will experience it in their lifetimes (Verick, 2009). Many will experience it during an economic downturn such as the recent COVID-19 pandemic. I find a negative direct relationship between economic hardship and food waste, and I find that this experience of economic hardship prompts ontological insecurity, which leads consumers to over-consume and in turn waste more food – partially mediating the direct effect. This preliminary work opens the door to future work exploring a potentially rich avenue of research on the implications of adverse economic events on consumer food choice, consumption, and disposal.

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APPENDIX 1: TABLES

Table 1

Descriptive Statistics and Intercorrelations

	Items	Alpha	Mean	SD	Skewness	Kurtosis		Economic Hardship	Ontological Insecurity	Over-consumption
Economic Hardship	5	0.827	4.09	1.08	0.075	0.29	Pearson Correlation			
							Sig. (2-tailed)			
							N			
Ontological Insecurity	10	0.932	2.01	0.924	0.9	0.057	Pearson Correlation	.211**		
							Sig. (2-tailed)	<.001		
							N	519		
Over-consumption	4	0.853	4.15	1.033	-0.359	-0.196	Pearson Correlation	.002	.089*	
							Sig. (2-tailed)	.958	.044	
							N	519	519	

Food Waste	24	-	641.02	791.89	2.67	9.67	Pearson Correlation	-.098*	.086	.122**
							Sig. (2-tailed)	.026	.05	.005
							N	519	519	519

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 2

Regression Coefficients for Hypothesis Tests

Regression coefficients (standard errors) analyses (N = 519)						
	Coefficient	SE	t	*p*	LLCI	ULCI
Mediator variable model (DV = Ontological Insecurity)						
Constant	1.28	.15	8.23	<.0001	.9714	1.581
Economic hardship	.18	.04	4.90	<.0001	.1078	.2520
	Coefficient	SE	t	*p*	LLCI	ULCI
Mediator variable model (DV = Over-consumption)						
Constant	4.005	.19	21.3	<.0001	3.636	4.375
Economic hardship	-.02	.04	-.38	.703	-.1004	.0678
Ontological insecurity	.103	.05	2.05	.040	.0045	.2016
	Coefficient	SE	t	*p*	LLCI	ULCI
Dependent variable model (DV = Total Food Waste)						
Constant	462.15	195.13	2.37	.018	78.80	845.49
Economic hardship	-87.15	32.40	-2.69	.0074	-150.82	-23.48
Ontological insecurity	86.57	38.11	2.27	.0235	11.7	161.44
Over-consumption	87.02	33.32	2.61	.0093	21.57	152.49
Direct Effect of X on Y: effect = -87.15, SE = 32.41, *t* = -2.69, *p* = .0074						
Indirect Effect of X on Y (serial): effect = 1.61, SE = 1.11, CI: 0.131 to 4.239						
Total Effect Model: effect = 15.77, SE = 9.76. CI: -1.938 to 36.299						

APPENDIX 2: METHODOLOGICAL DETAIL

Introduction and Theorizing

Expanded Rationale

In this research, two different theories have been tested using a theoretical model of scarcity known as the self-regulatory model which explains how consumers respond to scarcity (Cannon et al., 2019). According to this model, people compare their obtained goals with favorable or standard goals, and if they find any discrepancy between them, they adjust their behavior to reach the desired goals and the standard level (Cannon et al., 2019; Carver & Scheier, 1990).

Consumers respond to resource scarcity through two routes, scarcity-reduction, and control-restoration. In the scarcity-reduction route, consumers are stimulated to eliminate the discrepancy by consuming and obtaining scarce resources. In this route, they establish a causal link between their previous experience of facing resource scarcity and their behavior to reduce differences (Cannon et al., 2019). In other words, when people are restricted from engaging in a specific behavior or consuming a product, their response to this restriction increases the attractiveness of that behavior or product, which can lead to an increase in doing that behavior or consuming that product (Fitzsimons, Kerckhove, & Lunardo, 2020).

In contrast, in the control-restoration route, consumers realize that their personal control over resources has diminished (Cannon et al., 2019). Scarcity narrows consumers' psychological freedom, which is an ability to select outcomes (Brehm, 1966) and also causes insecurity that can lead to loss of personal control (Chou, Parmar, & Galinsky, 2016). Indeed they perceive resource scarcity as a psychological threat to their personal control and security (Cannon et al., 2019).

In the first theorizing, I examined the impact of economic hardship on consumers' food-related behavior by considering control restoration strategy. It is discovered that economic hardship has a negative and significant impact on consumer food waste behavior, where economic hardship leads consumers to waste less food. I also find that economic hardship positively predicts ontological insecurity, the aversive feeling of being overwhelmed and out of control, which in turn positively predicts over-consumption and in turn higher food waste. Indeed, when a threat disrupts consumers' routines and behaviors, their ontological security can be affected. Ontological security is a concept to describe the level to which consumers believe their environment and their behavior within it is stable, secure, and reliable (Campbell et al., 2020). In this way, Consumers try to regain their control and security by engaging in consumption behaviors that leads to over-consumption (Cannon et al., 2019) and, in turn, heighten food waste.

In the second theorizing, I examined the effect of economic hardship on food waste, which I proposed will be moderated by childhood scarcity (vs. non-scarcity) experiences. Specifically, I predicted that consumers currently experiencing financial scarcity such as due to a recent job loss or pandemic-related scarcity (vs. consumers not recently experiencing financial scarcity) will be more likely to undertake a scarcity-reduction route (vs. control restoration route) when they did not experience scarcity in their childhood (vs. did experience scarcity in their childhood). That is, that childhood experience of scarcity will moderate the effect of economic hardship on scarcity reduction strategy and in turn food waste behavior, via restoration strategy.

I suggested that this is because, under the condition of low experience of scarcity during childhood (high mutability), consumers will recognize that by employing a reasonable amount of effort they can alleviate the discrepancy between resources and allocate their effort toward prioritizing, planning, obtaining, or consuming the scarce resources (e.g., "stocking up" on food and pantry items) which, in turn should increase food waste. In contrast, in higher childhood experience of scarcity condition (low mutability), participants are more likely to pursue control-restoration because they believe they cannot overcome the scarcity by investing their effort, being more inclined to purchase small amounts of food as needed (Gustavsson et al., 2011), and also seeking to eliminate threat to the self, in turn resulting in less food waste.

Method

Attention Checks

Respondents were asked to complete one bot check and two attention checks. The bot check included a captcha that was presented following the consent form but before respondents completed any of the measures to ensure that responses were received from humans rather than bots, which can occur with online samples. Each attention check was a bit different. The first, embedded within the mutability measure, asked participants to select a specific point on the scale (i.e., "Select 3 for this item"), resulting in clearly wrong (and one right) answers. The second, presented on its own page, asked respondents to "Please write the fifth word in this sentence exactly as written," wherein the correct answer was "word" ("Word" capitalized was also accepted as correct). Both attention checks were derived from prior practice (Huang, Curran, Keeney, Poposki, & DeShon, 2012; Meade & Craig, 2012; Ward & Pond III, 2015), and all failed attention check were removed from the dataset before any analysis was conducted (see below for further detail on exclusions).

Inclusion/Exclusion of Participants

Initially, 1 of my 600 respondents was rejected for failing at least one attention check at time 1, giving me a total of 599 eligible participants. 560 participants completed time 2 within the 1 week allotted. In this time, 9 participants who failed an attention check and 32 participants who indicated a household size above my target (i.e., 2 or less) were removed. This resulted in a final sample of 519 respondents.

Bootstrapping

I used a bootstrapping analysis approach, with 5000 replications. Bootstrapping analysis has been shown to perform better than other regression-based approaches (Taylor, MacKinnon, & Tein, 2008), in part because it does not require a normality assumption (Hayes, 2018).

Harman's Single Factor Test for Common Method Variance

I conducted a Harman's single factor test using all items from all measures in a Principal Components Analysis and forcing a single factor to be extracted. The analysis found 29.30% of the variance was explained by the single factor solution, falling far short of the 50% threshold indicative of common method variance concerns (Harman, 1960). Thus, while the Harmon's single factor test also has its limitations (Aguirre-Urreta & Hu, 2019) this analysis presents some evidence that common method variance has not substantially influenced my results.

Confirmatory Factor Analysis

I performed confirmatory factor analyses for the economic hardship, ontological insecurity, and over-consumption scales to assess the validity of them. Confirmatory factor analysis (CFA) using maximum likelihood estimation obtained adequate fit for the measurement model ($\chi 2(167) = 591.5$, $p < .0001$, CFI = .922, TLI = .912, RMSEA = .071% CI [.065 to .077]). More information is provided in table 3.

Table 3

Confirmatory Factor Analysis

Number of observations:			
Used	Total	-	
505	519	-	
Model Test User Model:			
Test statistic	Degrees of freedom	P-value (Chi-square)	
591.520	167	0.000	
Model Test Baseline Model:			
Test statistic	Degrees of freedom	P-value (Chi-square)	
5648.874	190	0.000	
User Model versus Baseline Model:			
Comparative Fit Index (CFI)	Tucker-Lewis Index (TLI)	-	
0.922	0.912	-	
Loglikelihood and Information Criteria:			
Loglikelihood user model (H0)	Loglikelihood unrestricted model (H1)	-	
-14016.239	NA	-	
Akaike (AIC)	Bayesian (BIC)	Sample-size adjusted Bayesian (BIC)	
28118.477	28300.133	28163.647	
Root Mean Square Error of Approximation:			
RMSEA	90 Percent confidence interval - lower	90 Percent confidence interval - upper	P-value RMSEA
0.071	0.065	0.077	<= 0.05
Standardized Root Mean Square Residual:			
SRMR	-	-	-
0.055	-	-	-

Results

Alternative Measurement Models

Another way for analyzing the data is to examine the effect of economic hardship on food waste which can be moderated by childhood scarcity (vs. non-scarcity) experiences. To do that, I conducted a study in two parts. In part 1 of the study, economic hardship (X), childhood experience of scarcity (W), and scarcity-reduction (M1) and control-restoration (M2) behaviors were assessed and in the second part food waste behavior was measured.

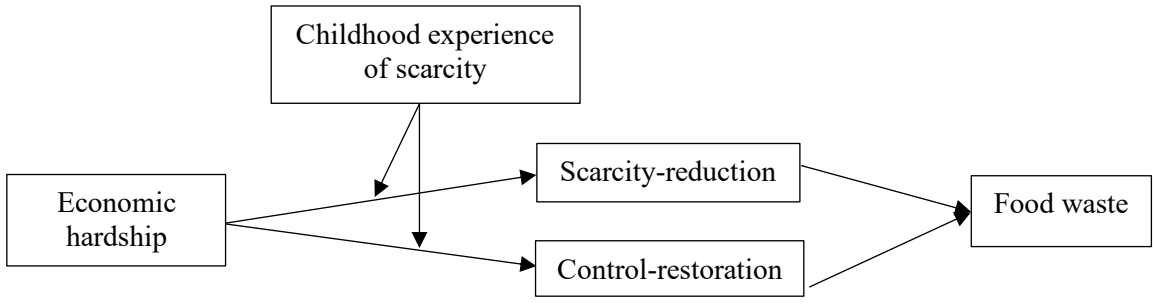

Figure 3: Previous Conceptual Model

Measures

All items in the predictor and mediator measures are presented in the tables below.

Table 4

Economic Hardship Items

Economic Hardship			
Reference	Number of Items	Scale	Cronbach's alpha
Sharma & Alter, 2012	5	1= Much Better 7= Much Worse	.83
Please indicate how well each statement describes your situation. 1 means your situation is Much Better and 7 means your situation is Much Worse. 1- Compared to my financial position last year, my financial position this year is: 2- In comparison to most of my peers, I am financially: 3- Compared to my material possessions last year, my material possessions this year are generally: 4- In comparison to most of my peers' material possessions, my material possessions are: 5- In comparison to last year, my ability to spend money freely is:			

Table 5

Childhood Experience of Scarcity Items

Childhood Experience of Scarcity			
Reference	Number of Items	Scale	Cronbach's alpha
Griskevicius et al. (2013) Simpson et al. (working paper)	7	1= Strongly Disagree 7= Strongly Agree	.898
Please rate the extent to which you agree or disagree with each statement, with 1 meaning you Strongly Disagree and 7 meaning you Strongly Agree. 1- My family usually had enough money for things when I was growing up. 2- I grew up in a relatively wealthy neighborhood. 3- I felt relatively wealthy compared to the other kids in my school. 4- As a child, I often had the sense that my family did not have "enough". 5- As a child, there were things I wanted to have or do that my family did not have the means to pay for. 6- As a child, I always felt like I had what I needed. 7- As a child, I felt worried about my family's financial situation.			

Table 6

Mutability Items

Mutability			
Reference	Number of Items	Scale	Cronbach's alpha
Simpson et al. (working paper)	4	1= Strongly Disagree 7= Strongly Agree	.79
Thinking about the resources you currently have in your life, to what extent do you agree with the below statements. With 1 meaning you Strongly Disagree and 7 meaning you Strongly Agree. 1- With a reasonable amount of effort, I can obtain more resources. 2- The ability to obtain more resources is out of my control. 3- Obtaining enough resources at this time will be difficult. 4- I can get the resources I need by putting in effort.			

Table 7

Ontological Insecurity Items

Ontological Insecurity			
Reference	Number of Items	Scale	Cronbach's alpha
Marlowe, Nicholson Perry, & Lee, 2020	10	1= Not at All 5= Completely	.93
Please select the option that best describes how each statement applies to you, with 1 meaning Not at All and 5 meaning Completely. 1- I find the world to be overwhelming. 2- I am sometimes afraid that my identity might be crushed by the strength of my own intense feelings. 3- If I am not careful, the world will swallow up my identity. 4- I find the world too dangerous and difficult for me to be myself. 5- I feel so empty that I am afraid reality might crash in and destroy my sense of who I am. 6- I must be very careful to keep reality at a distance. 7- At times, I feel persecuted by reality. 8- Sometimes I am afraid that the world may cause me to lose control of my life. 9- Sometimes I wonder if the world is going to collapse in on me. 10- Much of the time, I feel I am nothing.			

Table 8

Scarcity-Reduction Items

Scarcity-Reduction			
Reference	Number of Items	Scale	Cronbach's alpha
I made these items based on Cannon et al. (2019)	5	1= Not at All 6= Extremely	.84
Please indicate how important are each of the following to you, with 1 meaning Not at All and 6 meaning Extremely. 1- How is important for you to have a full pantry. 2- How is important for you to have a full fridge. 3- How is important for you to have lots of food on hand. 4- How is important for you to have a choice of food for yourself. 5- How is important for you to have a new food for yourself.			

Table 9

Control-Restoration Items

Control-Restoration			
Reference	Number of Items	Scale	Cronbach's alpha
I made these items based on Cannon et al. (2019)	2	1= Not at All 6= Extremely	.695
Please indicate how important are each of the following to you, with 1 meaning Not at All and 6 meaning Extremely. 1- When food is scarce, I will engage more in food categorizing. 2- When food is scarce, I will engage more in housekeeping.			

Table 10

Over-Consumption Items

Over-Consumption			
Reference	Number of Items	Scale	Cronbach's alpha
I made these items based on Cannon et al. (2019)	4	1= Not at All 6= Extremely	.85
Please indicate how important are each of the following to you, with 1 meaning Not at All and 6 meaning Extremely. 1- How is important for you to have a full pantry. 2- How is important for you to have a full fridge. 3- How is important for you to have lots of food on hand. 4- How is important for you to have a choice of food for yourself.			

Food Waste

Food waste behavior was assessed using a detailed and validated food waste inventory (van Herpen et al., 2019). Respondents indicated which of a set of 24 food categories (e.g., fresh vegetables and salad; fresh fruit; pasta; meat; fish; bread; etc.) they had disposed of in the previous week. For each food type, a unit of measurement was provided to respondents as they assessed their discarded food in each category. For example, fresh fruit was assessed in pieces (i.e., approximately 1⁄4 of a piece of fruit, approximately 1⁄2 of a piece of fruit, approximately 1 piece of fruit, 2 to 4 pieces of fruit, and more than 4 pieces of fruit), whereas pasta was assessed by serving spoon (i.e., less than 1 serving spoon; 1 to 2 serving spoons; 3 to 4 serving spoons; 5 to 6 serving spoons; more than 6 serving spoons). Waste was then converted to grams as a common unit, using the estimated grams computed by van Herpen et al. (2019) for each unit. The total grams across all 24 food categories were then summed to create a "total food waste" metric and utilized as my dependent measure.

Analysis

For analysing data I used SPSS version 26 and the Process version 3.5 macro model 7 (5000 bootstrap replications) (Hayes, 2018). According to the result, the theorized model was not significant. Although the moderated mediation is significant, I found no significant indirect effect, which means mediators are not mediating the relationship between economic hardship and food waste. The tables below show the results.

Table 11

Model Summary

R	R-sq	MSE	F	Df1	Df2	p
.2186	.0478	600605.044	8.6140	3.0000	515.0000	.0000
	Coeff	se	t	p	LLCI	ULCI
Constant	294.6958	201.6178	1.4617	.1444	-101.3988	690.7904
Economic hardship	-70.0918	31.4562	-2.2282	.0263	-131.8900	-8.2936
Scarcity-reduction	93.9271	34.9748	2.6856	.0075	25.2163	162.6380
Control-restoration	87.6327	27.4530	3.1921	.0015	33.6991	141.5662
Direct effect of X on Y						
Effect	se	t	p	LLCI	ULCI	
-70.0918	31.4562	-2.2282	.0263	-131.8900	-8.2936	

Table 12

Indirect effect of economic hardship on food waste through scarcity-reduction

Economic hardship - > Scarcity-reduction - > Food waste				
Mutability	Effect	BootSE	BootLLCI	BootULCI
3.7500	.1032	6.1502	-13.1881	12.2969
4.7500	.5749	4.9373	-9.8119	10.0320
6.0000	1.1645	6.6914	-12.9762	13.9102
Index of moderated mediation				
	Index	BootSE	BootLLCI	BootULCI
Mutability	.4717	3.6372	-6.8953	7.8146

Table 13

Indirect effect of economic hardship on food waste through control-restoration

Economic hardship - > Control-restoration - > Food waste				
Mutability	Effect	BootSE	BootLLCI	BootULCI
3.7500	2.3965	6.1246	-9.5087	15.4065
4.7500	-4.8360	6.2836	-19.0812	6.0029
6.0000	-13.8767	10.5101	-40.2838	1.2813
Index of moderated mediation				
	Index	BootSE	BootLLCI	BootULCI
Mutability	-7.2325	4.9356	-19.2722	-.0504

Discussion

Strengths and Weaknesses

One of the strengths of this research is using a valid and accurate questionnaire for measuring food waste (van Herpen et al., 2019). In this questionnaire, various categories of food (24 categories) have been considered, and two types of questions have been asked for each category. The first question measured the amount of food waste. The unit of measurement for each category was equivalent to the type of food, such as liter, slice, and spoon. Ultimately, all units were recalculated to grams as a standard and common unit of measurement. The second question examined the stage in which waste occurs, such as storing, preparing, consuming, and leftover. Therefore, in this questionnaire, three essential features are examined: the type and amount of wasted food and the stage of food waste. Gathering this information gave me a better and more accurate understanding of food waste behavior.

One of the weaknesses of this study is the lack of use of a pre-announcement. van Herpen et al. (2019) believe a pre-announcement can increase participants' awareness of food waste and provide more accurate information, especially if a specific and short period of time (e.g., the past week) is considered. I did not use this pre-announcement because my research sought to investigate the relationship between economic hardship and food waste. Therefore, respondents may not be sufficiently aware of the amount of their food waste, and their answers may not be very accurate. However, by not pre-announcing the study, it also prevents the respondents from changing their behavior, which is also a strength.

Contribution

To the best of my knowledge, very little is known about the psychological antecedents of household food waste. In this research, I tried to provide evidence about the relationship between economic hardship and food waste behavior, where many believe that financial restrictions may reduce food waste. I find that there is a direct effect of economic hardship predicting decreased food waste. There is, however, also a positive indirect effect through ontological insecurity and over-consumption, partially mediating the direct effect. In this study I used the ontological insecurity concept, which is a new concept in the food waste and scarcity context, and I tested my model by considering ontological insecurity as a mediator.

Moreover, this study is one of the first tests of the self-regulatory model of scarcity (Cannon et al., 2019) in its entirely and it will contribute to the literature of both food waste behavior and scarcity.

Future Research

In this study, I considered situational scarcity and examined its effect on food waste. One area for future research can be considering the impact of chronic scarcity on food waste, that consumers may develop skills toward routines and practices related to food such as buying, preparing, and consuming.

Another area for future research can be considering compensatory consumption. It can be interesting to examine how ontological insecurity can encourage compensatory consumption and what effect can have on food waste.

Many people are facing financial difficulties and as a result, insecurity. According to my research, ontological insecurity contributes to more food waste. In order to reduce food waste, future research should investigate how people can feel secure while they are experiencing scarcity and economic hardship.