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Psychological Pathways Through Which Social Norms and Social Identity Influence Eating Behavior: Testing a Conceptual Model

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Abstract

Background Although interventions frequently promote healthy eating, failing to consider psychosocial factors, such as social norms, may limit the effectiveness of these efforts. Perceived social norms are a well-documented determinant of eating behavior; however, there is limited understanding of the processes through which, and for whom, this relationship emerges. Using identity-based motivation as a theoretical framework, we present a conceptual model identifying one route through which descriptive social norms—beliefs about how others behave—predict eating behavior, and test whether this process varies across social identities (e.g., self-perceived weight status).

Method Structured telephone interviews were conducted for a national sample of non-diabetic adults who identified as non-Hispanic White, non-Hispanic Black, or Mexican American ($n = 990$).

Results Multigroup SEM analysis comparing individuals who self-identified as overweight (versus "about the right weight" and underweight) demonstrated that perceiving descriptive social norms that people do not eat healthy foods predicted greater perceived barriers to eating healthy foods. Perceived barriers, in turn, predicted stronger beliefs that body weight is uncontrollable, and this relationship was stronger for participants who self-identified as overweight (relative to participants who did not identify as overweight). These beliefs subsequently predicted greater self-reported consumption of unhealthy foods (e.g., sweets), but did not predict consumption of fruits or vegetables.

Conclusions This study extends our understanding of a psychosocial process that predicts consumption of unhealthy foods and underscores the importance of social identities for shaping responses to perceived norms.

Keywords Social norms · Social identity · Eating behavior · Barriers · Health beliefs · Weight status

Introduction

Although US dietary recommendations encourage people to consume healthy foods (e.g., fruits and vegetables) while limiting their intake of unhealthy, processed foods (e.g., salty snacks, sweets, and fast food), a majority of Americans do not meet these aims [1]. In particular, 88–91% of American adults fail to meet guidelines for daily fruit and vegetable intake, and approximately 60% of Americans' daily caloric intake stems from "ultra-processed foods" [2, 3]. Poor eating habits, in turn, have been associated with negative psychosocial and health outcomes, such as increased stress levels, greater rates of depression and anxiety, worse cardiovascular functioning, decreased immune system functioning, high blood pressure, and an increased risk of developing chronic health conditions, such as type 2 diabetes [4–6]. Given these extensive consequences, many intervention efforts have sought to target factors that contribute to unhealthy eating

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behaviors. However, to most effectively intervene on eating behavior, it is imperative to understand (a) the processes that influence eating behavior, and (b) for whom these processes are most likely to emerge. Identifying processes that affect health behavior is crucial because these routes can elucidate additional points of intervention that can be leveraged to improve uptake of healthy eating behavior.

The present research focuses on one specific factor in social environments that can shape health behavior: social norms [7]. Social norms develop from explicit or inferred perceptions about how one should behave based on what others are doing, and several health behavior models, such as the theory of reasoned action and the health belief model, have identified norms as an important determinant of health behavior [8, 9]. Indeed, norms have been shown to influence behavior across a range of health domains, including alcohol use, food selection, and physical activity [10–13]. Because people frequently detect and adhere to normative information in their environments, social norms that reflect healthy behavior (e.g., perceiving that most people eat vegetables) can increase engagement in healthy behavior, whereas norms that reflect unhealthy behavior (e.g., perceiving that most people eat fast food) can increase engagement in unhealthy behavior [14]. To date, extant research has focused extensively on the behavioral consequences resulting from two types of normative perceptions: descriptive norms, which reflect beliefs about others' behavior (e.g., how people typically behave), and injunctive norms, which reflect beliefs about what people ought to do (e.g., whether a behavior is approved of) [15]. Although both types of norms guide subsequent behavior [12] and can do so in tandem [16], descriptive norms can be a particularly strong predictor of behavior uptake [17–21]. Given the robust relationship between descriptive norms and eating behavior, it is important to extend our understanding of the processes through which this relationship emerges.

Although extensive research demonstrates that norms impact behavior, limited research investigates *how* norms may influence behavior. Prior work examining the relationship between norms and eating behavior has found evidence for several mechanisms, such as increasing the expected liking of a food or fulfilling motives to affiliate with social groups (for a review, see Higgs [11]). The present work tests an additional route through which norms may impact behavior; namely, norms may impact behavior by signaling how easy or difficult it is to enact a given behavior. Meta-analytic data examining the constructs utilized across several prominent health behavior models shows that barriers are a particularly robust predictor of subsequent behavior (and according to the reasoned action approach, the most proximate predictor of behavior alongside behavioral intentions) [22, 23]. As such, one route through which social norms may impact behavior is by changing perceptions of barriers [24]. For example, if people see that others fail to eat healthy foods, they may infer that eating healthy foods will be relatively difficult for them to do. In support of this idea, previous research demonstrates that learning about normative information can shape perceptions of barriers to the behavior (e.g., that the behavior is unimportant or incompatible with one's identity) [25]. Thus, extant research offers initial evidence of an association between perceived norms and barriers.

Examining factors that amplify perceived barriers is important because perceived and actual barriers can inhibit behavior uptake through several routes [26–28]. For example, experiencing sustained difficulty when attempting a task can prompt beliefs, such as helplessness [29], where individuals feel a low sense of control over their outcomes. Relatedly, perceiving unsurmountable barriers can also result in health fatalism. Within prior literature, fatalism has been conceptualized in several ways, including beliefs about the lack of internal control over external events, beliefs that health conditions are inevitable, and a sense of powerlessness due to expectations about negative health outcomes (for an overview, see Shen et al. [30]). In addition to these dimensions, genetic determinism is also a positive predictor of fatalism [30]; for instance, individuals who read about the genetic (versus experiential) causes of obesity exhibit increased weight fatalism [31]. Beliefs conveying helplessness and fatalism remain a construct of interest given their association with negative health outcomes, including reduced engagement in preventive health behavior, decreased self-care, and lower utilization of healthcare services [32–35]. Therefore, one consequence of perceiving barriers is that barriers can facilitate fatalistic beliefs (e.g., beliefs about the uncontrollability of one's health outcomes).

The Role of Social Identity in the Context of Norms

Although there may be multiple pathways through which norms impact behavior, the processes that emerge may depend largely on individuals' social identities [36]. For instance, prior research shows that membership in a particular social group can motivate individuals to adhere to ingroup-specific normative behavior [37, 38]. In the context of eating behavior, weight status is a particularly relevant social identity given pervasive weight-based stereotypes that convey information about how "people like me" behave (e.g., excessive consumption of unhealthy foods) [39]. Because these stereotypes can be chronically activated for people with higher body weights due to frequent experiences of marginalization based on weight, awareness of these stereotypes can influence subsequent cognitions and behaviors in stereotype-relevant domains (e.g., eating behavior) [40]. Therefore, we theorize that people across weight statuses may exhibit divergent responses to

the same normative information about eating behavior due to the stereotypes, cognitions, and experiences associated with their specific weight identity.

To extend prior research examining the moderating role of social identity on the relationship between perceived norms and eating behavior, the current work tests a process derived from identity-based motivation (IBM) theory. In addition to providing a theoretical framework through which perceived barriers can undermine health behavior (e.g., via cognitive processes), IBM theory accounts for differential responses to barriers as a function of social identity. In particular, IBM theory proposes that individuals are motivated to engage in behavior that is identity-congruent and often interpret any experienced difficulty in light of their social identities (for a comprehensive overview, see Oyserman [41–43]). According to theorizing, when behaviors feel incongruent with one's identity (e.g., "people like me do not eat vegetables"), any experienced difficulty when attempting these behaviors may be interpreted as impossibility, which can subsequently reduce motivation to engage in the behavior (e.g., "Eating vegetables is difficult and I will never be able to eat them consistently, so I will stop trying"). When behaviors feel congruent with one's identity, however, IBM theory proposes that individuals will be less likely to interpret experienced difficulty as signaling impossibility. Therefore, the IBM framework would suggest that when healthy eating is difficult, people with higher body weights, who are subject to pervasive stereotypes about unhealthy eating behavior, may be especially likely to feel pessimistic about the likelihood of effort leading to success for "someone like them".

The Current Research

The present work proposes a conceptual model derived from IBM theory that examines (a) one process through which perceived norms about eating healthy foods predicts eating behavior, and (b) the extent to which this process is moderated by individuals' social identities (e.g., self-perceived weight status). Specifically, the model assesses whether (1) perceiving descriptive social norms that other people do not eat healthy foods predicts greater perceived barriers to eating healthy foods, (2) perceiving barriers to eating healthy foods predicts stronger beliefs about the uncontrollability of one's body weight, (3) the relationship between perceived barriers and beliefs about the uncontrollability of weight is stronger for adults who identify as overweight (relative to adults who identify as underweight and "about the right weight"), and (4) stronger beliefs about the uncontrollability of weight predicts self-reported eating behavior (e.g., increased consumption of unhealthy foods and decreased consumption of healthy foods).

Method

Participants

This report is based on a secondary analysis of selected variables from the Genetic Explanations for Type 2 Diabetes: Prevention Implications project, which focused on US adults' self-reported perceptions, attitudes, and behaviors related to obesity and type 2 diabetes. This project was approved by the Health Sciences and Behavioral Sciences Institutional Review Board, and informed consent was obtained from all participants recruited into the study.

Inclusion criteria were individuals within the 48 contiguous states of the USA (excluding Hawaii and Alaska) who (a) self-identified their racial/ethnic identity as non-Hispanic White, non-Hispanic Black, or Mexican American; (b) were between the ages of 18 and 75; and (c) did not have a diagnosis of any kind of diabetes, excepting a history of gestational diabetes. Individuals who were currently pregnant with gestational diabetes were screened out. Furthermore, because respondents were contacted using landline numbers, an additional requirement for inclusion was access to a landline during the time interviews were conducted.

To recruit a national sample, researchers utilized a stratified sampling technique. The sample was stratified at four geographic levels: census region, state, county, and telephone exchange. Researchers relied on several resources to obtain population information, which was subsequently used to determine the eligible population size and corresponding race/ethnicity distributions for each telephone exchange. Each exchange was then ascribed to one of seven strata based on the approximately equivalent diabetes prevalence rates, telephone usage, and detailed race/ethnicity distributions. Additional details about the generated strata are reported in the online supplement (see Appendix A).

Thirty-nine trained professional interviewers conducted structured telephone interviews with respondents who were identified using list-assisted, random-digit-dialing methods between August 2011 and February 2012. A sample of 1168 non-diabetic US adults aged 18–75 who self-identified as non-Hispanic Black ($n = 387$), non-Hispanic White ($n = 396$), or Mexican American ($n = 385$) completed the survey after planned exclusions (e.g., ineligibility due to diabetic status [$n = 4$] and race/ethnicity status [$n = 29$]). To complete the interview, interviewers dialed landline telephone numbers and conducted a screening process where the individual who picked up the telephone answered screener questions (e.g., age, diabetes status) about all of the members of their household to determine participant eligibility. If more than one eligible member

was identified, the computer would randomly choose a respondent from the eligible household members. If the computer selected another household member to participate in the study (i.e., someone other than the individual who picked up the phone), that individual re-confirmed their eligibility by answering the screening questions. Information about race/ethnicity was obtained at the end of the interview.

Measures

In addition to questions regarding type 2 diabetes, interviewers asked participants about (a) perceived descriptive norms that most people they know do not eat healthy foods, (b) perceived barriers to eating healthy foods, (c) beliefs about the uncontrollability of body weight, and (d) eating behavior. Moreover, participants' weight identity was measured using self-reports. Complete wording for the survey items is reported in the online supplement (Appendix B).

Descriptive Social Norms Participants reported their perceptions about the extent to which most people they know fail to eat healthy foods using one item on a Likert scale ("Most of the people I know don't eat healthy foods").

Barriers to Eating Healthy Foods Participants reported their perceptions of structural barriers to eating healthy foods using three items on a Likert scale (e.g., "Eating healthy food costs too much money"). The barriers reflected in these items have been well-documented in extant literature [44, 45]. Because these three items showed inadequate reliability ($\alpha = 0.59$), we measured barriers by counting the number of survey items for which participants reported "agree" or "strongly agree." As such, eating barriers were measured using a scale ranging from 0, *zero perceived barriers*, to 3, *three perceived barriers*. Although this approach can reduce variability in participants' responses [46], we used this approach because (a) our scale offered clear cut points (e.g., whether or not a proposed factor was perceived to be a barrier) and (b) there is some evidence that the psychometric properties for dichotomous scales are not necessarily worse than scales with 4- and 5-point response categories [47].

Beliefs About the Uncontrollability of Body Weight Participants reported their beliefs about the uncontrollability of body weight using four items on a Likert scale (e.g., "Some people will become very overweight no matter what they do"). Some of these items were adapted from previous research [48]. Three additional items used Likert-type scales ranging from 1, *not at all*, to 6, *all* (e.g., "How much do you think that your current weight is due to your genes or genetic makeup?"). Because the items were measured on different scales, all seven items were z-scored before being averaged into an index, with higher numbers indicating stronger beliefs about the uncontrollability of body weight ($\alpha = 0.77$).

Participants' Self-reported Eating Behavior We assessed several foods that have been directly associated with worse health outcomes (e.g., developing chronic health conditions, such as type 2 diabetes) [49]. Using a Likert-type scale ranging from 1, *never*, to 5, *at least once a day*, participants reported how often they consumed foods across seven categories: fruits, vegetables, snacks, sweets, French fries, non-diet soda, and fast food or take -out.[1] Interviewers gave examples of the kinds of food in each category. Although the healthy food categories (e.g., fruits and vegetables) showed a low correlation and remained separate for analyses, the five remaining food categories showed adequate reliability ($\alpha = 0.67$) and were aggregated into an index, "unhealthy foods".[2]

Self-Perceived Weight Status To measure self-perceived weight status, participants described their weight using five options: underweight, about right, slightly overweight, somewhat overweight, and very overweight.[3] 54.6% of our sample identified as overweight. We used participants' self-perceived weight status as the operationalization of weight identity because previous research suggests that personal beliefs about weight status (a) have a strong influence on how people perceive themselves and their surrounding environment, and (b) can be a better predictor of symptomatology (e.g., depression or disordered eating behaviors) than body mass index [51, 52]. As such, self-perceived weight status can serve the function of social identities (i.e., personal characteristics that help organize beliefs and behavior, which can subsequently impact how people navigate the world) [53].

[1] Although the survey included two additional food categories that are not reported in the main text (fruit drinks and bread-like foods, such as tortillas), we focused our analyses on food categories that have high consensus about being (un)healthy or (un)processed (e.g., although there is high consensus that sweets are unhealthy, there is relatively less consensus regarding the healthiness of bread-like foods) [50].

[2] Although this is a conceptual measure and the single items may not be highly correlated, using the index is a more powerful predictor of the category (i.e., unhealthy foods). Thus, we collapsed across food categories given our interest in unhealthy eating broadly (rather than a specific type of behavior). Analyses measuring each type of food separately are reported in the online supplement.

[3] Although previous research assesses self-perceived weight using these labels, we acknowledge that the term "overweight" is pejorative. However, to maintain consistency with how participants responded to this measure, participants will be described as individuals who (do not) "self-identify as overweight" throughout the paper.

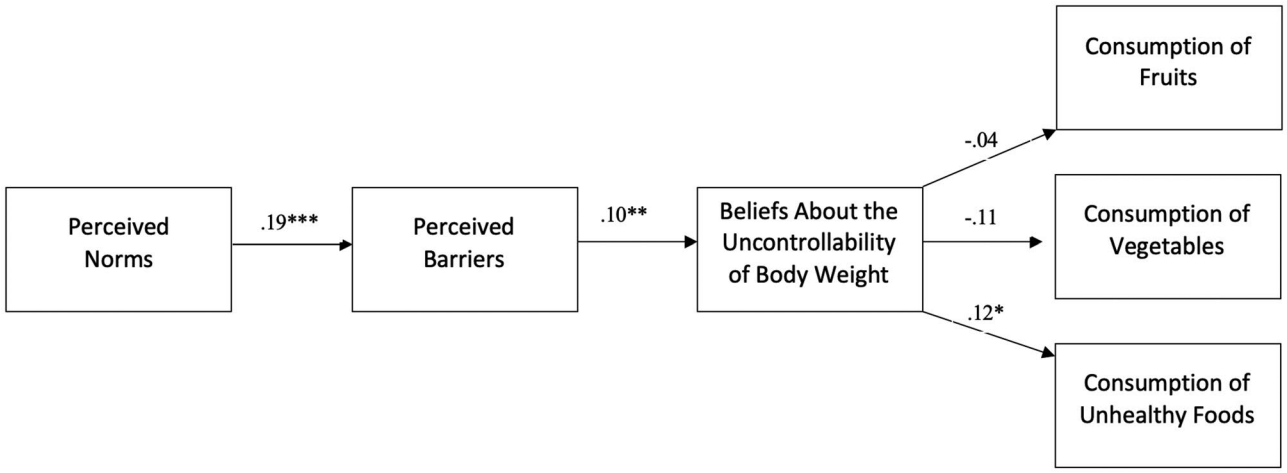

Fig. 1 Multigroup SEM model testing the process through which social norms predict eating behavior (across weight status). Note: coefficients are standardized. Analyses adjust for age, gender, race/ethnicity, and household income. *$p < .05$; **$p < .01$; ***$p < .001$

Statistical Analysis

The data were weighted to be nationally representative of the targeted ethnic/racial groups (except for their non-diabetes status). Additionally, sample weights were generated to compensate for several recruitment limitations (e.g., unequal selection probability, non-response and non-coverage errors) [54]. Because these adjustments produced large weights for individual cases that were overly influential on analyses, we used weight trimming to reduce the variance in the estimates [55, 56]. Furthermore, ratio-raking estimation was used to increase the representativeness of the target populations in the dataset [57]. Additional information regarding the methods used to generate the sample weights are reported in the online supplement (Appendix A).

We conducted multigroup SEM analysis in Stata 15.0 to test whether our conceptual model diverged for individuals who self-identified as overweight (versus "underweight" and "about right"; see Fig. 1 for the full model, and Fig. 2 for coefficients by weight status). Specifically, the model tested whether (a) perceived descriptive norms that people do not eat healthy foods predicts perceived barriers to eating healthy foods, (b) perceived barriers predict beliefs about the uncontrollability of body weight, and (c) beliefs about the uncontrollability of weight predict self-reported consumption of healthy and unhealthy foods (e.g., fruits, vegetables, and the index for unhealthy foods).[4]

The following analyses model all direct effects at each model pathway. Although the relationships of greatest theoretical interest are presented below, standardized coefficients, test statistics, and *p*-values for all model predictors are reported in the online supplement (Table S1).

During data analysis, 3 participants who failed to report their weight status were dropped from analyses. Additionally, due to the exclusion of participants who did not respond to one or more of the demographic variables that were controlled for in the analyses (age, gender, race/ethnicity, and household income), our final sample included 990 participants (see Table 1 for sample demographics).[5] Additional analyses and information regarding missing data, including efforts to minimize data loss, are reported in the online supplement (Table S5 and Appendix C).

Results

Due to statistical limitations when conducting multigroup SEM analysis with sampling weights (e.g., violation of assumptions, such as non-independence of observations), we were unable to obtain goodness-of-fit indices to compare model fit between models where all pathway coefficients were constrained as equal (versus unconstrained). Moreover, because the model was saturated

[4] Although perceived barriers were transformed into a count variable, it was not estimated with a Poisson distribution because this distribution cannot be used with negative values (as generated by our standardized variables). Therefore, we tested our model without Poisson distribution to avoid issues with interpretability caused by having both standardized and unstandardized coefficients in the model. Use of the Poisson distribution did not change the reported results, and this model is reported in the online supplement for interested readers.

[5] When completing the survey, some participants volunteered responses, particularly on the eating outcomes, that we retained in the dataset to mitigate a substantial loss of statistical power (e.g., 30% of the sample volunteered a response of "never" in response to drinking regular soda). However, exclusion of these responses showed no significant impact on the pattern of reported results. These analyses are reported in the online supplement (Table S4).

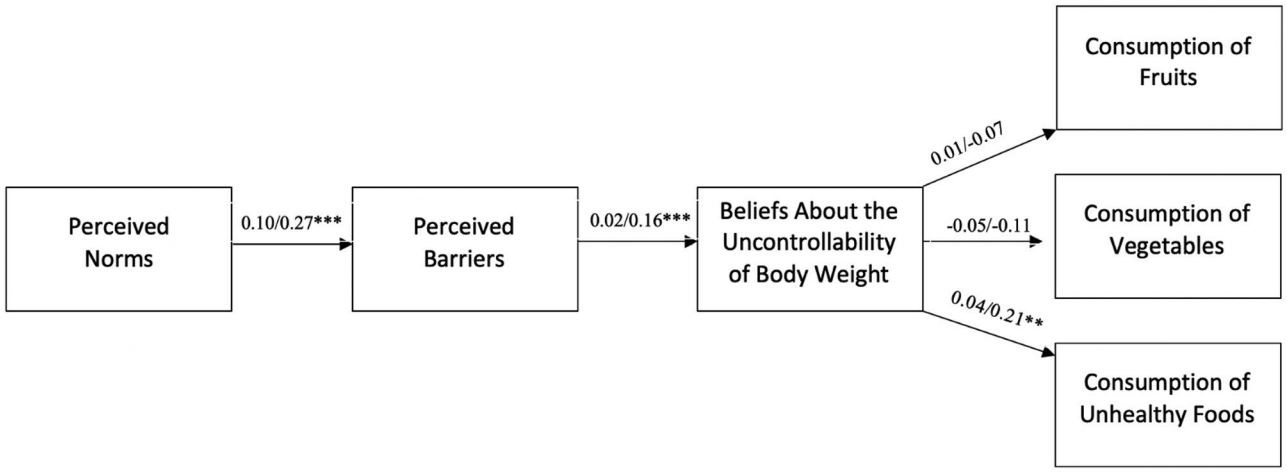

Fig. 2 Multigroup SEM model testing the process through which social norms predict eating behavior (separated by weight status). Note: coefficients are standardized and are reported as: estimates for individuals who do not identify as overweight/individuals who identify as overweight. Analyses adjust for age, gender, race/ethnicity, and household income. *$p < .05$; **$p < .01$; ***$p < .001$

(i.e., contained zero degrees of freedom), we evaluated model fit by examining the SRMR of our proposed model to alternative models where one of the direct pathways (e.g., the relationship between perceived norms and beliefs about the uncontrollability of body weight, the relationship between perceived norms and eating behavior, or the relationship between perceived barriers and eating behavior) was removed. Analyses revealed that the SRMR of thesealternative models varied between .001 and .023, which would indicate good fit based on established criteria (e.g., a value below .08) [58].

We conducted multigroup analysis (rather than testing for moderation specifically on the relationship between perceived barriers and beliefs about the uncontrollability of body weight) as a more conservative test of our prediction that the strength of this particular relationship would vary between individuals who identified as overweight (versus not). To assess group differences, we used Wald's tests to compare coefficients across weight status for the pathways between (a) perceived norms and barriers to eating healthy foods, (b) barriers to eating healthy foods and beliefs about the uncontrollability of body weight, and (c) beliefs about the uncontrollability of weight and eating behavior. These analyses, testing differences across pathway coefficients, are reported below. Means and standard deviations for each measure (both across and split out by self-perceived weight status) are reported in Tables 2, 3, and 4.

Using 5000 bootstrap samples, analyses revealed a significant indirect effect for consumption of unhealthy foods, $b = .002$, $SE = .001$, $p = .041$, 95% CI [.000, .005], but non-significant indirect effects for consumption of fruits, $b = -.001$, $SE = .002$, $p = .466$, 95% CI [−.004, .002], and vegetables, $b = -.002$, $SE = .002$, $p = .308$, 95% CI [−.006, .002].

Do Descriptive Social Norms Predict Perceived Barriers to Eating Healthy Foods?

Perceiving descriptive norms that other people do not eat healthy foods predicted stronger barriers to eating healthy foods, $\beta = 0.19$, $SE = 0.05$, $p < 0.001$, 95% CI [0.09, 0.29].

Table 1 Participant demographics ($n = 990$)

Demographic	Percentage	Mean (SD)
Age		43.87 (15.52)
Sex		
Male	52.7	
Female	47.3	
Household income		
<$15,000	8.8	
$15,000–$25,000	12.2	
$25,000–$35,000	8.9	
$35,000–$50,000	13.8	
$50,000–$75,000	17.9	
$75,000–$85,000	7.8	
$85,000–$100,000	10.5	
>$100,000	20.1	
Education		
8th grade or less	1.2	
9th–11th grade	6.1	
12th grade or GED	35.2	
Some college	15.9	
Associate's degree	9.4	
Bachelor's degree	19.7	
Master's degree	8.9	
Doctoral degree	3.5	

The magnitude of this relationship did not differ across weight identity, $F(1,984)=2.59$, $p=0.108$.

Do Perceived Barriers Predict Beliefs About the Uncontrollability of Body Weight?

Perceiving barriers to eating healthy foods predicted stronger beliefs about the uncontrollability of body weight, $\beta=0.10$, $SE=0.03$, $p=0.005$, 95% CI [0.03, 0.17]. Moreover, consistent with our hypotheses, the magnitude of this relationship was significantly stronger for participants who identified as overweight (relative to participants who identified as "about right" and underweight), $F(1,984)=4.67$, $p=0.031$.

Do Beliefs About the Uncontrollability of Weight Predict Self-reported Eating Behavior?

Stronger beliefs about the uncontrollability of body weight predicted self-reports indicating greater consumption of unhealthy foods, $\beta=0.12$, $SE=0.06$, $p=0.034$, 95% CI [0.01, 0.23]. However, beliefs about the uncontrollability of weight were not associated with consumption of healthy foods, such as fruits, $\beta=-0.04$, $SE=0.10$, $p=0.690$, 95% CI [−0.25, 0.16], or vegetables, $\beta=-0.11$, $SE=0.09$, $p=0.253$, 95% CI [−0.29, 0.08]. The magnitude of this relationship did not differ across weight identity for unhealthy foods, $F(1,984)=2.45$, $p=.118$, fruits, $F(1,984)=0.25$, $p=0.620$, or vegetables, $F(1,984)=0.10$, $p=0.751$ (Tables 2, 3, and 4).

Discussion

To date, prominenthealth behavior models have examined the independent relationships forconstructs, such as social norms, perceived barriers, and health beliefs, onbehavior [9, 23, 59]. However, many of these theoretical models fail toconsider the relationships *between* these constructs, as well as themoderating role of social identities on these relationships. Thus, the goals ofthe current work were to (a) present a conceptual model delineating one processthrough which perceiving social norms about others' eating behavior predicts one'sown eating behavior, and (b) assess the extent to which this process variesacross social identities. Given this study's focus on eating behavior, a domainwhere weight-based stereotypes are pervasive [60], we were specificallyinterested in testing the moderating role of weight identity (e.g., whetherindividuals self-identify as overweight).

Using a large, national dataset, we found support for our proposed model. Specifically, the model revealed that perceiving descriptive social norms that other people do not eat healthy foods was associated with perceiving stronger barriers to eating healthy foods. Perceived barriers predicted greater beliefs about the uncontrollability of one's body weight, and the magnitude of this relationship was stronger for individuals who self-identified as overweight (relative to individuals who identified their weight to be about right and underweight). Beliefs about the uncontrollability of body weight, in turn, predicted self-reported behavior indicating increased consumption of unhealthy foods. However, these beliefs did not predict behavior regarding healthy foods (e.g., consuming fruits and vegetables). Nevertheless, this conceptual model offers an important step towards improving our understanding of the processes that can shape eating behavior, as well as the relationships between commonly studied psychosocial constructs.

Table 2 Means and standard deviations for study measures (across self-perceived weight status)

Measure	*M* (SD)
Perceived norms	3.13 (1.43)
Perceived barriers	0.94 (0.95)
Beliefs about the uncontrollability of body weight	0.00 (.61)
Consumption of fruits	4.42 (0.72)
Consumption of vegetables	4.67 (0.59)
Consumption of unhealthy foods	3.34 (0.74)

The measure for beliefs about the uncontrollability of body weight is standardized

Table 3 Means and standard deviations for study measures (participants who identified as overweight [$n=541$])

Measure	*M* (SD)
Perceived norms	3.16 (1.42)
Perceived barriers	1.09 (1.02)
Beliefs about the uncontrollability of body weight	−0.03 (0.62)
Consumption of fruits	4.40 (0.67)
Consumption of vegetables	4.73 (0.50)
Consumption of unhealthy foods	3.36 (0.73)

The measure for beliefs about the uncontrollability of body weight is standardized

Table 4 Means and standard deviations for study measures (participants who did not identify as overweight [$n=449$])

Measure	*M* (SD)
Perceived norms	3.10 (1.44)
Perceived barriers	0.79 (0.84)
Beliefs about the uncontrollability of body weight	0.04 (0.59)
Consumption of fruits	4.43 (0.76)
Consumption of vegetables	4.60 (0.66)
Consumption of unhealthy foods	3.33 (0.75)

The measure for beliefs about the uncontrollability of body weight is standardized

Study findings indicated that beliefs about the uncontrollability of body weight predicted consumption of unhealthy foods (e.g., sweets), but did not predict consumption of healthy foods (e.g., fruits). Although the reasons underlying these null effects are unclear, one possible explanation for non-significance is a ceiling effect. The percentage of participants who reported eating fruits and vegetables "at least once a week" or "at least once a day" (90.58–96.82%) was higher than the percentage of participants who reported these responses for the unhealthy foods (37.54–72.74%). Despite non-significant findings for the consumption of healthy, unprocessed foods, these results offer some evidence that the observed process predicts consumption of unhealthy foods—a well-documented risk factor for developing chronic health conditions, such as type 2 diabetes.

This study contributes to a growing body of research examining processes that underlie the relationship between social norms and eating behavior. To date, research in this area has provided empirical support for multiple mechanisms; for example, perceiving norms about others' typical portion size can influence one's own consumption by changing perceptions about the amount of food that is deemed appropriate to eat [61]. Moreover, other research shows that perceiving norms about the vegetable intake of one's social group can increase identification with the behavior, generate more positive attitudes towards the behavior, and increase feelings of efficacy for engaging in the behavior—responses that subsequently increase vegetable consumption [62]. Of note, examining individuals' responses to different types of normative information have elucidated additional mechanisms. Specifically, exposure to dynamic norms, such as learning that Americans are increasingly avoiding sugary beverages, can prompt beliefs that the behavior is (in)compatible with one's identity, subsequently reducing American adults' interest in consuming sugary drinks [25].

Although prior research has provided converging evidence for several mechanisms to explain the relationship between norms and various health behaviors [25, 62, 63], additional research investigating these processes is warranted to develop a more comprehensive understanding of psychosocial factors that influence (un)healthy eating behavior. The current work builds upon previous findings by examining the relatively unexplored association between constructs, such as perceived structural barriers and fatalistic beliefs, on eating behavior. Although fatalism is related to previously established mechanisms in this area, such as self-efficacy, research suggests that fatalism is a predictor of low self-efficacy, rather than an interchangeable construct [64, 65]. Therefore, the current findings contribute to burgeoning literature in this area [11, 66] by providing initial evidence for another process that predicts eating behavior.

In addition to documenting a process through which social norms can predict behavior, this model furthers our understanding of the ways in which social identities can influence responses to normative information. Extant research examining the interplay between social identities and norms has focused primarily on the way in which social identities determine who serves as a reference group for normative information. For example, a robust pattern of findings demonstrates that people are more likely to adhere to normative information conveyed by individuals who share their social identity, particularly when their social identities are salient [38, 62, 67]. The current findings offer supportive evidence for another way in which social identities may operate in the context of social norms; specifically, identities may prompt different interpretations of the same normative information (even when the norm does not directly reference a specific identity). These findings are consistent with other research showing that social identities can differentially affect the ways in which people interpret cues in their environment. For instance, prior research shows that adults with higher (versus lower) body weights show greater reactivity to food cues, which may result in differential processing when perceiving food-related norms [68].

The observed role of social identity in our model is supported by identity-based motivation theory, which argues that when health behaviors are perceived to be inconsistent with salient social identities (e.g., an "overweight" weight identity), individuals may be particularly likely to interpret difficulty associated with engaging in the identity-inconsistent behavior as impossible. This interpretation can facilitate beliefs about having low controllability over one's outcomes (e.g., body weight) and impede health behavior engagement [41]. Previous theorizing posits that this identity-based process is driven largely by individuals' personal experiences and awareness of stereotypes tied to their social identity (e.g., stereotypes that people with higher body weights eat unhealthy foods). Although the current study did not assess participants' knowledge about stereotypes directly, negative stereotypes about body weight are pervasive within American culture [69]. Thus, the current findings contribute to research on identity-based motivation by examining stimuli, such as normative information in one's environment, that might serve as antecedents to these identity-based processes, and testing this theory with a social identity (e.g., weight status) that has been unexplored in this context.

Importantly, it is not always the case that (a) people with higher body weights have unhealthy eating habits, or (b) people with higher body weights perceive engaging in health behaviors to be difficult. However, consistent with identity-based motivation, we argue that pervasive stereotypes about people with higher body weights (e.g., having poor eating habits) may activate beliefs about how "people like me"

are expected to behave, and these expectations can shape interpretations of, and responses to, perceived difficulty. To develop a more comprehensive understanding of the ways in which social identities moderate responses to normative information, continued research in this area is needed.

Limitations and Future Directions

An important limitation of this study is that the conceptual model is based on cross-sectional data and causality cannot be inferred. However, we accounted for order by including the direct effects for all predictors at each stage of the model. Although our conceptual model is likely one of several processes that arise in response to perceived norms, this work offers a fruitful first step towards understanding the various processes that can predict uptake of eating behavior. To provide additional support for the current model, future research should replicate these findings by manipulating the model constructs using an experimental design.

In this study, we posited that the relationship between perceived barriers and beliefs about the uncontrollability of body weight is moderated by weight identity due to the awareness of pervasive stereotypes which signal that eating healthy foods is identity-incongruent for people who identify as overweight (resulting in perceptions of difficulty as impossibility). This framework is supported by identity-based motivation theory, as well as extensive research documenting how weight stigma and negative weight-based stereotypes influence subsequent processing of social information and behavior, especially in the context of eating [39, 70–72]. However, it is possible that this relationship may vary across weight status due to differences in past experiences (e.g., diet history, struggles with weight loss attempts). Future research should include survey measures that directly test the role of these experiences against perceptions that eating healthy foods is identity-incongruent to determine the cause of the associations identified in the current model.

Additionally, this study assessed a limited number of factors that can influence eating behavior. Although we controlled for demographic characteristics (e.g., household income) to account for the influence of some of these factors, it is important to note that eating behavior can be driven by many factors (e.g., family influence, home and neighborhood environment, history of food scarcity, etc.). Moreover, future research should assess additional moderators, such as the strength of one's social identity, which may also affect the strength of the associations reported in the model.

Furthermore, a sizeable number of participants were dropped from analyses due to non-response on demographic covariates (e.g., household income). However, eliminating the income covariate from the model did not change the reported results (see the online supplement for additional analyses). Another limitation of this work is that although the measures used in this study were informed by prior literature, they are not validated scales. Relatedly, the eating outcomes were assessed using self-report measures that asked participants to recall past behavior. Future studies should utilize additional behavioral measures (e.g., asking respondents to record their eating habits in a daily diary) that may more accurately track eating behavior over time.

Lastly, although this study identified one process through which perceived norms about others' eating behavior predicts one's own eating habits, the survey items did not identify who the normative referents were and whether these referents vary systematically among people with higher (versus lower) body weights. The current data showed no evidence that adults who identified as overweight (versus not) knew more people who did not eat healthy foods, suggesting that differential exposure to unhealthy eating in social networks cannot explain this model (see online supplement for relevant analyses). However, future studies should explore normative referents in the context of this conceptual model to identify whether and how they might influence subsequent processes. For example, perceptions that "people like me" do not engage in healthy eating behavior may have a stronger impact on barriers than norms based on strangers or "people not like me." Additionally, future research should consider (a) the existence of actual, rather than perceived, barriers to healthy eating behavior, and (b) whether this model generalizes to other social identities and behaviors, such as exercise, to examine the role of these factors in light of the larger questions being explored in this work.

Implications and Interventions

Although extensive research shows that perceived norms directly influence behavior uptake, examining processes through which norms influence eating behavior have important implications for the strategies used to intervene on health behavior. For example, although intervening on norms is one possibility for changing eating behavior, behavior change is complex and multiply determined. As such, this work suggests other possible intervention points, such as barriers and/or fatalistic beliefs, on which public health efforts might also direct their focus. Furthermore, these findings suggest that the way in which psychosocial constructs are targeted in behavior interventions may also benefit from accounting for social identities. For example, developing interventions that frame behaviors as identity-congruent may be a viable intervention strategy to change how people interpret experienced or anticipated difficulty [43, 73].

Conclusion

Although healthy eating is frequently targeted in behavior interventions, social environmental cues have important influences on the extent to which people engage in such behavior. Using identity-based motivation as a theoretical framework, the current work presents a conceptual model to lend further insight into how, and for whom, perceived social norms can predict one's own (un)healthy eating behavior. By identifying a process through which perceived norms that others do not engage in healthy eating behavior predicts self-reported consumption of unhealthy foods and elucidating the role of social identities (e.g., weight status) in this process, this work offers testable hypotheses that can be developed in future research to inform health behavior interventions and improve uptake of healthy eating behavior.

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Availability of Data and Materials Data is available from the corresponding author upon request.

Declarations

Ethics Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Conflict of Interest The authors declare no competing interests.

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