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BRIEF REPORT

The Effect of Visualizing Healthy Eaters and Mortality Reminders on Nutritious Grocery Purchases: An Integrative Terror Management and Prototype Willingness Analysis

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Objective: To use insights from an integration of the terror management health model and the prototype willingness model to inform and improve nutrition-related behavior using an ecologically valid outcome. ***Method:*** Prior to shopping, grocery shoppers were exposed to a reminder of mortality (or pain) and then visualized a healthy (vs. neutral) prototype. Receipts were collected postshopping and food items purchased were coded using a nutrition database. ***Results:*** Compared with those in the control conditions, participants who received the mortality reminder and who were led to visualize a healthy eater prototype purchased more nutritious foods. ***Conclusion:*** The integration of the terror management health model and the prototype willingness model has the potential for both basic and applied advances and offers a generative ground for future research.

Keywords: nutrition, prototypes, mortality salience, grocery, health

Lack of adequate nutrition has been linked to a wide range of negative health consequences (Klein et al., 2014). Bringing theoretically derived approaches to bear on understanding and ultimately improving nutritional choices is therefore a vital task for behavioral science research (Glanz & Bishop, 2010). To this end, the present article focuses on the intersection between existential motivation and individuals' representations of normative, positive health behavior. We integrate two theoretical perspectives—the terror management health model (TMHM; Goldenberg & Arndt, 2008) and the prototype willingness model (PWM; Gibbons, Gerrard, & Lane, 2003)—with the aim of fostering nutrition-related behavior.

TMHM expands on terror management theory (Greenberg, Pyszczynski, & Solomon, 1986) to suggest that subtle or fleeting thoughts of mortality can influence health-relevant decisions by motivating people to adhere to cultural norms and values because doing so provides existential security. For example, reminders of mortality increase or decrease sun protection tendencies depending on whether people view pale or tanned skin as attractive (Cox et al., 2009). Research has also examined how mortality reminders affect food preferences in light of such factors as the food's cultural origin and body-esteem and appearance standards (Ferraro, Shiv, & Bettman, 2005; Friese & Hofmann, 2008; Goldenberg, Arndt, Hart, & Brown, 2005; Hirschberger & Ein-Dor, 2005), but none of these laboratory studies were designed to translate into nutrition-related behavior outside of the lab.

PWM posits that an individual's health-relevant behaviors are guided, in part, by socially informed images (i.e., prototypes) that an individual associates with those behaviors. PWM conventionally focuses on adolescent risky behavior and finds that risky health behavior (e.g., unsafe sex) can result from more positively construed prototypes (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008). Studies demonstrate the relevance of this analysis

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to nutrition-related behavior; for example, adolescents with more favorable images of prototypical unhealthy eaters report consuming more unhealthy (higher fat) foods (Gerrits, de Ridder, de Wit, & Kuijer, 2009; Gerritz et al., 2010). Yet, despite the insights gleaned from these studies, little is known about factors that might amplify the influence of prototypes on behavior.

TMHM and PWM converge to suggest a novel perspective for understanding nutrition-related decisions. Whereas PWM provides insights about a mechanism (prototypes) to guide behavior, TMHM highlights a potential catalyst to enhance that mechanism: mortality reminders that spur adherence to cultural/societal standards. Supporting this, Arndt et al. (2009) found that reminders of mortality and visualization of a prototypical person who exercises increased endorsement of exercise as a self-esteem resource among participants high in extrinsic contingencies of worth. This suggests that prototypes can impact the contingencies of value that individuals pursue following reminders of death. To examine the potential for prototypes and mortality reminders to positively impact ecologically valid nutrition-related behavior, the present study adopted a food purchasing assessment method used in previous research: the collection of grocery receipts to assess the nutritional value of foods purchased (e.g., Anderson, Winett, & Wojcik, 2000; Gilbert, Gill, & Wilson, 2002). We hypothesized that people would purchase more nutritious foods after being reminded of death (vs. control) and visualizing a healthy eater prototype (vs. control).

Method

Participants

Store patrons participated ($N = 128$).[1] Fourteen participants did not return to provide a receipt, leaving 114 participants in the final sample. Demographic variables (age: $M = 47.53$ years, $SD = 15.44$; body mass index: $M = 30.17$, $SD = 7.87$; education: $M = 13.48$ years, $SD = 2.11$; ethnicity: 11 Hispanic, 76 non-Hispanic, 27 unreported; race: 109 Caucasian, one American Indian, four other; religion: 87 Christian, five atheist/agnostic, 22 other/missing) were collected at the end of the study.[2]

Procedure, Setting, and Materials

After receiving institutional review board approval, researchers collected data outside a grocery store in the Midwest. Two researchers, blind to condition, solicited patrons and administered preshopping questionnaires. A third researcher who was also blind to condition administered postshopping questionnaires and collected receipts. Patrons who expressed interest were informed that the study was about how personality, attitudes, and emotions relate to people's choices at the supermarket and involved filling out questionnaires before and after shopping. Participants were promised a $10 gift card to the store on completion. After providing consent, participants were randomly assigned to conditions via a (preshopping) questionnaire packet. The packets were placed in a random order by another assistant and were distributed in that order.

To induce mortality salience (MS), participants completed a 12-item true–false scale about either fear of death or pain (e.g., "I am very much afraid to die/of pain") as in prior research (Burke, Martens, & Faucher, 2010). Participants then completed the 20-item Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988), which assesses both positive ($\alpha = .89$) and negative ($\alpha = .90$) self-reported affect, and a 10-item innocuous word search puzzle to allow thoughts of death to fade from focal awareness (see Pyszczynski, Greenberg, & Solomon, 1999).

Participants then completed a prototype manipulation adapted from previous research (Gibbons & Gerrard, 1995). They were led to visualize a prototypical healthy eater (vs. typical person) through the following instructions: "When trying to describe someone, people usually use characteristics of that person.. . . We want you to think about the image that you have of a healthy eater/typical person of your age for a moment.. . ." Participants were then asked to rate the prototype on 12 adjective pairs (e.g., *foolish–wise*, *unpopular–popular*) on 7-point scales.

Following this, participants completed three questions about intentions to purchase nutritious foods when shopping, desire for a more nutritious diet, and the importance of eating healthily (i.e., preshopping nutrition interest; $\alpha = .81$). The final page reminded participants to return when finished shopping to answer more questions and receive the coupon.

After shopping, participants were asked whether the research team could either retain their receipt or take a photograph of the receipt. All participants agreed. Participants then completed four questions about their efforts to buy more nutritious food, the desire for a more nutritious diet, future intentions to eat healthy, and interest in trying more nutritious recipes (i.e., postshopping nutrition interest; $\alpha = .87$). An additional four questions probed characteristics of the shopping trip (see Footnote 5).

Results[3]

Nutritional Content of Food Purchases

In total, 927 unique items were accumulated across receipts and coded by three assistants (blind to conditions) for type (food vs. nonfood) and clarity (identifiable product) of reference. Initial agreement was 74% and discrepancies were discussed. Consensus was reached on 93.9% of the items as having a clearly identifiable product. This resulted in 859 unique food products that were allocated a health rating from a database of food nutrition information (http://nutritiondata.self.com) indexing essential nutrients per calorie.[4] Scores ranged from 0.25 to 5 (in 0.25 increments) with higher ratings indicative of

[1] Unfortunately, because of researcher oversight, the number of people declining to participate was not recorded.

[2] There were no significant differences between conditions on any of the demographic variables (participants' sex $\chi^2 = 11.11$; age $F = 1.36$; religion $\chi^2 = 9.47$; race $\chi^2 = 10.47$; ethnicity $\chi^2 = 8.88$; years of education $F = 0.27$; or body mass index $F = 0.28$, computed from reported height and weight; $ps \geq .09$). Furthermore, demographic variables were not significantly related to the ratings of foods purchased ($ps \geq .44$).

[3] All pairwise comparisons reported below remain significant when using a Bonferroni correction. In addition, nonsignificant effects are reported in summary form with $\geq$ than the relevant value to conserve space.

[4] The Website explains that 130+ different essential nutrients are tracked by Nutrition Data's database, drawn from the U.S. Department of Agriculture's National Nutrient Database for Standard Reference and supplemented by listings provided by restaurants and food manufacturers. To ascertain whether these ratings converge with lay perceptions of nutrition, two independent coders rated each food item for perceived healthiness. The composites of these ratings ($\alpha = .94$) were correlated with the database ratings ($r = .46$, $p < .001$), suggesting some convergent validity to the ratings used.

Table 1
Means (Standard Deviations) by Condition

Measure	Mortality salience + healthy eater	Mortality salience + typical eater	Pain + healthy eater	Pain + typical eater	Overall
n	29	29	31	25	114
Positive affect (range 1–5)	4.45 (0.82)	4.38 (0.66)	4.20 (0.84)	4.22 (0.83)	4.31 (0.79)
Negative affect (range 1–5)	1.73 (0.76)	1.73 (0.80)	1.77 (0.79)	1.40 (0.49)	1.67 (0.73)
Preshopping nutrition interest (range 1–10)	7.52 (2.05)	7.40 (1.59)	7.67 (1.85)	7.79 (2.07)	7.59 (1.87)
Health rating of foods purchased (range 0.25–5)[a]	2.83_b (0.93)	2.24_a (0.48)	2.18_a (0.59)	2.19_a (0.55)	2.37_a (0.71)
Postshopping nutrition interest (range 1–10)	6.81 (2.19)	6.91 (1.79)	6.75 (1.84)	7.13 (2.58)	6.89 (2.07)

Note. The only means to differ by condition were for foods purchased (differences at $p < .05$ indicated by unshared subscripts).
[a] Nontransformed values.

healthier foods (e.g., broccoli = 5, candy bar = 1). In the majority of cases (75.4%), products were matched to a generic food type (e.g., frosted toaster pastries) because brand names were not specifically listed in the database. Scores were averaged across raters, demonstrated high reliability ($\alpha = .95$), and checked for outliers (none were present).

Primary Analyses

A log transformation (based on a Box-Cox test) was used to address the violation of equality of variance as revealed by a Levene's test. A 2 (MS) × 2 (prototype) analysis of variance (ANOVA) on nutrition scores revealed a main effect for salience, $F(1, 110) = 6.93$, $p = .01$, $\eta_p^2 = .06$; a marginal effect of prototype, $F(1, 110) = 3.42$, $p = .07$, $\eta_p^2 = .03$; and a MS × Prototype interaction, $F(1, 110) = 4.69$, $p = .03$, $\eta_p^2 = .04$. After MS exposure, shoppers exposed to a healthy prototype purchased more nutritious food compared with shoppers exposed to a healthy prototype but reminded of pain, $t(58) = 3.49$, $p < .01$, $d = 0.92$, and shoppers exposed to the typical personal prototype after MS, $t(56) = 2.87$, $p < .01$, $d = 0.77$.[5] MS (vs. pain) did not affect food choices when visualizing prototypes of a typical person, and there were no differences between the healthy (vs. typical) prototype within the pain condition ($ts < 0.32$, $ps \geq .75$). Table 1 depicts the means and standard deviations for this and other measures in the study.

Additional Analyses

Additional 2 (MS) × 2 (prototype) ANOVAs on preshopping nutrition interest and postshopping nutrition interest revealed no main or interaction effects ($Fs \leq 0.18$, $ps \geq .74$). Also, as in previous research (e.g., Burke et al., 2010), there were no effects of MS on self-reported positive or negative affect ($Fs \leq 1.85$, $ps \geq .17$).

Discussion

Integrating TMHM and PWM, the present study suggests that mortality reminders interact with socially informed images (i.e., a healthy prototype) to increase food purchases that are likely to affect nutrition. In so doing, this study offers a number of contributions. First, although a few TMHM studies have been conducted in the field, most occur in controlled lab settings. The present study shows that subtle reminders of mortality, in conjunction with prototypes, can impact actual grocery shopping behavior. Second, most PWM research has measured the dispositional influence of prototypes (Gerrard et al., 2008). This study demonstrates that prototypes can be manipulated to impact health-relevant behavior. Third, whereas most extant PWM research examines adolescent samples, the current study suggests that, when paired with mortality reminders, manipulated prototypes can also impact adult health-relevant behavior. Fourth, whereas previous research suggests that prototypes of unhealthy eaters increase consumption of fatty foods (Gerrits et al., 2010), this study suggests that prototypes of healthy eaters can actually impact food purchasing behavior that is likely to affect nutrition.

Finally, although research indicates that social norms can influence health decisions, one challenge is how to engage these influences. MS may be one factor with that potential (see Jonas et al., 2008). Given the ubiquity of naturally occurring mortality concerns in health contexts, and the feasibility of manipulating MS in the context of health communications (Hansen, Winzeler, & Topolinski, 2010), the present results point to how underlying motivations—in this case triggered by mortality concerns—might be used to bolster primed normative values (i.e., prototypes) that may then impact health-related behavior. Of course, although the present setting and dependent measure can be considered ecologically valid, future work is needed to inform the direct applicability to public health; for example, research could explore whether advertisements that make mortality salient and prime healthy normative behavior would have similar effects.

Although promising, these findings should be regarded as preliminary for a number of reasons (e.g., sample size, ambiguity about food purchasing vs. consumption) until replicated and extended. One potential limitation is that the dependent variable did not take into account quantity of items purchased. Because of ambiguities with inferences from receipts (e.g., number of people consuming the food, duration for consumption, and also quantity/serving size per item), we opted to control for such influences in the analyses (see Footnote 5). Further research is also needed to examine the mechanisms underlying the observed effects. Although the combination of MS and the prototype induction was directive enough to encourage food purchases that were rated as

[5] Analyses were also run controlling for total money spent, total number of items purchased, whether shopping for a day or more, whether shopping from a list, number and age of people shopping for, and whether using food stamps (as identified on the receipt). The interaction reported and the following pairwise patterns (Bonferroni corrected) held when controlling (individually) for these ($Fs \geq 4.39$ $\eta_p^2 \geq .04$, $ps < .04$).

healthier, it is unclear what specific norms were activated by the prototype visualization and whether such norms would differ for different people. In addition, it is notable that there were no MS or prototype effects on the preshopping nutrition interest composite given that models have linked intentions to behavior (e.g., Fishbein & Ajzen, 2011). This may reflect poor measurement of intentions in the present study (i.e., actually just a single item). However, such findings can also be seen as broadly consistent with the PWM's suggestion that prototypes influence behavior, not through intentions, but through often more subtle, nonintentional influences (i.e., willingness; Gerrard et al., 2008) and fits with Friese and Hofmann's (2008) suggestion that mortality concerns may impact food choices through more implicit (impulsive) regulatory processes.

In sum, although clearly just a first step, examining people's food purchasing behaviors highlights a meaningful and fruitful theoretical amalgamation between TMHM and PWM that has the potential for practical impact in a behavioral domain at the crux of healthy living.

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