Religious shoppers spend less money☆

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ABSTRACT

Although religion is a central aspect of life for many people across the globe, there is scant research on how religion affects people's non-religious routines. In the present research, we identify a frequent consumption activity that is influenced by religiosity: grocery shopping. Using both field and laboratory data, we find that grocery spending decreases with religiosity. Specifically, we document that people who live in more religious U.S. counties spend less money on groceries and make fewer unplanned purchases. We also demonstrate this negative relationship by measuring religiosity at the individual level and employing a religious prime. That is, the more religious people are, the less willing they are to follow through on novel purchase opportunities that arise during their grocery shopping trips. This effect is consistent with the account that many religions emphasize the value of being prudent with money. Additional analysis supports our predicted indirect effect of religiosity on spending through frugality.

1. Introduction

Three out of every four people in the United States are affiliated with a religion, according to a 2014 Pew Research Center study (http://www.pewforum.org/religious-landscape-study). Even for the non-religious, religion is a prevalent social force, influencing realms of life ranging from politics and economics to education and art (e.g., Iannaccone, 1998). Despite being a widespread part of American society, limited research has been conducted on how religion affects people's routine, non-religious activities. In the present research, we examine whether religiosity affects the amount of money people spend on their grocery purchases, a major and frequent consumption activity. For the purpose of our study, we define religion broadly as "a belief in God accompanied by a commitment to follow principles believed to be set forth by God" (McDaniel & Burnett, 1990; p. 103).

We are surrounded by religious symbols and cues that remind us of religious values, which can potentially guide our and others' actions. Research has shown that because people tend to anticipate protection from God, reminders of God increase risk taking in domains with no moral implications (Chan, Tong, & Tan, 2014; Kupor, Laurin, & Levav, 2015). Prior studies have also found a link between religiosity and virtuous behavior (e.g., Geyer & Baumeister, 2005; Vitell, 2009; Vitell, Paolillo, & Singh, 2005). For example, reminders of religion (e.g., recalling the Ten Commandments) have been shown to reduce unethical behavior (Mazar, Amir, & Ariely, 2008) and enhance social fairness (Shariff & Norenzayan, 2007). Others have found that when exposed to religious themes, people endure unpleasant or impossible tasks for a longer period of time (Rounding, Lee, Jacobson, & Ji, 2012).

More relevant to the current topic, research has found that people with stronger religious beliefs exhibit less brand reliance (Shachar, Erdem, Cutright, & Fitzsimons, 2011) and are less likely to engage in conspicuous consumption (Stillman, Fincham, Vohs, Lambert, & Phillips, 2012) than those with weaker or no religious beliefs. In addition, being exposed to brands has been shown to reduce one's commitment to religion (Cutright, Erdem, Fitzsimons, & Shachar, 2014). There is also some evidence that religiosity hinders the diffusion of new products (Chandrasekaran & Tellis, 2008). These findings are consistent with the notion that religious thoughts lead to distancing oneself from materialism and unjustified spending. Many religions discourage overspending, which is believed to impede spiritual growth (Lastovicka, Bettencourt, Hughner, & Kuntze, 1999). Conversely, frugality is commonly viewed as virtuous across different religions (e.g., Westacott, 2016).

More generally, religious people have value systems that differ from

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those of less or non- religious people (Minton & Kahle, 2013; Minton & Kahle, 2017), and they follow religious principles and values in their daily life. For example, highly religious people tend to impose greater discipline on their consumption (Mathras, Cohen, Mandel, & Mick, 2016; McCullough & Willoughby, 2009; Zell & Baumeister, 2013). They generally have more traditional views and tend to be more conservative than less religious people (Malka, Soto, Cohen, & Miller, 2011; Saroglou, Delpierre, & Dernelle, 2004). In fact, religiosity has been used as a proxy for conservatism in prior research examining whether consumers' preferences for established, national brands versus generic, store brands depend on their conservative ideology (Khan, Misra, & Singh, 2013).

Building on this body of research, we argue that a higher degree of religiosity (either at the individual or community level) is associated with frugal shopping behavior, such that those high in religiosity spend less money on their purchases and make fewer unplanned purchases. We also suggest that, more generally, religiosity affects people's spending behavior such that even being reminded of God makes people less likely to spend money. We argue that this occurs due to the emphasis on frugality common to many religions. This belief, which can be made salient not only by a religion's tenets but more generally by religious priming, translates into real consumption behavior.

While religiosity has been shown to be associated with consumers' brand preferences (Khan et al., 2013; Shachar et al., 2011), the direct link between religiosity and consumer spending as well as the role of frugality in this relationship have not been explored in previous research. Focusing on selected supermarket items categories (e.g., soda, soup, diapers), Khan et al. (2013) document that the relative market share of national versus generic brands is higher in more religious U.S. counties. They attribute this finding to the notion that religious consumers, who are conservative, tend to prefer national brands, which are perceived to be less risky than generic brands. Unlike Khan et al. (2013), we built our theory around the concept of frugality and examine shoppers' total spending on all categories of grocery items including unplanned purchases, which account for 55% of total grocery purchases of the average shopper in the U.S. and thus have a significant impact on shoppers' pocketbook (POPAI, 2012). Our focus on the amount of grocery spending complements and extends their brand preference analysis.

1.1. The present research

We test our main hypotheses in five studies using both field and lab data. Study 1 tests the association between religiosity and grocery spending by utilizing county-level data obtained from the U.S. Census Bureau. The use of county-level rather than state-level data increases the variation in both dependent and independent variables.[1] It also increases the sample size and thus, the power of our tests. The county-level religiosity measure contains two pieces of information related to our research. First, it is a coarse proxy for individual-level religiosity (e.g., people who reside in Jefferson County, AL are, on average, more religious than those who reside in Pasco County, FL). Second, it captures the extent to which people living in a particular region are being exposed to religious cues and reminders (e.g., churches, temples, the Christian cross, Hanukkah candles, Christmas trees, religious banners and slogans, etc.). Hence, the county-level religiosity is a suitable measure for our tests using secondary datasets.

Study 2 combines county-level religiosity data with individual-level shopping data and examines whether people who live in more religious counties spend less money on their grocery purchases and make fewer

unplanned purchases. Study 3 presents more direct and robust evidence for the link between religiosity and reduced spending by measuring religiosity at the individual level and employing an experimental shopping task. These correlational studies control for conservatism and demonstrate the role of religiosity in grocery shopping above and beyond shoppers' conservative ideology, which is actually positively correlated with grocery spending. Study 4 provides evidence of the causal relation between religion and spending using a laboratory experiment in which participants are primed with religiosity or not, and their spending is then assessed in a subsequent task. Finally, Study 5 provides evidence of the underlying mechanism by documenting the indirect effect of religion on spending through frugality. We report all measures, manipulations, and exclusions in the main text. We did not extend the sample size in any of the studies after initial analysis.

2. Study 1: religiosity and spending on groceries at the county level

2.1. Method

2.1.1. Data

Every five years, the U.S. Census Bureau surveys businesses around the country as a part of the Economic Census and releases information on industry revenues and other relevant metrics, broken down to the county level. In its most recent Economic Census in 2012, the Bureau surveyed nearly four million business establishments, which were required by law to respond to the survey. We collected the aggregated survey data from the U.S. Census Bureau database. We also gathered data on each county's population, median income, median age, gender distribution, race distribution, and education level from the U.S. Census Bureau database.

We obtained county-level data on religiosity from the Association of Religion Data Archives (ARDA), which conducted its most recent survey in 2010. Over 230 religious groups reporting more than 150 million adherents participated in the survey. Finally, to create a measure of conservatism based on Republican voting, we downloaded the county-level U.S. Presidential election results from the following link: https://github.com/helloworlddata/us-presidential-election-county-results. While our main tests use the election results for 2012, using the average of the election results in 2004, 2008, and 2012 yields similar results.

2.1.2. Measures

The data on grocery stores sales are available for 1638 counties. Our dependent variable is grocery store sales per store in a particular county. Our key independent variable is the number of religious adherents (per 1000 population) reported for a county.[2] We apply log transformation to both variables to reduce skewness as well as to facilitate the interpretation of results (Wooldridge, 2006).[3] We use the proportion of Republican votes in a county as a proxy for conservatism.

We control for several other county characteristics in the regression model: the log of population, the log of median income, the log of median age, the log of the proportion of female residents, the log of the proportion of white residents, and the log of the proportion of college graduate residents. Previous research has shown that grocery shopping patterns and spending change depending on shoppers' demographic characteristics (e.g., Aguiar & Hurst, 2007; Chandon, Hutchinson, Bradlow, & Young, 2009; Kim & Park, 1997). We log-transformed the control variables as well to facilitate the interpretation of estimated coefficients.

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[1] For instance, while religious adherence rate is greater than 70% in 15 counties of Texas, there are five counties in the state with less than 40% adherence rate. Thus, using the 56% state-wide adherence rate underestimates the level of religiosity in certain regions of Texas and overestimates it in other regions.

[2] For five counties in our sample, the number of religious adherents (per 1000 population) was reported to be greater than 1000. We set these values equal to 1000. Excluding these observations from the sample does not change the results.

[3] Pre- and post-transformation histograms for the transformed dependent variables are presented in Online appendix A. We note that, throughout the paper, log transformation refers to taking the natural log of a particular variable. If the range of a variable includes 0, we add 1 to the variable before applying log transformation.

2.2. Results

2.2.1. Exclusions

We excluded 17 Alaska counties that were not included in the Presidential election dataset and one South Dakota county with missing population data, yielding a final sample of 1620 observations. We note that there are 31 counties in the sample that had a population less than 5000. The results remain unchanged if we exclude those counties from the sample. There are also 15 counties for which the log of grocery store sales per store is less than three standard deviations below the mean (i.e., 13.59). Winsorizing these values at the three standard deviations below the mean (i.e., setting them equal to 13.59) or dropping them from the sample does not alter our conclusions.

2.2.2. County-level religiosity and county-level grocery spending

The average annual grocery store sales per store is $5,684,266 and the average number of reported religious adherents (per 1000 population) is 493.5 (for summary statistics, see Table A1 in Online appendix A).

Table 1 reports the OLS regression results with robust standard errors. Column A presents the simple regression model (adjusted R-squared = 1.5%). Column B shows the multiple regression model, which explains a larger percentage of the variation in grocery store sales per store across counties (adjusted R-squared = 40.5%, the joint F-test on the control variables = 135.3, $p < .01$). Thus, we discuss the results obtained from the model with the full set of covariates and follow the same approach throughout the paper.

Consistent with our thesis, the results reveal a negative relationship between religiosity and grocery store sales ($\beta = -0.119$, SE = 0.044, 95% CI = $[-0.205, -0.033]$, $t(1611) = -2.73$, $p < .01$; column B). The results also show that conservatism as measured by the proportion of Republican votes in the county is positively associated with grocery store sales ($\beta = 0.223$, SE = 0.059, 95% CI = $[0.107, 0.339]$, $t(1611) = 3.77$, $p < .01$; column B). The estimated coefficient on religiosity suggests that a 20% increase in the number of religious adherents living in a county is associated with about a 2.2% decline in the

county's annual grocery store sales per store, a decline of about $125,000. Thus, the magnitude of the relation between religiosity and grocery spending is economically meaningful.

2.3. Discussion

Using county-level data, this study provides preliminary evidence of the link between religiosity and total spending by grocery shoppers. In the next study, we focus on grocery shopping behavior at the individual level. In particular, we examine the association between county-level religiosity and shoppers' total spending and unplanned purchases.

3. Study 2: shoppers in more religious counties spend less money on their purchases

3.1. Method

3.1.1. Participants

This study uses data obtained from grocery store shoppers who were surveyed by the in-store marketing trade group Point of Purchase Advertising International (POPAI). POPAI periodically conducts field studies to examine different aspects of grocery shopping behavior in the United States. It fielded its most recent survey during the period 2011–2012 at 35 stores across 10 states. POPAI provided us with the survey data for the present analysis. Shoppers were randomly intercepted by interviewers as they entered the store and asked to complete pre- and post-shopping surveys in exchange for a $25 store gift card. Two thousand four hundred and one shoppers completed the study (mean age = 48.4 years, mean income = $58,966, 74.9% female).

3.1.2. Measures

As a part of the pre-shopping survey, shoppers listed all the products they planned to purchase in the store. They also answered questions regarding their demographics and shopping trip (e.g., whether they had a shopping list). After completing their purchases, shoppers returned to the interviewer for a post-shopping survey. They answered additional questions related to their shopping trip (e.g., their payment method) and responded to a set of retailer-specific questions. The interviewer made a copy of each participant's receipt and recorded all the items purchased by the participant. Participants were also asked to provide their zip code for survey validation. We use this information to match each observation with the county-level religiosity data obtained from the ARDA.

We have two dependent variables: (1) total money spent during the trip and (2) the number of unplanned items purchased. We log-transform each variable to reduce skewness and facilitate the interpretation of results. As in Study 1, the independent variable of interest is the log of the number of religious adherents (per 1000 population) who live in the same county as the participant. Following previous research (e.g., Bell, Corsten, & Knox, 2011; Hui, Inman, Huang, & Suher, 2013; Inman, Winer, & Ferraro, 2009), we control for the following variables in our regression models: the log of the number of items purchased, the log of the number of weekly visits to the store, store familiarity measured on a five-point scale, a dummy for shoppers who use a shopping list, a dummy for coupon usage, a dummy for sale item purchase, a dummy for credit card payment, the log of shopper household income, the log of shopper age, household size, a dummy for shoppers accompanied by others, a dummy for female shoppers, a dummy for married shoppers, a dummy for white shoppers, and a dummy for shoppers with a college degree.

3.2. Results

3.2.1. Exclusions

We excluded 501 observations with missing or invalid zip codes because we could not match these observations with the religiosity

Table 1

Study 1: The relation between grocery sales per store in a county and county-level religiosity measure.

	Dependent variable = ln(grocery sales per store)	
	A.	B.
ln(# of religious adherents per 1000 population)	−0.232***	−0.119***
	(0.052)	(0.044)
ln(Proportion of Republican votes in the county)		0.223***
		(0.059)
ln(Population of the county)		0.196***
		(0.014)
ln(Median income of the county)		0.032*
		(0.078)
ln(Median age of the county)		−0.542***
		(0.111)
ln(Proportion of female residents in the county)		0.090**
		(0.406)
ln(Proportion of white residents in the county)		0.374***
		(0.074)
ln(Proportion of college graduate residents in the county)		0.365***
		(0.047)
Intercept	16.823***	16.495***
	(0.317)	(1.000)
Observations	1620	1620
R-squared	0.016	0.407

Standard errors are reported in parentheses.
* $p < .10$.
** $p < .05$.
*** $p < .01$.

data. We further excluded 197 participants who participated in a si-multaneous EEG eye-tracking study and put on special equipment that monitored their activity during the entire shopping trip. We also re-moved 20 participants who purchased only a single item or for whom we had no information on the number of items purchased. We also discarded 164 observations due to missing data on income or age. Finally, we dropped one observation for which the number of weekly grocery trips was recorded as 150. These exclusions yield a final sample with 1518 observations.

There are six observations for whom the log of total spending is less than three standard deviations below the mean (i.e., 1.62). Winsorizing these observations at the three standard deviations below the mean or excluding them from the sample does not change the results. The log of the number of unplanned items for all participants was within three standard deviations of the mean value (for summary statistics, see Table A2 in Online appendix A).

3.2.2. County-level religiosity and individual shopping behavior

The average participant spent $62.62 and bought 7.4 unplanned items. The OLS regression results with robust standard errors appear in Table 2. Because the intraclass correlation coefficients estimated across counties for both total spending and unplanned purchases were low ($ICC_{spending} = 0.040$; $ICC_{unplanned} = 0.044$), a multilevel model estima-tion was not necessary for this study.

As predicted, we find that county-level religiosity is negatively as-sociated with participants' total spending ($\beta = -0.107$, SE = 0.049, 95% CI = $[-0.204, -0.011]$, $t(1500) = -2.19$, $p = .029$; column A). There is also a negative relation between county-level religiosity and participants' unplanned purchases ($\beta = -0.089$, SE = 0.042, 95% CI = $[-0.172, -0.006]$, $t(1500) = -2.10$, $p = .036$; column B).[4] Specifically, a 20% increase in the total number of religious adherents living in a county is associated with a 2.0% and 1.6% decline in total spending and the number of unplanned purchases, respectively. As a comparison, we note that a 20% increase in a shopper's income is as-sociated with a 1.3% increase in total spending. In addition, as shown in Table A3 in Online appendix A, the likelihood of shoppers' coupon usage increases with county-level religiosity ($\beta = 2.301$, SE = 0.331, 95% CI = $[1.652, 2.949]$, $z = 6.96$, $p < .01$), further supporting the argument that religiosity is associated with frugal shopping behavior.

3.3. Discussion

Using actual grocery shopping data, Study 2 shows that shoppers living in more religious counties spend less money on their overall purchases and make fewer unplanned purchases relative to shoppers living in less religious counties. In the next study, we conduct a more direct test of the relation between religiosity and shopper spending by measuring religiosity at the individual level in an experimental setup.

4. Study 3: individuals' religiosity and spending behavior

4.1. Method

4.1.1. Participants

We recruited participants from Amazon's Mechanical Turk (MTurk). Eight hundred and twelve adults completed the study (mean age = 36.7 years, mean income = $54,440, 67% female). Assuming a relatively small effect size and testing the statistical significance at the 5% level, our sample size yields about 80% power in a correlational test setting (see Cohen, 1970).

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[4] When all the control variables other than the number of items are excluded from both models, the documented relations are again negative and significant (total spending: $\beta = -0.141$, SE = 0.046, 95% CI = $[-0.232, -0.051]$, $t(1515) = -3.06$, $p < .01$; unplanned items: $\beta = -0.124$, SE = 0.039, 95% CI = $[-0.200, -0.048]$, $t(1515) = -3.21$, $p < .01$).

Table 2

Study 2: The relation between individual shoppers' grocery spending and county-level religiosity measure.

	Dependent variable =	
	ln(Total spending)	ln(# of unp. items)
	A.	B.
ln(# of religious adherents per 1000 population)	−0.107**	−0.089**
	(0.049)	(0.042)
ln(Proportion of Republican votes in the county)	0.075*	0.064*
	(0.042)	(0.036)
ln(# of total items purchased)	0.865***	1.115***
	(0.027)	(0.018)
ln(# of weekly grocery shopping trips)	−0.104***	0.004
	(0.031)	(0.030)
Store familiarity	0.019	−0.023*
	(0.014)	(0.013)
Shopping list dummy	0.076**	−0.154***
	(0.038)	(0.029)
Coupon usage dummy	−0.018	0.020
	(0.029)	(0.027)
Sale dummy	0.069**	−0.068**
	(0.031)	(0.027)
Credit card payment dummy	0.029	−0.027
	(0.028)	(0.027)
ln(Income)	0.070***	0.032
	(0.022)	(0.021)
ln(Age)	0.099**	0.021
	(0.039)	(0.039)
Household size	0.012	0.001
	(0.010)	(0.009)
Shopping w/ others dummy	0.049*	0.092***
	(0.028)	(0.025)
Female dummy	−0.022	−0.010
	(0.029)	(0.026)
Married dummy	0.050*	−0.007
	(0.030)	(0.028)
White dummy	0.036	−0.003
	(0.029)	(0.027)
College graduate dummy	0.019	−0.094***
	(0.024)	(0.023)
Intercept	1.243***	−0.352
	(0.381)	(0.349)
Observations	1518	1518
R-squared	0.634	0.732

Standard errors are reported in parentheses.
* $p < .10$.
** $p < .05$.
*** $p < .01$.

4.1.2. Measures

This study employs a hypothetical grocery shopping scenario (see Online appendix B for the materials used in the experiment). We asked participants to imagine that they were going grocery shopping and planned to spend about $25 during their shopping trip. The shopping task consisted of two parts: (1) browsing and buying relatively typical grocery items, and (2) deciding how much to pay for an unplanned item toward the end of the shopping trip. Specifically, in the first part, participants picked an item among several options presented under seven different product categories (i.e., grapes, milk, eggs, frozen pizza, snacks, soda, and bread). To ensure that all the participants spent the same amount of money prior to the unplanned shopping task (i.e., $24.50 in total), the price of each item in a given category was the same (e.g., red grapes, green grapes, and black grapes were all priced at $2 per pound).

After participants completed the first part of the task, we asked participants to imagine that they had come across a display of 3-pack Orbit gum as they were going to the cashier to pay for their purchases. Following Haws, Bearden, and Nenkov (2012), we measured partici-pants' willingness to pay (WTP) for a 3-pack gum by asking them to

indicate whether they would purchase it at different prices ranging from $0 to $4 with $0.25 increments. Because all the participants spent the same amount of money prior to buying the gum, we use WTP for the gum as the dependent variable in our analysis. We did not assess another dependent variable. The control variables included in the regression model are self-reported conservatism, the log of income, the log of age, a dummy for female participants, a dummy for married participants, a dummy for white participants, and a dummy for college graduate participants.

Upon completion of the shopping task, participants answered a set of demographic questions, which included a five-item religiosity scale adapted from Worthington et al.'s (2003) religious commitment inventory ($\alpha = 0.97$; see Appendix A for details). We also measured participants' conservatism based on their feelings toward the following five concepts from the social political ideology scale of Everett (2013): the family unit, traditional marriage, traditional values, patriotism, and military and national security ($\alpha = 0.89$; see Appendix A for details).

4.2. Results

4.2.1. Exclusions

We excluded 22 participants who provided non-monotonic responses to the WTP question (e.g., a participant was not willing buy the gum at $1.25 but would do so at $1.50). We also excluded two participants who gave erroneous responses to the conservatism scale items (i.e., a score higher than 100 was provided for a scale item). These exclusions yielded a final sample with 788 observations. WTP of all participants were within three standard deviations of the mean value (see Table A4 in Online appendix A).

4.2.2. Religiosity measure and WTP

The OLS regression results appear in Table 3. Consistent with our prediction, we find a negative relationship between participants' religiosity and their reported WTP for the gum ($\beta = -0.056$, SE = 0.027,

Table 3
Study 3: The relation between unplanned spending and individual-level religiosity measure (Amazon MTurk sample).

	Dependent variable = WTP for a 3-pack Orbit Gum
Individual-level religiosity score	−0.056**
	(0.027)
Individual-level conservatism score	0.003**
	(0.001)
ln(Income)	0.073*
	(0.053)
ln(Age)	−0.661***
	(0.109)
Female dummy	0.189***
	(0.068)
Married dummy	0.059
	(0.071)
White dummy	−0.041
	(0.077)
College graduate dummy	−0.018
	(0.067)
Intercept	2.813***
	(0.645)
Observations	788
R-squared	0.059

Standard errors are reported in parentheses.
* $p < .10$.
** $p < .05$.
*** $p < .01$.

95% CI = [−0.108, −0.003], $t(779) = -2.08$, $p = .038$).[5] Specifically, a one standard deviation increase in religiosity score (i.e., 1.31) is associated with a 5.2% decline in the average participant's WTP.

4.3. Discussion

This study provides evidence that participants' spending during a hypothetical grocery-shopping trip decreases with religiosity. In Study 4, we prime religiosity via an experimental manipulation to test whether there is a causal relation between religiosity and shoppers' spending.

5. Study 4: a religious priming and spending behavior

5.1. Method

5.1.1. Participants

We recruited participants from Amazon's MTurk. Eight hundred and nine adults completed the study (mean age = 35.3 years, mean income = $52,250, 58.2% female). As in Study 3, assuming a relatively small effect size and testing the statistical significance at the 5% level, our sample size yields about 80% power for testing the differences in means between two experimental conditions (see Cohen, 1970, 1992).

5.1.2. Measures

This study uses the same shopping task employed in Study 3 but a different unplanned item was displayed at the end of the shopping trip. Specifically, we asked participants to imagine that they had come across a special issue of one of their favorite magazines as they were heading to the cashier to pay for their purchases. We measured participants' WTP for the magazine by asking them to indicate whether they would purchase the magazine at different prices ranging from $0 to $8 with $0.50 increments. We did not assess another dependent variable.

For religious priming, we asked participants before they began shopping to watch a short video and rate the speaker in the video on various dimensions (e.g., the use of body language). Participants were randomly assigned to either the religious priming condition or the control condition. In the former condition, participants watched a video of a preacher discussing God's presence. He was dressed in a suit and tie. In the portion of the speech shown, the preacher does not try to explicitly impose a particular religion onto viewers, but rather maintains that God exists and is everywhere. In the latter condition, participants were shown a video of a speaker presenting oil painting tips.[6] The speakers in both videos were white males, albeit the speaker in the religious priming video was older than the speaker in the control condition. No other individuals appeared or talked in the videos. The speakers did not mention anything related to consumption, shopping, food, money, or frugality. Therefore, we have no compelling reason to believe that the videos had a confounding priming effect. Because the videos differed in length, we showed participants a portion of each video lasting about 85 s. Our approach is consistent with prior studies that prime God concepts to assess the effect of religion on behavioral outcomes (e.g., Inzlicht & Tullett, 2010; Rounding et al., 2012; Shariff & Norenzayan, 2007).

A manipulation check conducted with participants from the same subject population ($n = 400$) suggests that our manipulation was effective. Specifically, following the video watching and rating task, we

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[5] The simple correlation between WTP and individual-level religiosity score is negative ($\rho = -0.07$, $p = .066$).

[6] Both videos were selected from YouTube and accessed via the following links: https://www.youtube.com/watch?v=uw0eDW3iueY ("The Awareness of God's Presence"; the section between 0′ 40″ and 2′ 04″) and https://www.youtube.com/watch?v=zoO_8JYJw0I ("Oil and Acrylic Landscape Painting Tips and Tricks", the section between 0′ 11″ and 1′ 36″). The former video is unavailable at the original link and can be accessed via the following link: https://www.youtube.com/watch?v=Ei2M-SwsQRY.

measured participants' feelings toward God using the following four items: "I feel God's presence," "I desire to be closer to God," "I believe God watches over me and others," and "One should seek God's guidance when making decisions" (1 = *strongly disagree*, 5 = *strongly agree*, α = 0.98). As expected, a regression analysis controlling for participants' self-reported religions reveals that feelings toward God are stronger in the religious prime condition than the control condition ($M_{Religiosity}$ = 3.48 vs. $M_{Control}$ = 3.24, 95% CI for the difference in LS means = [0.05, 0.43], $t(387)$ = 2.51, p = .013, d = 0.155).[7]

5.2. Results

5.2.1. Exclusions

We excluded 22 participants who provided non-monotonic responses to the WTP question, yielding a final sample with 787 observations. There were 14 participants whose WTPs are more than three standard deviations above the mean (i.e., $7.50). Winsorizing these values at the three standard deviations above the mean or excluding these observations from the sample does not change our conclusions.

5.2.2. Religious priming and WTP

Supporting our prediction, participants in the religiosity condition were willing to spend 9.6% less on the magazine (M = $2.36, SD = $1.66) than those in the control condition (M = $2.61, SD = $1.69) (95% CI for the difference in means = [−0.02, −0.48], t (785) = −2.09, p = .037, d = 0.149). We obtained consistent results in a multiple regression with control variables (see Table 4 for the OLS regression results). Further, including dummy variables for participants' self-reported religions as additional controls in the regression model yielded similar results.[8]

As an additional analysis, we also controlled for participants' emotional states in the regression model using positive and negative affect ratings provided by participants on a 10-item, five-point scale of Positive and Negative Affect Schedule (PANAS). Positive affect items were "happy," "cheerful," "energetic," "delighted," and "joyful" (α = 0.93). Negative affect items were "sad," "angry," "nervous," "upset," and "jittery" (α = 0.91). After participants completed the shopping task, they indicated the extent to which they currently felt each of those emotions (1 = *not at all*, 5 = *very much*). Adding participants' positive and negative affect ratings to the regression model did not alter the reported results.

Finally, in untabulated analyses using weighted effects coding, we tested the interactions between the religious priming and different categories of religiosity including believers versus non-believers (i.e., atheists and agnostics) as well as Christians versus other religions versus non-believers. There were no significant interactions, which is consistent with previous research showing that priming God concepts yields comparable behavioral outcomes among both believers and non-believers (Kupor et al., 2015; Laurin, Kay, & Fitzsimons, 2012; Shariff & Norenzayan, 2007). This suggests that the effect of religion on grocery spending arises from people's tendency to associate religion and religious cues with frugality rather than the documented effect is simply being a manifestation of religious people's values. We specifically test this prediction in the next study.

5.3. Discussion

Study 4 shows that a religious prime lowers grocery shoppers' spending. Next, we examine the underlying mechanism for this

Table 4
Study 4: The direct effect of religious priming on unplanned spending (Amazon MTurk sample).

	Dependent variable = WTP for the magazine
Religious priming	−0.242**
	(0.120)
ln(Income)	0.126
	(0.095)
ln(Age)	−0.025
	(0.200)
Female dummy	0.047
	(0.122)
Married dummy	−0.086
	(0.134)
White dummy	0.140
	(0.147)
College graduate dummy	−0.243*
	(0.126)
Intercept	1.368***
	(1.236)
Observations	787
R-squared	0.013

Standard errors are reported in parentheses.
* p < .10.
** p < .05.
*** p < .01.

documented effect. We argue that a religious prime increases shoppers' frugality and thereby lowers their spending. Study 5 tests the proposed indirect effect of religiosity on grocery shoppers' spending through frugality.

6. Study 5: the indirect effect of religious priming on spending through frugality

6.1. Method

6.1.1. Participants

Two hundred eighty-seven undergraduate students studying at a large Northeastern university completed the study in exchange for course credit (mean age = 19.5 years, 56.5% female).[9] There were multiple sessions of the study. All participants registered for a particular session and reported to the university's behavioral lab, where they completed an online survey.

6.1.2. Measures

This study uses a modified version of the shopping task employed in Study 4. To make the shopping task more realistic, participants were informed that one of them in the session would be randomly selected by the experimenter and his/her choices would be honored at the end of the session.[10] Thus, for practical reasons, we changed the unplanned product from a magazine to a pack of three Snickers bars. Also, some product categories were dropped or replaced with easier-to-store alternatives (e.g., eggs were replaced with ketchup).[11] Total spending prior to the unplanned shopping task, however, was not changed (i.e., $24.50). The dependent variable is participants' WTP for the Snickers bars, measured between $0 and $4, with $0.25 increments. We did not assess another dependent variable.

To manipulate religiosity, we used the same video-watching task as

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[7] Among the participants, 19.0% were Protestant, 18.0% were Catholic, 2.8% were Jewish, 24.0% reported that they follow other religions (e.g., Muslim, Orthodox, Buddhist), 16.8% were agnostic, 15% were atheists, and 4.5% declined to answer.
[8] Among the participants, 21.7% were Protestant, 15.6% were Catholic, 20.3% reported that they follow other religions, 21.1% were agnostic, 14.2% were atheists, and 7.0% declined to answer.

[9] Using the effect size of 0.149 reported in Study 4, we calculate the desired sample size to achieve 80% power (at α = 0.05) as 1413 subjects (i.e., $2 \times 2 \times (2.80 / 0.149)^2$; see Cohen, 1970). Our sample size, however, was limited by the university's subject pool availability. Thus, we acknowledge that our study has less than ideal power.
[10] Because not all the product alternatives were available at the time of the study, the selected participants were actually offered available choices or cash.
[11] The product categories include grapes, milk, ketchup, potato chips, orange juice, and bread.

in Study 4. However, because the control condition video was unavailable on YouTube at the time of the study, we used another video on oil painting tips.[12] We again showed participants a portion of each video lasting about 85 s. Further, we asked participants to write a short paragraph summarizing what the speaker talked about in the video. As in Study 4, a manipulation check was conducted with participants from the same subject population ($n = 88$). The manipulation check revealed that feelings toward God were stronger in the religious prime condition than the control condition ($M_{Religiosity} = 3.38$ vs. $M_{Control} = 2.94$, 95% CI for the difference in LS means = [0.03, 0.84], $t(77) = 2.16$, $p = .034$, $d = 0.404$).

We measure participants' frugality using two items from the frugality scale of Lastovicka et al. (1999). These items are "I believe in being careful in how I spend my money" and "I am willing to wait on a purchase I want so that I can save money" (1 = *strongly disagree*, 5 = *strongly agree*; α = 0.66). In our analysis, we use the average of participants' responses to these items (collected following the video-watching task but prior to the shopping task).

6.2. Results

6.2.1. Exclusions

We excluded three participants who provided non-monotonic responses to the WTP question. We also removed two participants who failed to describe the content of the video they were shown. One participant indicated that she did not clearly hear the content. The other participant did not answer the question. These exclusions resulted in a final sample with 282 observations. WTP of all participants were within three standard deviations of the mean value (see Table A6 in Online appendix A).

6.2.2. Religious priming, frugality, and WTP

While participants in the religious prime condition were willing to spend 10.9% less on the Snickers bars ($M = \$1.22$, $SD = \$1.04$) than were those in the control condition ($M = \$1.37$, $SD = \$1.10$; $d = 0.142$), the difference between the two conditions did not reach statistical significance ($p = .237$). However, consistent with our thesis, we find that religiosity has a significant indirect effect on WTP through frugality (see Table 5). As predicted, the religious prime increases frugality (β = 0.207, SE = 0.101, CI = [0.009, 0.405], $t(278) = 2.06$, $p = .040$), which decreases participants' WTP (β = −0.238, SE = 0.075, 95% CI = [−0.385, −0.090], $t(277) = −3.17$, $p < .01$). Formally, the 95% bootstrapped confidence interval (Hayes, 2013) for the indirect effect of the religious prime on participants' WTP for Snickers bars through frugality does not contain zero (i.e., 95% CI = [−0.138, −0.011]).[13] This supports our argument that religiosity affects spending by leading consumers to be more prudent with money. Further, similar to Study 4, the untabulated additional analyses revealed no significant interaction between the religious priming and believer versus non-believer categorization.

As pointed out by Zhao, Lynch, and Chen (2010), the presence of competing mediators may lead to cases in which there is no direct effect of X on Y but an indirect effect of X is observed. A possible competing mediator in this particular setting is religious shoppers' strong preference for established national brands versus store brands (Khan et al., 2013), which may increase participants' WTP for Snickers bars (which is a well-known brand in the U.S.) in the religious priming condition.

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[12] The video was accessed via the following link: https://www.youtube.com/watch?v=GEUQjTIpnmA ("Oil Painting Tips: How to Paint a Sunrise"; the section between 0′ 01″ and 1′ 25″).

[13] Regarding the test of indirect effect of X on Y through a proposed mediator, Hayes writes: "Modern thinking about mediation analysis does not impose the requirement that there be evidence of a simple association between *X* and *Y* in order to estimate and test hypotheses about indirect effects." Retrieved from http://processmacro.org/faq.html on April 17, 2017.

Future research should explore this possibility.

7. General discussion

Although religion represents a key aspect of many people's lives, little is known about how religion affects their non-religious routines. In the present research, we identify a frequent consumption activity that is influenced by religiosity: grocery shopping. Our evidence shows that religiosity curbs people's spending on their grocery purchases. This effect seems to be due to a common religious principle: one needs to be prudent with money. Overspending is not typically a welcome behavior in communities with strong religious ties.

At first blush, our conclusion may seem to be inconsistent with that of Khan et al. (2013), who find that religiosity is positively associated with shoppers' relative preference for national brands, which are typically more expensive than their generic counterparts. A greater preference for national brands, however, does not necessarily imply higher spending. For instance, a religious shopper, who tends to be conservative, may prefer to buy products sold under national brands rather than generic ones (e.g., Jif Peanut Butter versus Great Value Peanut Butter of Walmart) but she may also purchase and consume less of those products or only purchase them on price promotion. While our study analyzes shoppers' total spending and unplanned purchases, Khan et al. (2013) examine shoppers' relative preference for national versus generic brands with a focus on selected supermarket product categories (excluding major unbranded categories such as bakery, fresh produce, and meat). They actually note that the positive relation between religiosity and national brand preference is not observed in some product categories such as snacks, coffee, sauces, and deodorant. Moreover, the sample period in Khan et al. (2013) coincides with the pre-financial crisis period (2001–2006), whereas our study utilizes data collected in the post-financial crisis period in which frugality has become a more relevant concern for many in the U.S. As a result, we believe that our study complements rather than contradicts Khan et al. (2013).

While previous research emphasizes that religious people have different belief systems and values than nonreligious people (e.g., Minton & Kahle, 2013), limited research has focused on specific religious values (e.g., frugality, modesty, absence of envy) and their (causal) behavioral implications. This examination is important because religion affects human behavior through shared values (e.g., Mathras et al., 2016). Our research contributes to the literature by demonstrating that a common religious theme—frugality—shapes people's spending patterns for a frequent shopping activity. This effect likely has broader implications for individual financial decision making, as spending patterns determine and are also influenced by such decisions as saving and borrowing money. This discussion is linked to a fundamental broader question in theology: Why are there religions? Some argue that religions continue to exist in modern societies because they help people further human social life—for example, by helping them control their biological and psychological desires (Baumeister, Bauer, & Lloyd, 2010). Religion also has been shown to be beneficial for physical and mental health, as religious people tend to avoid unhealthy lifestyles (George, Larson, Koenig, & McCullough, 2000). Positive, albeit modest, financial implications of religiosity could be another reason why people value religions.

If one attributes one's positive qualities to religion, one's religiosity and self-worth will be positively correlated. Some evidence supports this view (e.g., Crocker, Luhtanen, Cooper, & Bouvrette, 2003). Thus, it is plausible that religion affects spending through self-worth. However, *ex-ante*, the direction of this proposed effect is not clear. On the one hand, increased self-worth is expected to reduce spending because people with higher self-worth are less likely to engage in compensatory consumption than those with lower self-worth, particularly in the domain of status goods (e.g., Sivanathan & Pettit, 2010). On the other hand, higher self-worth may lead to greater spending (e.g., "I spend money on myself because I am worth it"). Because compensatory

Table 5
Study 5: The indirect effect of religious priming on unplanned spending through frugality (undergraduate student sample).

DV	Independent variables				Intercept	Obs.	R-squared
	Religious priming	Frugality	Female dummy	White dummy			
Frugality	0.207**		0.183*	0.229	3.543***	282	0.037
	(0.101)		(0.102)	(0.105)	(0.105)		
WTP for Snickers	−0.109	−0.238***	−0.054	−0.155	2.353***	282	0.049
	(0.126)	(0.075)	(0.129)	(0.132)	(0.296)		

Bootstrap 95% confidence interval for the indirect effect of religious priming on WTP through frugality	= (−0.138, −0.011)

Standard errors are reported in parentheses.

* $p < .10$.
** $p < .05$.
*** $p < .01$.

consumption motivation and status concerns are not very relevant for everyday shopping activities, such as grocery shopping (except for such items as personal care products, exotic fruits, wine, etc.), these effects are more likely to manifest when people are shopping for visible and expensive product categories. Anecdotal evidence suggests that some religious leaders and prominent figures in predominantly religious countries endorse lavish lifestyles.[14] In such cases, religion may have a "licensing effect" on spending (e.g., "God has given me wealth and spending ability" or "I deserve better things because my religion makes me a better person") that could be compounded by religion's positive effect on risk taking ("God protects me"). We encourage future research to examine whether religion's effect on spending is conditional on product category (i.e., status vs. regular products; expensive vs. inexpensive products) and one's social status and wealth.

Our research is not without limitations. First, in Study 2, we used observed, county-level religiosity as a proxy for unobserved, individual-level religiosity. However, the variance at the observed level only partially reflects the variance at the unobserved level. Thus, if individual-level religiosity were controlled for in Study 2, the estimated partial effect of county-level religiosity would be lower than the current reported effect. Second, our datasets reflect shopping habits and patterns of American society. How often people shop, how long they shop, and to what extent they interact with others when shopping tend to vary across different countries and cultures. Thus, our results may not be generalizable to those who live in the other parts of the world. Also, our research design and models did not incorporate such factors as the level of social support within religious communities, the prevalence of social services in a region, and the rural versus urban location of shoppers. These factors likely affect the role of religion in shopping. Third, our definition of religion is centered around God. While this approach facilitates the operationalization of our key construct and thus enables us to meaningfully test our hypothesis, it presents a limited view of how people try to achieve spiritual growth. Future examination of the pertinent topic from a broader perspective with emphasis on spirituality is warranted.

Many religions set specific rules and principles that define how people should behave (e.g., Islam forbids consumption of pork). There are also various values shared across religions (e.g., avoiding overconsumption, being frugal). Unlike religious rules, religious values are broadly defined and tend to have a more subtle impact on human decision-making, presumably because these values are believed not to be strictly imposed by God. As evidence of such an impact, we document that highly religious people are more careful with their grocery spending than less religious people. Our research contributes to the literature on religion and economic behavior by demonstrating that the common religious theme of frugality influences spending patterns for a frequent shopping activity.

Open practices

This article earned the Open Materials badge for transparent practices. Related links are provided throughout the text and additional materials can be found in the Online appendix.

Appendix A

We used the following five items from Worthington et al. (2003) to measure religiosity in Study 3 ($\alpha = 0.97$). We asked participants to indicate to what extent each statement below describes them using a five-point scale (1 = *not at all true of me*, 5 = *totally true of me*):

1. My religious beliefs lie behind my whole approach to life.
2. I spend time trying to grow in understanding of my faith.
3. It is important to me to spend periods of time in private religious thought and reflection.
4. Religious beliefs influence all my dealings in life.
5. Religion is especially important to me because it answers many questions about the meaning of life.

We used the following five concepts from Everett (2013) to assess conservatism in Study 3 ($\alpha = 0.89$). We asked participants to indicate how positive or negative they feel about each issue on the scale of 0 to 100, where 0 represents very negative, and 100 represents very positive.

1. The family unit
2. Traditional marriage
3. Traditional values
4. Patriotism
5. Military and national security.

Appendix B. Supplementary materials

Supplementary materials to this article can be found online at https://doi.org/10.1016/j.jesp.2018.03.019.

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[14] See, for instance, http://www.huffingtonpost.com/2012/01/19/best-paid-pastors_n_1214043.html and http://www.forbes.com/sites/anthonydemarco/2015/04/13/sultan-of-brunei-hosts-a-lavish-gold-diamond-and-emerald-wedding-you-must-see-to-believe/#d6840dd47456 (both accessed on April 17, 2017).

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