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Title: Healthy eating habit: A role for goals, identity and self-control?

Running Head: Healthy eating habit

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Healthy eating habit: A role for goals, identity and self-control?

Abstract

Supporting healthier eating habits is crucial for improving population health outcomes. Underpinning everyday eating patterns are recurring actions which may lead to positive or negative health outcomes depending on the healthfulness of such actions. The aim of this research was to explore individual-level determinants of a healthy eating habit and consider to what extent personal goals and self-control are linked to a healthy eating habit. One thousand one hundred and nine adults completed a survey focusing on a range of factors that potentially sway food choice behaviors. A structural model, developed based on a review of existing literature, was tested using self-reported healthy eating habit (Verplanken & Orbell, 2003) as the dependent variable. Analysis suggests that along with health-conscious identity and food hedonism, self-control was one of the strongest determinants of a healthy eating habit. Furthermore, while healthy eating goals had a direct significant effect, other goals, economizing and emotional, did not. However, all three goals along with food hedonism had a significant indirect effect that was mediated through self-control. In revealing the role of self-control this work questions the underlying assumption of automaticity in a healthy eating habit. This leads to the questions: what is a healthy eating habit and to what extent can healthy eating behaviors ever be truly characterized as controlled by heuristics and automaticity? This analysis suggests that healthy eating is an ongoing behavioral project that requires the continued engagement of deliberative processes; thus habit within this context, and as measured using self-reported habit, may be a misnomer. The use of healthy eating routines, as opposed to habits, may be more appropriate to acknowledge the role of both automatic and deliberative processes with self-control being central in everyday decision making. Important practical and theoretical implications are discussed along with potential approaches for health and food sectors to support healthier eating behavior in the future.

Keywords: healthy eating, habit, self-control, identity, goals, automaticity.

Introduction

Eating healthily has long been highlighted as a significant part of protecting oneself against many non-communicable diseases (World Health Organization, 2003). Within this context, everyday eating behavior needs to be unpacked to understand its relevance to longer term health, particularly given that recurring everyday small actions, that individually have little consequences, can cumulatively lead to health-related problems (Verplanken & Wood, 2006). Indeed, Hall et al. (2011) illustrate this in the case of food behaviors when they note that as little as 100 calories greater than daily requirements can result in a weight change of six lbs, or three kgs, in one year. While this outcome varies between individuals, by age and by body composition (Hall et al., 2011), the impact of everyday small actions is apparent. Given that such small actions can lead to negative outcomes the opposite is equally possible. Embedding new behaviors, based on an understanding of healthy practices, can lead individuals to create and enact a healthy eating habit comprised of a combination of small actions. These new behaviors are initially goal driven and overtime may become habitual within stable contexts. However, the continuation of a healthy eating habit can be challenged due to changes in the environment representing a threat to the individual's efforts to maintain particular actions. This raises an interesting question about the dynamic between goals, habit and self-control in environments where competing cues can divert individuals away from their preferred behaviors. Gaining clarity on the determinants of a healthy eating habit is of particular interest to support healthier behaviors and improved health outcomes.

Habit has been defined by Verplanken & Aarts (1999) as "*learned sequences of acts that have become automatic responses to specific cues, and are functional in obtaining certain goals or end states"* (page 104). Extending on this definition and drawing on the work of Pashler (1994),

who suggests that habits are simply well-practiced behaviors, and Wood & Neal (2009), who acknowledge that habit is not immune to deliberative processes, the authors define a healthy eating habit, for the purposes of this paper, not as a wholly automatized behavior but one that includes elements of deliberation and negotiation. While Verplanken & Aarts (1999) definition of habit is nested in a stable environment, healthy eating behavior must be understood in a marketplace characterized by flux comprising of stable and unstable elements. Furthermore, a person may assess their eating behavior as automatized but may use elements of deliberation and self-control to address the challenges presented in a modern food environment that compromises on healthy eating goals. Consequently, the authors wish to develop a model of healthy eating habit that applies to such a marketplace. In doing so it is intended to provide a clearer understanding of a healthy eating habit which could inform future behavioral interventions and support positive population health outcomes. While there is comprehensive coverage in the literature on healthy eating determinants, no existing model examines these determinants simultaneously nor acknowledges the potential significance of self-control as a critical mediator between personal goals and a healthy eating habit.

Building on existing evidence and knowledge, a series of hypotheses are initially established which, when considered together, form a deductive model of a healthy eating habit. This model is tested using a sample of 1109 respondents who participated in the National Adult Nutrition Survey (NANS). Having established the reliability and validity of the chief constructs, the structural model is tested using structural equation modeling (SEM). In line with the recommendations of Podsakoff, MacKenzie, Lee, & Podsakoff (2003), a full consideration of bootstrapped direct and indirect effects inform the discussion of findings and theoretical and practical insights.

Hypotheses

The authors argue that for a healthy eating habit to exist in a marketplace characterized by the proliferation and ubiquitousness of food-related cues, conscious deliberation and engagement of self-control may be exerted at least from time to time. Thus, consideration is initially given to a healthy eating habit within a market context. In the following section, existing knowledge is drawn upon to establish a deductive model to reveal the role of self-control. To assist the reader and to contextualize each hypothesis, figure 1 represents the proposed model of a healthy eating habit with each link representing one of the hypotheses set out below.

[Insert figure 1 here]

Health Conscious Identity

The role of self-identity, defined as "*the relatively enduring characteristics that people ascribe to themselves, which take the form of (or incorporate) socially given linguistic categorizations*" (Sparks & Guthrie, 1998, pg. 1394), in the prediction of behavioral intention and behavior has been extensively documented (Biddle, Bank, & Slavings, 1987; Charng, Piliavin, & Callero, 1988; Sparks & Guthrie, 1998; Sparks & Shepherd, 1992). It has been argued that self-identity represents a generative force behind behavior (Biddle et al., 1987) with the marketplace acting as a driver of identity formation but also as a forum for identity expression (Arnould & Thompson, 2005). Connections are created with a salient group through common purchases and consumption; thus in the process of communicating identity to others individuals consume certain products and actively avoid others (Lindeman & Stark, 2000; Shavitt, 1990). Thus, it is not surprising, given the central role of food to everyday life, that food is used by many as a

means of projecting a chosen identity position (Arnould & Thompson, 2005). One related self-identity position is that of health, with the relevance to food behaviors illustrated in the work of Sparks & Guthrie (1998). As an enduring personal characteristic, self-identify can drive behavioral repetition and may play a key role in habit. Thus, the authors propose that:

H1: There is a direct and positive relationship between health-conscious identity and healthy eating habit.

Human Capital Resources

Human capital is described as "*the stock of information and knowledge obtained in the past that makes the consumer more productive in the current period*" (Putrevu & Ratchford, 1998, p.467) or as "*knowledge, skill or expertise in people acquired through investments in formal or informal education, training or learning by doing*" (Ratchford, 2001, p.397). One of the features of human capital is that it helps the individual economize on time and cognitive effort by repeatedly taking recourse to existing know-how and established routines, i.e. they allow individuals to enact behaviors and form habits that fit with important personal goals. Indeed, Rothman, Sheeran, & Wood (2009) and Webb & Sheeran (2004) argue that adequate resources need to be available to allow the initiation of action. In the proposed model, human capital encompasses good cooking skills and the ability to prepare foods from scratch, which is associated with improved dietary quality and healthier weight levels, rather than reliance on more convenience type products (Mancino & Gregory, 2012; Reid, Worsley, & Mavondo, 2015; Zick, Stevens, & Bryant, 2011). To maximize the value of these embedded capabilities and knowledge, consumers are encouraged to draw upon them repeatedly, influencing not just the foods purchased but also the manner in which these foods are prepared and consumed. Thus it is proposed that human capital will be positively related to a healthy eating habit.

H2: There is a direct and positive relationship between human capital resources and healthy eating habit.

Self-Control

The level of self-control a person holds influences food choice and adherence to a healthy diet. Drawing on the work of Baumeister (2002) and MacInnis & Patrick (2006), self-control is defined as the process of controlling behavior to achieve a set of self-correcting actions to attain a personally desirable goal. Thus, self-control is a narrower but related concept to that of self-regulation as employed by Petit et al. (2016). In the context of a healthy eating habit, it relates to the ability to override contextual cues to particular undesired patterns of food consumption and replace them with healthier behaviors to attain their healthy eating goal. High levels of self-control are associated with increased levels of healthy eating, less binge eating, and reduced alcohol consumption while low self-control is typically associated with increased consumption of sugary and fatty foods (Friese & Hofmann, 2009; Oaten & Cheng, 2006). Interestingly, Salmon et al. (2014) demonstrated that low self-control and healthy eating are not incompatible but rather environmental cues determine the extent to which healthy food choices were made as impulsive decision-making strategies prevail in times of low self-control. Thus, self-control is of greater relevance to a healthy eating habit in environments which encourage unhealthier eating behavior.

At first glance the role of self-control in habit appears clear. As habits are typically viewed as unconscious automatic behaviors controlled by contextual cues rather than a deliberative decision-making process (de Ridder et al., 2012), self-control should be of minimal importance in habit. However, Pashler (1994) argues that automatic behaviors do not truly exist but habits simply appear automatic as less time and effort is required for their performance as they have been consistently repeated over time. However, habitual behaviors may still be part of a

conscious decision-making process and may continue to utilize deliberative processes which the authors propose occupies that space that is typically viewed as self-control. It is in this regard that it is suggested that self-control is important in a healthy eating habit but the extent of its importance is unclear. The authors propose that:

H3: There is a direct and positive relationship between self-control and healthy eating habit.

Personal Goals and Mediation through Self-Control

Habits may be associated with positive or negative health outcomes as food behavior can be motivated by many, and sometimes, competing goals. These goals are characterized by a complex interplay between individual, interpersonal, and social factors (Köster, 2009; Randall & Sanjur, 1981; Sobal, Bisogni, Devine, & Jastran, 2006) and it is the interactions between these that shape food consumption patterns (McCarthy & Collins, 2008). Some goals, such as health goals, represent desired future states and are consciously accessible by the individual during decision-making (Schultheiss & Brunstein, 1999). Other goals, such as hedonic goals, relate to more immediate felt states which may be less consciously accessible to the individual but continue to have a latent influence on behavioral performance. As a habit is formed, changes are seen to occur at a neurological level with behavioral control moving from the goal-directed associative network to the context-directed sensorimotor network (Yin & Knowlton, 2006). Personal goals become less of a direct influence on a habit as contextual cues begin to direct the habitual response (Oulette & Wood, 1998; Wood & Neal, 2009). However, it is also argued that goals continue to exert a latent influence on habitual behavior as they underpin behavioral motivation and repetition (Bargh, 1994; Bargh & Gollwitzer, 1994; McClelland, 1987; Heckhausen & Beckmann, 1990). Figure 1 outlines a number of personal goals relevant to a healthy eating habit.

The level of importance placed on health impacts on food choice (Furst et al., 1996; Roininen et al., 2001; Steptoe, Pollard, & Wardle, 1995; Verbeke, 2008) with healthier dietary patterns reported more often in those with stronger health goals (Deshpande, Basil, & Basil, 2009; Pollard, Steptoe, & Wardle, 1998; Steptoe et al., 1995; Traill, Chambers, & Butler, 2012). In contrast, a hedonistic approach to food consumption with a simultaneous lack of concern for the healthfulness of dietary intake appears to undermine a healthy eating habit (Block, Gillman, Linakis, & Goldman, 2013; Geeroms, Verbeke, & Van Kenhove, 2008; Hayes & Ross, 1987). Thus it is proposed that:

H4: There is a direct and positive relationship between healthy-eating goals and healthy eating habit.

H5: There is a direct and negative relationship between food hedonism goals and healthy eating habit.

Desired emotional end states are often sought from food consumption (Furst et al., 1996). Indeed, it is often cited as one of the most significant goals driving food choice (Honkanen & Frewer, 2009; Steptoe et al., 1995; Sun, 2008) and is often reason enough for consumption (Roberts & Pettigrew, 2013; Sobal et al., 2006). In an attempt to deal with everyday stresses and emotional demands, individuals may opt for unhealthier foods as these are typically perceived as tastier and more effective at meeting emotional needs (Luomala, Laaksonen, & Leipämaa, 2004; Raghunathan, Naylor, & Hoyer, 2006). Thus, encountering cues related to emotional goals is likely to have a negative impact on healthy eating behavior, and as a consequence diminish a healthy eating habit, as individuals choose unhealthier foods to meet emotional goals.

H6: There is a direct and negative relationship between emotional goals and healthy eating habit.

Another important influence on food choice relates to the extent to which consumers are motivated by price and the need for food purchases to be cheap, which is referred to as economizing goals in this paper. Existing evidence illustrates that it is up to 10 times more expensive to source calories from healthy foods than from foods high in fat, salt and sugar on the island of Ireland (Healthy Food for All, 2009), and estimates from the US indicate that shifting from an unhealthy diet to a healthy one costs in the region of $550 per capita per annum (Rao, Afshin, Singh, & Mozaffarian, 2013). As evidence suggests that unhealthy foods are often seen as the cheaper option, consumers motivated by economizing goals and the need to extend the purchasing power of their financial resources will be less likely to display a healthy eating habit (Collins & McCarthy, 2005; Macdiarmid, Loe, Kyle, & McNeill, 2013).

H7: There is a direct and negative relationship between economizing *goals and healthy eating habit.*

It is evident that an individual can hold a variety of personal goals which may display specific context and temporal characteristics. Context can influence the extent of saliency of particular cues and relevant goals. The modern food environment provides a diverse set of cues that exploits humans natural inclination towards more immediate rewards and goals encouraging the habitual over-consumption of calorie-dense foods (Chandon & Wansink, 2012). Thus, an unhealthy eating habit may be formed and maintained more readily in comparison to a healthy eating habit driven by health goals and desired future states. New health goals can prompt an initial behavior change but existing habits, driven by alternative goals, can present a significant challenge to consumers when attempting to embed a healthy eating habit (Baumeister, Gailliot, DeWall, & Oaten, 2006; Hofmann, Friese, & Strack, 2009; Naughton, McCarthy, & McCarthy, 2015a). Indeed, existing and past beliefs, perceptions around food, and the memory traces linked to previous behavioral responses and related habits present the key challenge. This challenge may demand resolution through a process of deliberation and negotiation in the form

of self-control. As higher levels of self-control enable unwanted behaviors to be overridden (Baumeister, 2002), self-control may act as a buffer and mediate the episodic influence of competing goals ensuring a healthy eating habit is supported if not maintained in its entirely. Thus, the authors suggest that engaging self-control may form part of a person's overarching healthy eating habit.

In particular, goals related to economizing, emotion, health, and hedonism display inherent competition and warrant particular attention in the proposed model. Particular food environments tend to disproportionately promote cheaper, unhealthier foods (Ravensbergen, Waterlander, Kroeze, & Steenhuis, 2015) and, as a consequence, economizing goals may dominate healthy eating goals in this context necessitating the engagement of self-control processes to maintain a healthy eating habit. Occasions of emotional distress can act to diminish an individual's level of self-control (Baumeister, 2002; Baumeister, Heatherton, & Tice, 1994) which may lead to consumption of unhealthier foods as a means of addressing emotional needs (Baumeister, 2002; Luomala et al., 2004; Raghunathan et al., 2006). In contrast, clear health goals build a greater capacity to control behavior to ensure goal attainment (Baumeister, 2002). Thus, possession of clear healthy eating goals is likely to enhance self-control capacity while either hedonistic or emotional goals are likely to have the opposite effects and diminish self-control. As many elements influence a healthy eating habit, particular goals may dominate in different contexts. When faced with multiple cues that relate to competing goals, a trade-off occurs requiring negotiation through self-control with consequences for a healthy eating habit. Consequently, the authors propose:

H8: There is an indirect and positive relationship between healthy eating goals and healthy eating habit mediated through self-control.

H9: There is an indirect and negative relationship between food hedonism goals and healthy eating habit mediated through self-control.

H10: There is an indirect and negative relationship between emotional goals and healthy eating habit mediated through self-control.

H11: There is an indirect and negative relationship between economizing *goals and healthy eating habit mediated through self-control.*

Methods

Sample

This inquiry formed part of a larger funded study on food entitled the National Adult Nutrition Survey (NANS). The methodology has been described in detail previously (Naughton, McCarthy, & McCarthy, 2015b). Briefly, a stratified random sample of 1500 independently living adults (men 740, women 760) aged 18 and over from across the Republic of Ireland took part in NANS between October 2008 and April 2010. The overall NANS sample was representative of adults in Ireland with respect to age, gender, marital status, social class, and urban/rural location when compared to Census 2006, as shown by Naughton et al. (2015b). Respondents were asked to complete three questionnaires over the course of the four day food diary, namely a physical activity questionnaire, a health and lifestyles questionnaire (which covers demographics) and finally a food choice questionnaire. The current analysis is drawn from the food choice questionnaire which was distributed by the field workers on the second of three visits that occurred. The questionnaire was designed for self-completion and was left with the participant for three days. 1109 of the returned 1500 questionnaires were sufficiently completed for inclusion in the analysis. Table 1 outlines the demographic characteristics for the population sample used in the current analysis. In comparison to the total NANS dataset, the sample population used in the current analysis appears to have a younger population with

72% aged 18 – 50 years compared to 64% in the total NANS dataset. All remaining demographic variables followed the same pattern as seen in the total NANS dataset.

[Insert table 1 about here]

Measurement Model

Item selection

The interest of this paper is to identify the significant determinants of a healthy eating habit. The dependant variable, healthy eating habit, was measured using a shortened version of Verplanken & Orbell's (2003) Self-Reported Habit Index (SRHI). Five of the original twelve items were included. Verplanken & Orbell (2003) argue that they designed the instrument from the position that a habit is intentional in its origins (initiated to attain a particular goal), is controllable within limits, is efficient (frees a person to think about things other than the action) and is done without awareness. These key principles are not violated in the reduced instrument. The SRHI is dominated with items that measure a history of repetition and features of automaticity (efficiency, lack of awareness and difficulty of controlling behavior), thus these two elements were of particular importance in the selection of the final set of items.

A feature of the SRHI reflects a sense of identity and is measured with the statement 'Behavior X is something that is typically "me"'. The inclusion of self-identity in a habit scale is questionable and while Verplanken & Orbell (2003) argue that habits form an important part of how individuals organize their everyday life and as such might reflect a sense of identity they recognize that this may not be the case for all products. Sniehotta & Presseau (2012) reinforce this point and suggest that this is an independent construct and should not form part of a habit measure. Following this argument one may expect that health-conscious identity acts as a significant determinant of a healthy eating habit but is not a measure of habit. Thus a

separate measure of health conscious identity was identified for use in the final questionnaire. Health conscious identity was measured using the three items developed by Sparks & Guthrie (1998). For both habit and identity seven point likert type scales were used ranging from (1) strongly agree to (7) strongly disagree.

As mentioned previously habit, as a psychological construct, originates in the attainment of goals. Consequently measures for the major types of food choice goals were included. These measures were drawn from the work of Steptoe et al. (1995) and Roininen, Lähteenmäki, & Tuorila (1999) and included economizing, emotional, food hedonism, and healthy eating goals. As indicated earlier individual resources frame both goals and habit formation. As a result it is expected that personal resources will be a significant determinant of a healthy eating habit. The measure related to human capital resources was informed by the work of Dean et al. (2008) while Clark et al. (1991) informed the development of the self-control measure.

Reliability and Validity

The indicators used for each latent construct in the model are presented in table 2. The initial set of items was subjected to a confirmatory factor analysis using AMOS 21. A common methods factor was introduced to deal with any potential problem associated with common methods bias (Podsakoff et al., 2003). Thus all factor loadings presented are net of common methods bias. Due to a low factor loading, 'Healthy eating is something I have been doing for a long time' was removed from the healthy eating habit construct.

The resulting overall model fit measure, Chi-square (χ^2) = 774.012, d.f. = 246, χ^2 / df = 3.146, p = <0.001, shows that there is a significant difference between the variance covariance matrix and that implied by the measurement model suggesting a poor fit. However, such a finding is common where the number of observations is high (>200), where even minor differences show as significant (Bentler & Bonett, 1980). Consequently the authors examined the comparative

fit index (CFI = 0.958), the Tucker Lewis index (TLI= 0.949), the Root Mean Square Error of Approximation (RMSEA= 0.044), and the Standardized Root Mean Square Residual (SRMR =0.0373) all of which support a good fit (Byrne, 2001).

Convergent validity was assessed by examining the size and significance of the factor loadings (Table 2) as well as inspecting the average variances extracted (AVE) for each construct (Table 3) all of which meet the 0.50 threshold (Hair, Anderson, Thatham, & Black, 1995). All items loaded significantly on their corresponding construct demonstrating adequate convergent validity. Reliability is demonstrated through the use of Cronbach's alpha scores (Table 2) with all constructs meeting the desired 0.70 threshold (Nunally, 1981). Discriminant validity is supported by the fact that the average variance extracted exceeds the squared correlation coefficient for each pair of latent factors (Table 3) (Fornell & Larcker, 1981). Consequently the measures of the constructs used in the model achieve satisfactory reliability, convergent and discriminant validity and account for any common methods bias.

[Insert table 2 about here]

[Insert table 3 about here]

Results

Prior to testing the model, descriptive statistics are presented relating to the model constructs. Mean scale values were calculated based on the construct item scores. Analysis highlighted no differences by social class, education level, or marital status. However, mean scores varied

across age and gender (table 4). Gender differences were seen for human capital resources and females typically reported higher resources compared to males. This is unsurprising given that females continue to undertake much of the food duties within the home (Caraher, Dixon, Lang, & Carr-Hill, 1999; Dixey, 1996) and thus they may be more mentally accessible for participants. Differences by age group were seen for emotional goals with higher means seen in older population groups.

[Insert table 4 about here]

Having successfully tested for validity and accounted for common methods bias the next stage is to test the structural model. Figure 2 presents the direct effects between the dependent and independent variables as specified in the hypotheses. The model demonstrates good fit with all measures, Chi-square (χ^2) = 776.132, d.f. = 248, χ^2 / df = 3.13, p =<.001, CFI = 0.958, TLI =0 .950, RMSEA= 0.044, SRMR =0.0373, meeting the accepted thresholds (Byrne, 2001). Overall the model explains 55.6% of the variation in healthy eating habit and 14.6% of self-control.

Focusing first on the direct relationships and the primary variable of interest, healthy eating habit, no support is found for the postulated relationships with either emotional goals (β=-.037, NS) or economizing goals (β=.023, NS). No support is found for human capital resources (β=.037, NS) while health conscious identity is strongly related to healthy eating habit (β=.358***). Self-control is also found to be positively related to healthy eating habit (β=.173***). Healthy eating goals are found to be positive and significantly related to healthy eating habit (β=.136*).

[Insert figure 2 about here]

While the direct effect of self-control on healthy eating habit is of interest, the authors were more concerned with self-control's role as a mediating variable. Following the works of Preacher & Hayes (2004) and Zhao, Lynch, & Chen (2010) the authors applied bootstrapped tests (5000 samples) to investigate the hypothesized effects. To reveal these, table 5 presents the standardized direct, indirect and total effects, their standard errors and their bias controlled two tailed significance levels between the variables embedded in the model.

The evidence indicates that the indirect effects between economizing goals (β=-.016**), food hedonism (β=-.052***), emotional goals (β=-.014*) and the focal variable, healthy eating habit, are all significant and mediated by self-control. The evidence indicates that the economizing goal reduces self-control (β=-.095**) which is positively related to healthy eating habit (β=.173**). Thus the indirect effect is negative (β=-.016**) while the lack of a significant direct effect between the economizing goal and healthy eating habit supports a fully mediated relationship. Food hedonism goals reduce self-control substantially (β=-.297***) and as a consequence has a significant indirect effect on healthy eating habit (β=-.052**). However in this instance a very strong direct relationship between food hedonism and healthy eating habit is also observed (β=-.239**). As both the direct and indirect effects are negative it points to a case of complementary mediation but the size of the direct effect suggests the possibility of an additional but omitted mediator (Zhao et al., 2010). Moving to emotional goals the direct effect on healthy eating habit is non-significant (β=-.037, NS), while its indirect effect via self-control is negative and significant (β=-.014*) providing evidence of a fully mediated relationship. Emotional goals are found to undermine (β=-.083*) the positive effect of self-control (β=-.173***) on healthy eating habit. Turning to healthy eating goals a positive and significant

direct relationship with healthy eating habit is observed (β=-.136*). The indirect effect is found to be non-significant (β=-.017, NS).

Considering variables with only direct relationships with healthy eating habit turns the attention to health conscious identity which is found to be very strongly related to healthy eating habit (β=.358, ***). An indirect relationship via self-control was tested for but the change in Chi-square Δ (χ2) for 1 degree of freedom = 2.008 is not significant at the 0.01 level indicating no improvement in fit. However the strength of the direct relationship raises the question of how exactly health conscious identity effects a healthy eating habit and the search for an omitted mediator within this relationship may be fruitful. The final variable, human capital resources, is not found to be significantly related to healthy eating habit (β=-.037,NS).

[Insert table 5 about here]

Discussion

The proposed model is the first to simultaneously examine relevant determinants of a healthy eating habit and reveal the critical role of self-control as a mediator between personal goals and a self-reported healthy eating habit. It acknowledges and reconciles the multiple cues and subsequent competing goals that arise in a modern food environment in contrast to the stable environments in which habits usually reside. Findings question the relevance of the traditional definition of habit, as an unconscious behaviour driven by automatic responses to specific cues, to a healthy eating habit. Instead, the model illustrates that habit is not immune to conscious deliberative processes (Wood & Neal, 2009) and utilization of self-control processes may be a central component of creating and maintaining a healthy eating habit. Based on the findings, it

may be more appropriate to refer to a healthy eating routine, rather than a habit, to acknowledge the utilization of deliberative processes that is necessary to manage the complex challenges encountered in everyday life. Routines, as defined by Betsch, Fiedler & Brinkmann (1998), are "*behavioural option(s) that comes to mind as a solution when the decision maker is confronted with a certain decision problem*" (pg 862). While a routine may encompass habits, they are not restricted to automatic decisions but conscious and deliberative processes are also an important component. Thus, consumers may perform specific food habits, such as habitually eating fruit with breakfast or the habitual purchase of semi-skimmed milk, which form part of a wider healthy eating routine that also incorporates a number of deliberative food-related decisions. Acknowledging the joint role of automatic and deliberative processes in healthy eating behaviour is important to ensure future dietary interventions are adequately designed to address both elements.

The key distinction between routine and habit is the engagement of self-control. In existing literature, self-control is not viewed as central to habit (de Ridder et al., 2012; Heckhausen & Beckmann, 1990; Wood & Neal, 2009). However, findings suggest that self-control plays a critical role during the deliberation and negotiation process in which multiple cues prompt competing goals. In this negotiation space, self-control allows the individual to override responses to cues leading to undesired patterns of food consumption. It has been shown that taste preferences and dislikes do not always directly equate with dietary patterns as individuals may restrict their food consumption due to concerns about health, body weight, or appearance (Nestle et al., 1998). Thus, individuals may be motivated by emotional or hedonistic goals but exert self-control to regulate their intake based on alternative motivations which may triumph in the context of a healthy eating routine. At a neurological level, habits are typically driven by the sensorimotor network with minimal reliance on the goal-directed associative network (Yin & Knowlton, 2006). As both networks are utilised in everyday tasks, it is possible that the

associative network plays a more significant role at particularly challenging times to ensure maintenance of a healthy eating routine. In addition, Petit et al. (2016) note that repeated acts of self-control result in the formation of a link between the episodic cue and the cognitive representation of the goal being disrupted. Consequently, it is possible that the habitual behavioural response to particular episodic cues, such as those related to economizing, emotional, or hedonistic goals, may be engagement of self-control processes to prevent disruption of healthy eating goals and maintain healthy eating behaviour.

The strongest relationship seen in this model was between health conscious identity and a healthy eating habit. This is unsurprising given that self-identity is a key driver of the behaviors performed in attempts to maintain particular roles which adhere to self-identity (Biddle et al., 1987). Continued repetition of behavior allows individuals to enact identity roles while concurrently guiding habit formation. Thus, eating healthily is seen as a fundamental enactment of a health conscious identity which continues to support maintenance of healthy eating behavior. The strength of this relationship poses a number of theoretical and practical implications which are discussed in greater detail in the relevant sections.

Conclusion

The proposed model simultaneously explores the roles of identified determinants of a self-reported healthy eating habit and illustrates the critical role of self-control. The central role of self-control is significant as it is not viewed as central to habitual behaviors. However, the authors propose that engagement of self-control is necessary to negotiate competing goals in an ever-changing food environment to ensure alignment with healthy eating practices. Findings question the unconscious automaticity of a healthy eating habit and suggest the continued requirement of deliberative and self-controlling processes to ensure maintenance of healthier

eating patterns. If healthy eating behavior is considered as a broader, composite measure that needs to deal with the variety of stable and unstable environments that are encountered in everyday life, the necessity for deliberation and self-control processes becomes more plausible. Habits are typically formed in a stable context but everyday life does not always offer stability. Thus, a healthy eating habit, in the strictest definition of habit, does not exist but rather a healthy eating routine best describes the set of automatic and deliberative processes engaged to maintain healthier eating practices.

Theoretical Implications

The proposed model is the first to simultaneously examine relevant determinants of a healthy eating habit and illustrate the central roles of deliberative and self-control processes. The significant role that such processes play is a notable finding and questions current definitions of a healthy eating habit as an automatic behavior that acts primarily in response to specific cues (Verplanken & Aarts, 1999). Consequently, the term habit is imprecise in this context and, as previously discussed, a healthy eating routine offers a better description to acknowledge the roles that both automatic and deliberative processes play in maintaining healthy eating practices. Such distinction in the literature is important. The authors suggest that future research recognizes this distinction and examines elements of healthy eating behavior appropriately. If dietary interventions are to be successful they must be designed in accordance with a valid theoretical underpinning (Craig et al., 2008); thus, it is crucial that there is a clear understanding of both automatic and deliberative components of a healthy eating routine.

One of the chief theoretical contributions that emerges from this piece of work is the clear distinction between habit and self-identity. The commonly used Self-Reported Habit Index (Verplanken & Orbell, 2003) views the habit construct as encompassing self-identity (pg. 1317). Self-identity relates to the characteristics that people ascribe to themselves (Sparks and

Guthrie, 1998) and is expressed through statements such as "I think of myself as". In contrast, behavior refers to the physical actions that a person performs (Davis et al., 2015). This finding adds support to Sniehotta & Presseau's (2012) assertion that self-identity is a separate construct and should be viewed as a determinant of habit rather than an inherent component. Adopting this perspective enabled the strength of the direct effect of health conscious identity on a healthy eating habit to be revealed. In doing so it opens up new lines of enquiry exploring potential mediators between these two constructs (Zhao et al., 2010). Furthermore, the broader concept of self-identity can be understood as multifaceted and comprised of a series of identity projects that are frequently contradictory and in conflict (Arnould & Thompson, 2005; Bisogni, Connors, Devine, & Sobal, 2002). It is readily acknowledged that self-identifies are not stable and can transition over time. Consequently, revealing those identity projects that have specific negative consequences for a healthy eating habit and understanding how they may be influenced would be a valuable line of future enquiry.

Practical Implications

Findings offer a number of approaches for both health and food sectors to support healthier eating routines in the future. More individuals are currently reporting a move towards healthier eating and the desire to consume a healthier diet (Bord Bia PERIscope, 2015; Department of Health & Ipsos MRBI, 2016). Hence, there is a need to build on this motivation and support the formation of healthier eating routines.

The proposed model demonstrates that self-control plays an important central role in the maintenance of healthier eating behaviors. Self-control capacity has been likened to a muscle in that it can be depleted with use but is restored upon resting (Baumeister, 2002). Therefore, the level of self-control that a person possesses can be enhanced and influence the degree to

which it can act as a buffer to conflicting goals. Utilising the theory of planned behavior (Conner, Norman, & Bell, 2002), many dietary interventions build on this relationship and aim to enhance individual self-control capacity. However, maintaining high levels of self-control requires great effort and may not be always possible in daily life (Muraven, Tice, & Baumeister, 1998). In addition, the episodic influence of competing goals may lead to daily fluctuations in self-control capacity and negatively impact the individual's subsequent ability to maintain a healthy eating routine. There is a need to explore alternatives which accommodate these everyday fluctuations rather than challenge them. Decision-making in times of low self-control is driven by impulse and external cues and this relationship should be utilized to influence the decision-making process towards healthier eating practices. The use of a social proof heuristic may prompt healthier food behavior in times of low self-control (Salmon et al., 2014), or modifying the food environment to promote healthier foods as more convenient, attractive, and normal to choose are potential strategies (Wansink, 2015). Further work needs to identify environmentally-relevant cues which are acceptable and effective for the consumer.

Another potential opportunity for intervention development that builds on this relationship with self-control is a focus on individual resilience. Resilience is a "*process wherein individuals display positive adaptation despite experiences of significant adversity or trauma*" (Luthar & Cicchetti, 2000). In the context of healthy eating behavior, resilience relates to the ability to develop strategies to overcome barriers and cues towards unhealthy eating behavior and is associated with healthier dietary patterns and weight status (Stewart-Knox et al., 2012; Williams, Veitch, & Ball, 2011). As particular competing goals are likely to have an episodic influence on healthy eating practices, building individual resilience to deal with challenging and adverse situations could address their potential negative impact on self-control. Both options provide a valid means of addressing the episodic influence of competing goals and need to be explored further to clarify how best this may be achieved.

The importance of a health conscious identity to a healthy eating habit is evident. However, as previously discussed, consumers may have multiple conflicting identities that may have positive or negative consequences on healthy eating behavior. Consequently, identifying those identities that have specific negative consequences and clarifying how best to support the creation of a health conscious identity would be of value to support healthier eating practices. The marketplace is seen as a forum in which identities are created and enacted (Arnould & Thompson, 2005) thus providing the ideal environment in which to support creation of a health conscious identity. However, there exists a diverse understanding as to what constitutes a healthy diet based on complex beliefs and feelings that are interconnected with other parts of ones life (Bisogni, Jastran, Seligson, & Thompson, 2012). Healthy eating is not simply related to perception of health risk, psychosocial wellbeing, or dietary control, but for some it relates to the expression of individual cultural identity, connection with family and friends, and adherence to personal beliefs and morals (Bisogni et al., 2012). It is unclear how these classifications of healthy eating relate to the objective measures put forward by health professionals, and evidence shows that a discrepancy is likely to exist between the two groups (Blake et al., 2007). Further work is needed to identify how best to create a health conscious identity that is founded upon a clear, objective measure of healthy eating but also meets the needs of the individual. Collaboration between health, food, and retail sectors are necessary to expand existing knowledge of health conscious identities and effective approaches to support their creation in diverse population groups.

Limitations

It is important to acknowledge that this analysis is based on self-reported measures. Thus, the measure healthy eating habit measure relates to habit as perceived by the individual rather than an objective measure. As such, it is open to interpretation by the individual and the measure may reflect an inferred habit rather than the actual habit (Sniehotta & Presseau, 2012). Bias

due to self-reporting may also influence the goal-habit relationship seen in the model. Individuals report having stronger goals for habitual behaviors despite subsequent context-specific tests showing that goals are not a useful predictor of habit (Neal, Wood, Labrecque, & Lally, 2012). Due to the ease and frequency with which the habit is performed, post-hoc inferences are made that the behavior must be goal-oriented (Neal et al., 2012). Alternative evidence highlights the importance of environmental cues as drivers of habitual behaviors and of greater relevance than personal goals (Oulette & Wood, 1998; Wood & Neal, 2007; 2009). Thus, the absence of data on environmental cues is a key limitation as it did not allow exploration of the influence of the environment on a healthy eating habit in conjunction with cognitive processes. There is a need to explore this further and examine the separate, and combined, influences of environmental cues and deliberative processes on a healthy eating habit to gain clarity on their roles.

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Table 1. Distribution of demographic characteristics

	Number	%
Total Sample	1109	-
Gender		
Female	571	51
Male	538	49
Sub-Total	**1109**	**100**
Age		
18 – 35 years	470	42
36 – 50 years	330	30
51 – 64 years	207	19
65+ years	102	9
Sub-Total	**1109**	**100**
Education		
Primary	86	8
Intermediate	219	20
Secondary	266	24
Tertiary	528	48
Sub-Total	**1099**	**100**
Social Class		
Professional, managerial and technical	477	45
Non-manual	207	19
Skilled manual	153	14
Semi-skilled, unskilled, and students	232	22
Sub-Total	**1069**	**100**
Marital Status		
Single	401	36
Married or living with partner	622	57
Widowed	32	3
Separated/Divorced	48	4
Sub-Total	**1103**	**100**

Table 2: CFA, Factor Loadings, Reliability, and Goodness of Fit for independent and dependent variables

Constructs		p-value	Std Loading
Economizing Goals (α= 0.764; Spearman-Brown=.766; Source: Steptoe et al. (1995))			
It's important to me that the food I eat on a typical day is not expensive		[a]	0.725
It's important to me that the food I eat on a typical day is cheap		<0.001	0.826
Human Capital Resources (α= 0.763; Constructs Source: Dean et al. (2008))			
I have good cooking skills		[a]	0.744
I have the ability to prepare the meals I wish to eat		<0.001	0.781
I have enough time to prepare meals from scratch		<0.001	0.611
Health Conscious Identity (α= .837; Source: Sparks & Guthrie (1998))			
I think of myself as someone who generally thinks carefully about the quality of foods I select.		[a]	0.787
I think of myself as someone who generally thinks carefully about the health consequences of my food choices		<0.001	0.869
I think of myself as the sort of person who is concerned about the long term effects of my food choices		<0.001	0.696
Food Hedonism Goals (α= 0.733; Spearman-Brown = .745; Source: Roininen, Lähteenmäki, & Tuorila (1999))			
I eat what I like and do not worry about the healthiness of food		[a]	0.735
The healthiness of a food has little impact on my food choices		<0.001	0.777
Healthy Eating Goals (α=0.83; Constructs Source: Steptoe et al. (1995))			
It's important to me that the food I eat on a typical day contains vitamins and minerals		[a]	0.688
It's important to me that the food I eat on a typical day is good for my appearance		<0.001	0.838
It's important to me that the food I eat on a typical day is nutritious		<0.001	0.785
Emotional Goals (α= 0.84; Source: Steptoe et al. (1995))			
It's important to me that the food I eat on a typical day helps me cope with life		a	0.721
It's important to me that the food I eat on a typical day keeps me awake/alert		<0.001	0.543
It's important to me that the food I eat on a typical day helps me relax		<0.001	0.750
It's important to me that the food I eat on a typical day cheers me up and makes me feel good		<0.001	0.686
It's important to me that the food I eat on a typical day helps me cope with stress		<0.001	0.813
Self-Control (α= 0.773; Source: Clark et al. (1991))			
I can control my eating on the weekends		[a]	0.706
I can control my eating on the weekdays		<0.001	0.811
I can control my eating when relaxing at home		<0.001	0.623
Healthy Eating Habit (α= 0.86; Source: Verplanken & Orbell (2003))			
Healthy eating is something I do frequently		[a]	0.844
Healthy eating is something I find hard to do (r)		<0.001	0.639
Healthy eating is something that is part of my normal routine		<0.001	0.872
Healthy eating is something I do automatically/without having to think consciously about it		<0.001	0.761
Chi-square (χ^2) = 774.012, d.f. = 246, χ^2 / df = 3.146, p = <.001, CFI = 0.958, TLI = 0.949, RMSEA= 0.044, SRMR = 0.0373			
[a] critical value not estimated as loading set to 1. (r) = reverse scoring			

Table 3. Composite Reliability, Inter Construct Correlations, R Squared and Average Variance Extracted

Correlations in the Upper Diagonal, Variance Extracted in the Diagonal, and R-Squared in the lower Diagonal.								
	Health Conscious Identity	Human Capital Resources	Self-Control	Healthy Eating Goals	Food Hedonism	Emotional Goals	Economizing Goals	Healthy Eating Habit
Health Conscious Identity	**0.620**	0.114	0.104	0.347	0.524	0.060	0.016	0.688
Human Capital Resources	0.337	**0.510**	0.121	0.064	-0.277	0.116	0.000	0.290
Self-Control	0.322	0.015	**0.520**	0.094	0.096	0.002	0.012	0.427
Healthy Eating Goals	0.589	0.252	0.306	**0.600**	-0.624	0.439	0.000	0.563
Food Hedonism	-0.724	0.077	-0.310	0.389	**0.570**	-0.184	0.012	-0.632
Emotional Goals	0.244	0.013	0.040	0.193	0.034	**0.500**	0.033	0.175
Economizing Goals	-0.126	-0.022	-0.108	-0.014	0.110	0.181	**0.600**	-0.111
Healthy Eating Habit	0.473	0.084	0.182	0.317	0.399	0.031	0.012	**0.620**

Table 4. Mean scale values (mean of items) for age and gender categories (Scale 1, low–7, high)

	Economizing Goals	Human Capital Resources	Health Conscious Identity	Food Hedonism Goals	Health Eating Goals	Emotional Goals	Self-Control	Healthy Eating Habit
Mean	**4.3**	**5.3**	**4.9**	**2.9**	**5.6**	**4.6**	**5.2**	**4.7**
Gender								
Female	4.4	5.7	5.2	2.7	5.8	4.8	5.1	4.8
Male	4.3	4.9	4.7	3.1	5.4	4.4	5.3	4.6
Age (years)								
18 – 35	4.5	5.2	4.8	3.1	5.4	4.4	5.0	4.5
36 – 50	4.2	5.4	4.9	2.9	5.7	4.5	5.1	4.2
51 – 64	4.2	5.5	5.2	2.8	5.9	4.8	5.4	4.2
65+	4.4	5.6	5.4	2.8	5.8	5.2	5.6	4.4

Table 5. Bootstrapped (5000) Standardized Direct, Indirect and Total Effects between Hypothesized Variables and Healthy Eating Habit.

Standardised Direct Effect

	Emotional Goal			Health Conscious Identity			Food Hedonism Goal			Human Capital Resources			Healthy Eating Goal			Economizing Goal			Self Control		
Dependent Variable	β	(SE)	P- value (2 tailed)	β	(SE)	P- value (2 tailed)	β	(SE)	P- value (2 tailed)	β	(SE)	P- value (2 tailed)	β	(SE)	P- value (2 tailed)	β	(SE)	P- value (2 tailed)	β	(SE)	P- value (2 tailed)
Self Control	-0.083	(0.05)	0.102				-0.297	(0.091)	0.002				0.101	(0.102)	0.33	-0.095	(0.046)	0.024			
Healthy Eating Habit	-0.037	(0.033)	0.24	0.358	(0.083)	0.006	-0.239	(0.125)	0.009	0.037	(0.038)	0.307	0.136	(0.073)	0.086	-0.023	(0.035)	0.482	0.173	(0.04)	0.001

Standardised Indirect Effect

	Emotional Goal			Health Conscious Identity			Food Hedonism Goal			Human Capital Resources			Healthy Eating Goal			Economizing Goal			Self Control		
Dependent Variable	β	(SE)	P- value (2 tailed)	β	(SE)	P- value (2 tailed)	β	(SE)	P- value (2 tailed)	β	(SE)	P- value (2 tailed)	β	(SE)	P- value (2 tailed)	β	(SE)	P- value (2 tailed)	β	(SE)	P- value (2 tailed)
Healthy Eating Habit	-0.014	(0.009)	0.07				-0.052	(0.018)	0.001				0.017	(0.02)	0.279	-0.016	(0.009)	0.016			

Standardised Total Effect

	Emotional Goal			Health Conscious Identity			Food Hedonism Goal			Human Capital Resources			Healthy Eating Goal			Economizing Goal			Self Control		
Dependent Variable	β	(SE)	P- value (2 tailed)	β	(SE)	P- value (2 tailed)	β	(SE)	P- value (2 tailed)	β	(SE)	P- value (2 tailed)	β	(SE)	P- value (2 tailed)	β	(SE)	P- value (2 tailed)	β	(SE)	P- value (2 tailed)
Self Control	-0.083	(0.05)	0.102				-0.297	(0.091)	0.002				0.101	(0.102)	0.33	-0.095	(0.046)	0.024			
Healthy Eating Habit	-0.052	(0.034)	0.123	0.358	(0.083)	0.006	-0.291	(0.125)	0.002	0.037	(0.038)	0.307	0.154	(0.079)	0.088	-0.039	(0.037)	0.215	0.173	(0.04)	0.001

Figure 1. A Model of Healthy Eating Habit

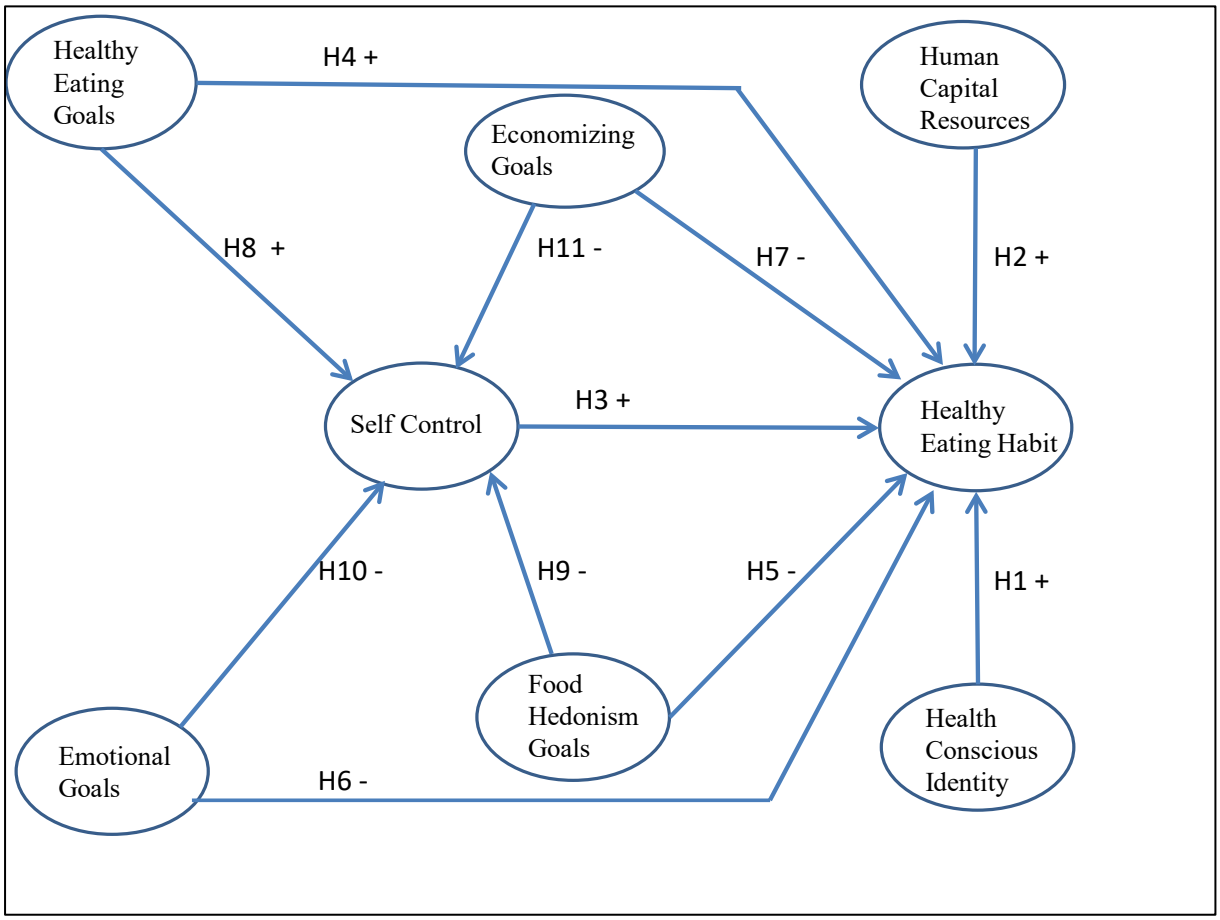


Figure 2. Standardized Direct and Indirect Effects in the Determination of Healthy Eating Habit

