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A hierarchical investigation of personality and behavior: Examining Neo-Socioanalytic models of health-related outcomes

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Abstract

Based on proposed hierarchical relations derived from the Neo-Socioanalytic Theory of personality [Roberts, B. W., & Wood, D. (2006). Personality development in the context of the Neo-Socioanalytic Model of personality. In D. K. Mroczek & T. D. Little (Eds.), *Handbook of personality development* (pp. 11–39). Mahwah, NJ: Lawrence Erlbaum Associates Publishers], the present study examined the relationships between trait and motivation constructs and health-related outcomes. Participants ($N = 201$) completed a Big Five measure of personality traits, parallel exercise and diet behavioral identity trait measures, measures of personal values, exercise and diet-related personal strivings, and exercise and diet self-reports. Participants also completed a physical activity assessment and were weighed on a calibrated electronic scale from which body fat percentage could be determined. It was expected that contextualized trait and motivation constructs would mediate the relations between broad trait and motivation constructs and the health-related outcomes. The patterns of relations across trait and motivation constructs also were explored. The trait domain exhibited the expected pattern of hierarchical relations, but the motivation domain showed a more complex pattern of relations. The results are discussed in relation to a hierarchical model of personality and behavior that brings together trait and motivation constructs at multiple levels of analysis.

Keywords: Personality; Identity; Diet; Exercise; Hierarchical

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1. Introduction

Although the relationship between personality and health-related outcomes has long been an important aspect of personality research, there is little in terms of explicit theory or modeling that attempts to explain the mechanisms or systems that tie personality to the health process. This is not to say that such models do not exist, but the role of personality in the health process is often limited to a consideration of broad dispositional influences (e.g., Adler & Matthews, 1994). Aside from simple correlational designs and findings (e.g., Bogg & Roberts, 2004), the absence of more process-oriented models leaves unaddressed the significant questions of how and to what extent personality constructs—of both broad and narrow conceptualization—permeate the health process, especially in regard to significant health-related behaviors. This shortcoming of health models is readily addressed by incorporating the perspective of personality theory to more concertedly address how personality can inform an understanding of health. To that end, the current study utilizes a hierarchical perspective of personality—Neo-Socioanalytic Theory (Roberts & Wood, 2006)—to investigate the role of personality in relation to diet- and exercise-related outcomes.

Theoretical and applied explorations of the hierarchical arrangement of personality and behavior have seen an upswing in recent years (Barrick & Mount, 2005; Hooker & McAdams, 2003; Roberts & Pomerantz, 2004). In particular, researchers have investigated the intervening role of motivation constructs (e.g., goals) between superordinate personality traits (e.g., the Big Five; Goldberg, 1992) and contextualized outcomes (e.g., sales volume) and behaviors (e.g., Barrick, Mount, & Strauss, 1993; Graziano, Hair, & Finch, 1997; Graziano, Jensen-Campbell, & Finch, 1997). These investigations have demonstrated a mediational role of motivation constructs in the relationships between broad dispositions and narrow behaviors and outcomes, and they have provided initial support for a hierarchical system of personality and behavior.

At a basic level, the Neo-Socioanalytic Theory (NST) provides an organizing framework for the major domains of personality psychology. In this regard, NST bears some resemblance to Hooker and McAdams' (2003) "triarchic" model of personality, where six foci (i.e., traits, personal action constructs, life stories, states, self-regulation, and self-narration) comprise the fundamental parts of the structure and processes of personality. NST differs somewhat from the triarchic model in its identification of the structural components of personality and its designation of hierarchies within these domains. Specifically, NST includes provisions for life contexts (e.g., roles), as well as the contention that a hierarchy exists within each of four major units of analysis (traits, motives/values, abilities, and narratives; Wood & Roberts, 2006). Across the four major domains, the broadest level of conceptualization of each construct represents an entity that is trans-situational or decontextualized. For example, the broadest level of narratives might be conceived to be something akin to McAdams et al.'s (2006) themes, which are observed across disparate stories and scenes in a person's life. Similarly, it could easily be argued that *g* (i.e., general intelligence) is the broadest level of ability, based on its ability to predict performance outcomes across a variety of contexts.

NST holds that each domain represents its own hierarchy, where the strongest relations should be expected within domain, but where relations can be expected across domains (and the respective hierarchies therein) based on psychological proximity. Psychological proximity can simply be defined as the theoretically anticipated strength of relations

between constructs of interest (Broadly speaking, this is related to Cronbach and Meehl's (1955) notion of specifying relations among constructs in a nomological network.). Functionally, this means that the presence of conceptually meaningful shared features (particularly construct content and context) would guide an expectation or prediction of psychological proximity within and across domains. For example, a decontextualized value of power (i.e., top-level motive construct) should be more psychologically proximal to a goal of becoming an executive (i.e., mid-level motive construct) than to being a generally conscientious person (i.e., top-level trait construct), although the increased psychological distance between general level conscientiousness and a goal of becoming an executive does not preclude a relation between these constructs.

As it pertains to the present study, NST posits that trait domains, such as the Big Five, and motivation-related constructs, such as Schwartz's (1992) personal values, are parallel structures at the highest level of their respective hierarchies, and that each domain can be further organized into a more narrow manifestation. Corresponding to Roberts and Pomerantz's (2004) second (''medium'', in their terms) level of the hierarchy on the trait side are identities related to particular roles, such as daughter or employer, or, as in the present study, behavioral domains. Just as social identities represent relatively coherent behavioral repertoires that are accessible to an individual, behavioral identities that encompass a meaningfully coherent suite of behaviors, such as those related to eating and being physically (in)active, should be similarly accessible and discernable. In NST, identity-specific behaviors and outcomes (e.g., performance ratings) should be more strongly related to the identity trait ratings (e.g., view of one's level of conscientiousness in the work domain) than general ratings (e.g., view of one's level of conscientiousness in general) because these identity trait ratings share the important common feature of context with the outcomes—i.e., they are more psychologically proximal to such outcomes than the decontextualized general trait ratings.

Parallel to the trait side are motivation-related constructs, which are assessed hierarchically by linking general motivation-related constructs, such as values, at the top level of the hierarchy to the more context-specific (i.e., second-level) domain of goals. Similar to the trait domain, the contextualized assessment of goals should more strongly predict behavior than the general motivation level. This is expected to be the case because goals are more psychologically proximal to behavioral action than decontextualized values. The NST hierarchical framework outlined above suggests that in any wide-ranging assessment of personality and behavior, it is important that not only trait or motivation constructs are assessed, but that they are assessed at multiple levels of analysis so as to increase conceptual understanding and predictive validity.

NST provides for clear predictions about the arrangement and interrelations of the major constructs of personality and how they might predict health-related behaviors (see Fig. 1). Mediation should occur within each domain, such that mid-level trait constructs, such as behavioral identities, will mediate the trait and health-related outcome relationship. Similarly, mid-level motivation constructs, such as personal strivings, should mediate the relationship between broad motivation-related constructs, such as values, and health-related outcomes. In the current study, NST models of personality are tested in the service of predicting health-related behaviors. Perhaps the most important class of health-related behaviors are those related to cardiovascular diseases, including heart disease and stroke, which are the leading causes of death and chronic disability in the United States (Services, 2004). We investigate two of the primary behavioral risk factors for the development of cardiovascular disease—poor diet and physical inactivity (Mokdad,

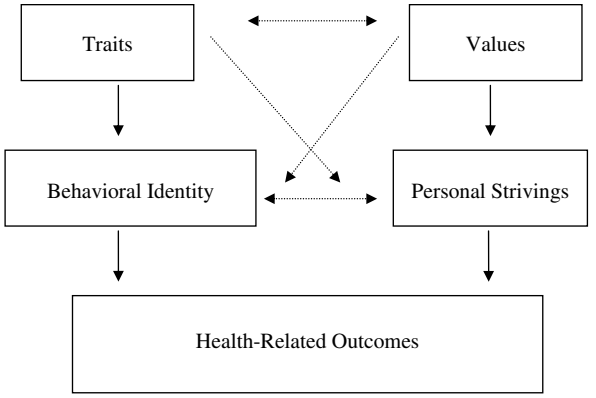

Fig. 1. A framework that serves as a basis for our conceptual organization and subsequent analyses. Solid arrows represent paths that were tested directly as part of NST models, and dotted arrows represent additional possibilities suggested by NST.

Marks, Stroup, & Gerberding, 2004). In the following sections, the relations between broad and mid-level trait and motivation constructs and exercise and diet outcomes are reviewed.

1.1. Personality traits and exercise and diet

Recent studies examining the relation between personality and exercise behaviors found that those who exercised more frequently tended to score significantly higher on extraversion and conscientiousness (Bogg & Roberts, 2004; Courneya & Hellsten, 1998). The relation between extraversion and exercise is most likely due to the fact that extraversion encompasses the propensity to be active (cf., Eysenck's (1981) notion of an extraverted person seeking out activity to maintain an optimal level of arousal). In meta-analytic research investigating the relation between conscientiousness and diet and exercise behaviors, Bogg and Roberts (2004) found the conscientiousness-related traits of industriousness (i.e., achievement and persistence) and traditionalism (i.e., conventionality and norm-adherence) to be the strongest predictors of healthy exercise and diet behaviors and outcomes.

Aside from conscientiousness, openness to experience also may be an important predictor of a healthy diet. In one of the most comprehensive studies of the Big Five personality traits and diet to date, Goldberg and Strycker (2002) found that conscientiousness and openness to experience were the most predictive of healthy eating habits. Goldberg and Strycker (2002) concluded that the relationship between a healthy diet and openness to experience might reflect a contemporary American cultural component to diet measures; "It is unlikely that particularly open individuals would have espoused the same dietary habits 50 years ago or in some other cultural context, or indeed that they will do so 50 years from now" (p. 63).

1.2. Values and goals and exercise and diet

Motivation constructs are the thoughts, beliefs, and goals that drive action (Austin & Vancouver, 1996). In the present study, values and goals are the motivation-related

constructs under investigation. One way values differ from goals is that values are trans-situational (Schwartz, 1992), whereas goals are internal representations of desired states of being and the activities that help achieve them (Austin & Vancouver, 1996). Specifically, abstract motivation constructs, such as values, serve to form an idealized view of the self or basic principles that guide the construction of goals and, in turn, those goals guide behavior (Austin & Vancouver, 1996). For example, a value of achievement may serve to inform a goal such as attaining a graduate degree, which, in turn, serves to inform behavior related to achieving that goal, such as matriculating in a preparation course for the Graduate Record Examination.

Broad values may play a role in health-related behaviors such as diet and exercise. Lindeman and Sirelius (2001) investigated values and diet preferences among women. Participants completed Schwartz's (1992) Value Survey. They found that semi- and full vegetarians (i.e., ate only fish or vegetarian meals) placed significantly more value on universalism than unrestricted eaters. A value of universalism is characterized by emphasizing the importance of broad-mindedness, wisdom, social justice, and a world at peace (Schwartz, 1992), and has been found to be positively related to openness to experience (Roccas, Sagiv, Schwartz, & Knafo, 2002).

Hooker and Siegler (1993) investigated goals and health in a sample of older adults. The participants listed goals for different life contexts (e.g., work, recreational activities) and rated the importance of each domain and goal achievements in each domain, as well as general health. The results suggested that goal importance and goal achievement were related to health. In fact, the only significant predictor of health was importance and achievement of recreational activities. People who rated recreational activities as more important and who were more likely to participate in them were likely to have better overall health (Hooker & Siegler, 1993).

Motivation-related constructs, such as values and goals, have demonstrated predictive utility for health-related behaviors. Drawing upon the implications of these findings and the framework of the NST, the current study systematically integrated values and goals in an effort to understand their relations with diet and exercise behaviors and outcomes.

1.3. The present study

The objective of the current study was to examine NST hierarchical models of personality and health-related behaviors. Specifically, we were interested in the motivation and trait components of personality that are related to the health-related behaviors of exercise and diet. In the NST model, traits are assessed hierarchically by linking them to the more context-specific domain of behavioral identity (i.e., physical and dietary). Research has shown that a person's general identity is a collection of social role identities (Roberts & Donahue, 1994). Previous research investigating the nature of role identities has demonstrated how these ratings differ from general personality ratings (Donahue & Harary, 1998; Roberts & Donahue, 1994), and how these ratings enhance predictive validity (Schmit, Ryan, Steirwalt, & Powell, 1995).

Consistent with NST and previous research, we expected behavioral identity ratings of conscientiousness and extraversion to be stronger predictors of exercise outcomes than general level trait ratings of the same traits. We also expected behavioral identity ratings of conscientiousness and openness to experience to be stronger predictors of diet outcomes than general level trait ratings of the same traits. In addition, because behavioral identity

ratings are posited to be related to general level trait ratings as well as behavioral outcomes, an additional expectation of the NST hierarchical model was that the behavioral identity level of traits would mediate (in the sense of intervening in) the effect of general level traits on health-related behaviors. This prediction suggests that the relation between a general level trait and an outcome should be, at a minimum, partly maintained at the level of the behavioral identity for the outcome domain (i.e., exercise or diet).

Motivation-related constructs also were assessed hierarchically, with values used at the general level and goals used at an intermediate level. In particular, we expected values related to achievement and health to be related to exercise and diet goals and outcomes. We also expected valuing universalism to be related to diet goals and outcomes. In addition, we expected exercise and diet goal importance and achievement dimensions to be related to exercise and diet outcomes. Because these goal dimensions are posited to be related to both values and the outcomes, it was expected that these dimensions would mediate (again, in the sense of intervening) relations between values and the health-related outcomes. As with the trait domains, this prediction suggests that the relation between a value and an outcome should be partly maintained at the level of the goal dimensions for the outcome domain (i.e., exercise or diet).

We also examined the extent to which relations across domains were present (represented by the horizontal dashed arrows in Fig. 1). At the very least, based on proximity within the model, we expected constructs at the same level to show some relations (i.e., decontextualized traits and values, and contextualized identity and goals). In addition, we examined the previously observed relations between broad traits and goals (i.e., strivings) and the previously unexamined relations between broad values and behavioral identities.

In summary, Fig. 1 illustrates how the present study assessesed traits hierarchically via the Big Five model of personality traits at the general level and a contextualized Big Five measure to assess two behavioral identities—physical and dietary. Motivation-related constructs were assessed hierarchically through an assessment of personal values, followed by a measure assessing the importance and achievement of specific goals that are available to help achieve the higher order motivation constructs—in this case, values. Although not a primary focus of the current study, an examination of gender differences in the patterns of the various relations in the hierarchical models could provide additional insight into the meaning of these health-related outcomes, especially given previously observed gender differences showing that women reported avoiding fat more than men (Goldberg & Strycker, 2002).

2. Methods

2.1. Participants

The present study recruited participants ($N = 201$) in two ways. First, college undergraduates were recruited from an introductory psychology class subject pool at a large Midwestern university. Subject pool participants received class credit for participation. Second, additional participants were recruited by advertisements on campus that offered paid compensation for participation in the study. Participants were required to be fully ambulatory. No participants were determined to be ineligible upon recruitment or participation. A predominantly white sample emerged (63%), in addition to a substantial

percentage of Asian Americans (17%). The mean age was 19.64 years ($SD = 1.88$ years; range: 17–29 years), and 49% of the participants were female.

2.2. Materials

2.2.1. Traits and behavioral identities

The Big Five Adjective Checklist (Roberts, Bogg, Walton, Chernyshenko, & Stark, 2004) was used to assess general trait scores for the Big Five. Instructions for the general trait ratings read, "Before each term, please circle the number indicating the extent to which this term is characteristic, usual, or typical of you using the following rating scale." Items were rated on a 5-point Likert scale, ranging from 1, "Strongly disagree", to 5, "Strongly agree". Included in the general level trait assessment was a list of 62 trait adjectives selected from Goldberg's (1992) 100 markers of the Big Five. For each Big Five trait, items that have demonstrated good reliability in self-reports of personality traits in past research were selected (Hofstee, de Raad, & Goldberg, 1992). Scale scores were created by computing the means of the scale items. The general trait level Big Five scales demonstrated acceptable levels of reliability (αs = .78–.89).

Participants also completed measures designed to assess exercise and diet behavioral identities. Following the methodology utilized in previous research (i.e., Donahue, Robins, Roberts, & John, 1993; Wood & Roberts, 2006), exercise and diet behavioral identity measures were parallel (i.e., contained the same 62 trait terms) to the general trait scale. Instructions for physical identity trait ratings were parallel to the general level except that they were preceded by behavioral identity instructions: "Describe yourself only with reference to how you see yourself in situations relevant to physical activities, such as exercise, sports or other physical activities." Scale scores were created by computing the means of the scale items. Items were rated on the same 5-point Likert scale described above (αs = .78–.90).

Instructions for the dietary-self trait ratings read: "Describe yourself only with reference to how you see yourself in situations involving your diet, such as eating or deciding what to eat." Scale scores were created by computing the means of the scale items. Items were rated using the same 5-point Likert scale (αs = .77–.81).

2.2.2. Personal values

Personal values were assessed using Schwartz's (1992) Value Survey, which presented one set of 34 values followed by another set of 31 values to be rated on their level of importance. Participants read a short explanation of the survey, and were asked, "What values are important to ME as guiding principles in MY life, and what values are less important to me?" Each value is followed by a brief explanation of its meaning. Items were rated on an 8-point scale, ranging from −1, "Opposed to my values", to 7, "Of supreme importance". Following the guidelines of Roccas et al. (2002), scale scores were calculated by computing the mean of the scale items. Ten value dimensions comprise the scales: self-direction, stimulation, hedonism, achievement, power, security, conformity, tradition, benevolence, and universalism (αs = .55–.79, a range quite similar to those found in previous research, e.g., Schwartz & Sagiv, 1995; Schwartz, Verkasalo, Antonovsky, & Sagiv, 1997). An additional value of interest to the current investigation was created. Specifically, six health-oriented value items were added to form a value of health scale—vitality, physicality, self-maintenance, purity, longevity, and youthfulness ($\alpha = .78$).

2.2.3. Personal strivings

Strivings were measured using an idiographic-nomothetic method developed by Emmons (1986a). Participants read an explanation of personal strivings, including examples of typical strivings, such as "Meet new people" or "Get good grades in school". Participants were instructed to list at least 10 of their own personal strivings. Participants then ranked their top six strivings from most important to least important and entered them into a Strivings Instrumentality Matrix (SIM). The SIM provided spaces for individual strivings to be rated on multiple goal dimensions (see Emmons, 1986a, 1986b). Based on the findings of Hooker and Siegler (1993), the dimensions of effort (amount of energy expended in pursuit of striving), future attainment (prediction of success in attaining striving), and importance of the goal were included in the assessment. These goal dimensions were rated on scales provided by the SIM instructions (see Emmons, 1986a). Two personal strivings were provided at the bottom of the SIM, relating to being in good physical condition ("I typically try to be in good physical condition") and maintaining a healthy diet ("I typically try to eat healthfully"). Participants were instructed only to respond to the provided prompts if such strivings were not already listed. If exercise and diet strivings were already listed, participants were instructed to indicate which prompt their striving overlapped with (i.e., diet or exercise).

2.2.4. Diet and exercise self-reports

The two primary subscales from the 48-item Food Habits Questionnaire (FHQ) (Goldberg & Strycker, 2002) were used to assess diet. Avoiding fat is comprised of items assessing the consumption of meatless tomato sauce, chicken without the skin and conversely, the consumption of fried chicken, hamburgers, bacon, sausage, and other fatty foods ($\alpha = .69$). Consuming fiber is comprised of items assessing the consumption of vegetables, whole grains, fruit, green salads, beans, oat bran, and other foods containing fiber ($\alpha = .71$).

Self-reported exercise was measured with a composite index of four items from three different questionnaires. The first two items came from the Behavioral Risk Factor Surveillance System (NCCDPHP, 2000), which asked, "During the past year, approximately how many times per week did you exercise or participate in physical activity for at least 20 min that made you sweat and breathe hard, such as basketball, soccer, running, swimming laps, fast bicycling, fast dancing, or similar aerobic activities?" and "During the past year, approximately how many times per week did you do exercises to strengthen or tone your muscles, such as push ups, sit ups or weight-lifting?" The third item came from the Medical Outcomes Study 36-item short-form health survey, which assesses the frequency of "Participation in vigorous activities, such as running, lifting heavy objects, or strenuous sports" (Ware & Sherbourne, 1992) The fourth item came from the Health Behavior Checklist, which measures the level of agreement with the phrase, "I exercise to stay healthy" (Vickers, Conway, & Hervig, 1990). Responses were standardized to create a composite scale of self-reported exercise and fitness ($\alpha = .84$).

2.2.5. Body composition and fitness

To obtain a more objective indication of body composition and fitness, we assessed body mass index (BMI) and body fat percentage, and had participants execute a series of low-to-moderate-impact physical activities. BMI was calculated based on self-reported height and observed weight. BMI was recoded into accepted ranges for being underweight,

healthy, overweight, and obese (Gallagher et al., 2000), and was standardized by gender. Body fat percentage was obtained via a bioelectrical impedance analysis scale. Body fat percentage was recoded into gender-appropriate ranges (Gallagher et al., 2000) and also standardized.

To obtain an objective estimate of cardiorespiratory fitness, participants completed a submaximal three-minute step test (ACSM, 2001; Kusinitz & Fine, 1987). Participants were instructed to step up and down on a 6-in. step at 31 steps per minute (a metronome set at 124 beats/min provided the tempo) for 3 min. After 3 min, participants immediately sat on the step and were instructed to find their pulse on the left side of the neck. After exactly one minute of sitting, they were instructed to count their pulse for 15 s. This count number was recorded and multiplied by four to obtain each participant's one-minute recovery heart rate. Participants were provided feedback on their heart rate in the form of an age-graded recommendation sheet (Kusinitz & Fine, 1987). For analytic purposes, the 1-min recovery heart rate was recoded according to age and gender such that a higher recovery heart rate indicated better cardiovascular fitness (Kusinitz & Fine, 1987).

To obtain an index of muscular endurance, participants performed a maximal number of good-form push-ups (both modified knees-down and traditional knees-up were allowed) and good-form handgrip squeezes. Push-ups and handgrip squeezes were standardized by gender. Specifically, within gender, modified push-ups were weighted to represent their relative difficulty compared to traditional push-ups. For those participants (men and women) who performed modified push-ups, their scores were recalculated by multiplying the gender-wide ratio of modified to traditional push-ups by the number of successfully completed modified push-ups. For men, the ratio was .74, whereas for women it was .91. In addition, participants performed curl-ups (modified sit-ups) at a set rate of 40 per minute to a maximum number of 75 (ACSM, 2001).

For all the fitness tests, participants were monitored to ensure proper form and were given immediate correction when form was broken. For the tests of muscular endurance, when form was broken repeatedly, participants were asked to stop. The number recorded corresponded to the last correctly performed act (i.e., push-up, handgrip squeeze, curl-up).

2.3. Procedure

Due to the nature of the fitness testing and the number of aerobic step benches that were available, the maximum number of participants tested at one time was five. Each participant signed an informed consent form before each session. Testing occurred in classrooms in mixed-sex groups. Participants first completed the personality and health-behavior questionnaires as described above. Once all participants were finished with the questionnaire packet, the fitness testing portion of the test began. A trained experimenter led participants through a series of light-to-moderate exercises as described above. The experimenter provided explicit instructions about good form for the exercises, as well as physically demonstrating good form. Additionally, the experimenter monitored the form of the participants during the exercises, offering corrections when necessary, and instructing individual participants to cease an exercise when good form was repeatedly broken. In this way, deviations from the goals of the exercises were monitored and controlled. The order of assessment of exercises was kept the same for every testing session. Height, weight, and body fat percentage were recorded first, followed by the step test, handgrip squeezes, curl-ups (modified sit-ups), and push-ups. All participants completed each stage

of testing before moving on to the next stage. The total time of assessment was approximately two hours.

3. Results

3.1. Health-related outcomes

Sample-wide and gender-specific descriptive statistics for the raw scores of the body composition and fitness outcomes are presented in Table 1. For body composition, mean body fat percentages and BMI scores fell into healthy ranges for men and women (Gallagher et al., 2000). Mean 1-min recovery heart rate also fell into a healthy range. Although the means indicate that an average participant was healthy, it is important to note that variability was observed for all of the body composition and fitness outcomes (see *SD*s for outcomes).

To examine the utility of self-reported exercise as compared to actual fitness test outcomes, we obtained correlations between self-reported exercise and fitness test scores. Results showed that self-reported exercise was significantly related to better performance in all of the fitness tests (rs = .20–.35, $p < .05$). Those who reported exercising more had a lower recovery heart rate and were able to do more push-ups, handgrip squeezes, and curl-ups (modified sit-ups). The correlational results also showed that individuals with higher body fat percentages performed fewer push-ups, but more handgrip squeezes (rs = −.20 and .26, $p < .05$). Similarly, individuals with higher BMI scores tended to perform more handgrip squeezes ($r = .26$, $p < .05$). Body fat percentage and BMI were highly correlated ($r = .79$, $p < .05$). The overall pattern of correlations among these variables suggested the possibility of constructing a more reliable composite health outcome or outcomes.

To create more reliable composites of body composition and fitness, we performed a principal components analysis with varimax (orthogonal) rotation of self-reported exercise, objective fitness indices, BMI, and body fat percentage. The diet scales of avoiding fat and consuming fiber were not included in the analysis because they came from an existing validated measure and were largely uncorrelated with the other health-related outcomes. The scree plot indicated a clear break at two components, with Eigenvalues below 1 for solutions with three or more factors. The result was a two-component solution accounting for 56% of the variance. The two components were labeled fitness and unhealthy body composition. The fitness component included push-ups, self-reported exercise, curl-ups (modified sit-ups), recovery heart rate, and handgrip squeezes

Table 1
Means and standard deviations for body composition and fitness outcomes

	Body fat %	Body mass index (kg/m^2)	1-min recovery heart rate	Handgrip squeezes	Standard or modified push-ups	Curl-ups
Sample-wide	23.99 (8.96)	23.51 (3.87)	79.14 (17.26)	70.12 (35.31)	24.16 (14.14)	48.63 (20.22)
Women ($n = 99$)	29.77_a (7.15)	22.88_a (3.58)	79.97 (19.41)	44.05_a (19.25)	17.12_a (10.55)	49.99 (21.14)
Men($n = 102$)	18.34_b (6.72)	24.11_b (4.05)	78.32 (14.90)	95.67_b (28.04)	30.99_b (13.87)	47.30 (19.29)

Note. Different subscripts indicate significant ($p < .05$) differences based on independent-samples t test.

($\alpha = .60$). The unhealthy body composition component included the BMI and body fat percentage variables. To summarize, four outcomes are included in the analyses—fitness, unhealthy body composition, avoiding fat, and consuming fiber.

3.2. Descriptive statistics and bivariate relations: Personality traits, behavioral identities, and health-related outcomes

Table 2 presents the means and standard deviations across the general, physical identity, and dietary identity ratings of the Big Five scales. Consistent with previous research, it was expected that significant mean-level differences would be found between general-level trait scores and behavioral identity trait scores. With the exception of emotional stability, physical identity (PI) mean trait scores were significantly lower than general level mean trait scores. In contrast, the mean PI extraversion score was significantly higher than the mean general level extraversion score. With the exception of extraversion, dietary identity (DI) mean trait scores were significantly lower than general level mean trait scores. In contrast, the mean DI emotional stability scores were significantly higher than the mean general level emotional stability scores. Mean DI extraversion, conscientiousness, agreeableness, and openness scores were significantly lower than mean PI extraversion, conscientiousness, agreeableness, and openness scores. The mean DI emotional stability scores were significantly higher than the mean PI emotional stability scores. In general, these results provide support for the contention that differences can be observed between the general level and behavioral identities of physical and dietary selves and that these behavioral identities are different from each other.

Table 3 presents the correlations for the Big Five personality traits and the health-related outcomes. It was expected that extraversion and conscientiousness would be related to fitness and conscientiousness and openness to experience would be related to the unhealthy body composition and diet variables. The results showed that being more extraverted was associated with better fitness. Unhealthy body composition was not predicted by any of the personality traits. Avoiding fat was positively associated with conscientiousness. Consuming fiber was positively related to both extraversion and openness to experience.

Correlations between behavioral identity measures of exercise and diet behaviors and the four health-related outcomes also are presented in Table 3. We anticipated that the magnitude of the relations would be larger at the identity level. The results showed that fitness was positively associated with physical identity (PI) extraversion and PI openness to experience. As with general level traits, unhealthy body composition was not predicted

Table 2
Means and standard deviations for general-level and behavioral identity Big Five scales

	Extraversion	Conscientiousness	Agreeableness	Emotional stability	Openness
General	3.33_{a} (.73)	3.69_{a} (.61)	4.15_{a} (.50)	2.85_{a} (.58)	3.99_{a} (.50)
Physical identity	$3.42_{b}{}^{a}$ (.78)	$3.60_{b}{}^{a}$ (.58)	$3.84_{b}{}^{a}$ (.62)	$2.85_{a}{}^{a}$ (.58)	$3.62_{b}{}^{a}$ (.61)
Dietary identity	$3.28_{a}{}^{b}$ (.59)	$3.39_{b}{}^{b}$ (.59)	$3.66_{b}{}^{b}$ (.56)	$3.10_{b}{}^{b}$ (.60)	$3.36_{b}{}^{b}$ (.63)

Note. Different subscripts indicate significant ($p < .05$) differences between general and behavioral identities based on a paired samples difference t test. Different superscripts indicate significant ($p < .05$) differences between physical and dietary behavioral identities based on a paired samples difference t test.

Table 3
Correlations between Big Five personality traits, health-behavior role identities, and health-related outcomes

	Health factors								
	Fitness		Unhealthy body composition			Avoiding fat		Consuming fiber	
	General	Physical Identity	General	Physical identity	Dietary identity	General	Dietary identity	General	Dietary identity
E	.18$^{*}_{a}$	.34$^{*}_{b}$	.07	−.02	.03	−.07	− .01	.18*	.22*
C	.06	.12	−.09	.02	.00	.17*	.26*	.08$_{a}$	.24$^{*}_{b}$
A	.13	.08	−.04	−.03	.00	−.05	.10	.07	.10
ES	.05	−.13	−.06	−.05	−.13	.05	.00	.05	−.11
O	.00$_{a}$	.19$^{*}_{b}$	.03	−.02	.08	.04$_{a}$	.21$^{*}_{b}$	.18*	.27*

Note. E, extraversion, C, conscientiousness, A, agreeableness, ES, emotional stability, and O, openness. Big Five personality traits were measured in a general domain (General) and in parallel behavioral identity physical and dietary domains. Different subscripts indicate significant differences ($p < .05$) using tests of dependent correlation coefficients (Williams, 1959).

* $p < .05$.

by any of the identity-level personality traits. Avoiding fat was positively related to dietary identity (DI) conscientiousness and DI openness to experience. Consuming fiber was positively associated with DI extraversion and DI openness to experience. In all cases where there was a significant correlation at the general trait level, the corresponding correlation at the identity level was larger. We used Williams' (1959) test for differences between dependent correlation coefficients to examine whether the differences between correlations at the identity level and the general level were significant. Pairs of correlations were selected for these tests if the identity-level correlation was statistically significant ($p < .05$). Of the seven possible pairs, significant identity- and general-level differences were found for the correlations between extraversion and fitness, $t(198) = 2.72$, $p < .05$, openness and fitness, $t(198) = 2.53$, $p < .05$, openness and avoiding fat, $t(195) = 2.14$, $p < .05$, and conscientiousness and consuming fiber, $t(195) = 2.28$, $p < .05$.

3.3. Bivariate relations: Values, goals, and health-related outcomes

Correlations between value domains and the health-related outcomes are presented in Table 4. Fitness was negatively predicted by placing a high value on universalism. A value of universalism is characterized by understanding, appreciation, tolerance, and protection for the welfare of all people and for nature (Schwartz, 1992). Unhealthy body composition was negatively predicted by valuing conformity. That is, individuals who valued self-restraint in everyday interactions tended to have lower BMI scores and body fat percentages. Avoiding fat was positively related to valuing universalism. Consuming fiber was positively associated with valuing stimulation and achievement. Contrary to our expectations, valuing health was only positively associated with consuming fiber.

Correlations between the personal strivings dimensions of effort, future attainment, and importance and the health-related outcomes are presented in Table 5. In line with previous research, it was expected that exercise and diet behaviors would be predicted by goal importance and goal achievement, reflected in the strivings dimensions of effort, future attainment, and importance. Fitness was positively related to the perceived future attainment of the exercise striving, and, to a lesser extent, the future attainment of the diet

Table 4
Correlations between personal values and health-related outcomes

	Fitness	Unhealthy body composition	Avoiding fat	Consuming fiber	Personal value mean (SD)
Self-direction	−.03	.03	.10	.11	4.64 (.92)
Stimulation	.10	.00	.04	.16*	3.84 (1.29)
Hedonism	−.02	−.01	.05	.00	4.25 (1.30)
Achievement	.05	.03	.04	.20*	4.60 (.97)
Power	−.03	.12	−.12	.10	2.52 (1.47)
Security	−.14	−.04	.04	.04	3.86 (1.10)
Conformity	−.13	−.17*	.04	.01	4.14 (1.15)
Tradition	−.09	−.12	.00	.11	3.33 (1.06)
Benevolence	−.10	−.11	.06	.07	4.74 (.91)
Universalism	−.26*	−.05	.18*	.07	4.42 (1.22)
Health	.08	−.01	.04	.22*	4.75 (1.33)

* $p < .05$.

striving. Fitness also was positively related to the importance of the exercise striving. Unhealthy body composition was positively related to the amount of effort put into, and the importance of, the exercise striving. Avoiding fat was positively related to the perceived future attainment and importance of the diet striving. Consuming fiber also was positively related to the perceived future attainment and importance of the diet striving. In addition, consuming fiber was predicted by the perceived future attainment of the exercise striving.

3.4. Examining NST hierarchical models of personality and health-related outcomes

Path models were constructed (using AMOS 6) to examine the predictive utility of NST models. For the NST hierarchy, models were constructed only when significant trait and motivation predictors were available at both levels of analysis. These model-building criteria ruled out NST hierarchical path models for unhealthy body composition as it was only predicted by motivation constructs.

We first examined an NST account of fitness. As was described in the method section, the fitness outcome was standardized by gender according to ACSM (2001) performance guidelines. This effectively ruled out a test of the effect of gender for fitness. To further rule out a test of gender for fitness, gender differences were examined (via t tests) for the other components of the NST model for fitness. No pattern of gender differences emerged. As a result, the NST models for fitness do not examine differential patterns of relations based on gender.

The first NST model combined the effects of trait and motivation constructs. In the preliminary model for fitness, only paths were selected which conformed to the solid vertical lines in Fig. 1 (i.e., between adjacent levels within domain, not across the domains), and which were indicated by the correlation analyses. The preliminary model did not fit the data well [$\chi^2(6, N = 201) = 30.60$, $p < .05$, NFI and CFI $> .81$, RMSEA $= .14$]. The preliminary NST model provided a small account of the variance of fitness ($r^2 = .13$). PI extraversion mediated the relationship between general extraversion and fitness. General extraversion had a strong relationship with PI extraversion ($\beta = .61$, $p < .05$), and in turn

Table 5
Correlations between exercise and diet personal striving dimensions and health-related outcomes

	Fitness		Unhealthy body composition		Avoiding fat		Consuming fiber		Means (SD)	
	Exercise strivings	Diet strivings	Exercise Strivings	Diet strivings	Exercise strivings	Diet strivings	Exercise strivings	Diet strivings	Exercise strivings	Diet strivings
Effort	.09	.03	.11	.14*	.12	.05	.05	−.10	3.87 (1.05)	3.52 (1.22)
Future attainment	.24*	.17*	.06	.08	.01	.28*	.21*	.22*	6.66 (1.96)	6.07 (2.26)
Importance	.26*	.11	.00	.13	−.01	.27*	.14	.17*	3.42 (1.06)	2.86 (1.27)

* $p < .05$.

PI extraversion positively predicted overall fitness ($\beta = .30$, $p < .05$). The effect of a value of universalism on overall fitness was not mediated. Rather, a value of universalism had a nonsignificant positive effect on exercise striving importance ($\beta = .10$, $p > .05$). However, exercise striving importance had a positive relationship with fitness ($\beta = .20$, $p < .05$).

In a second NST path model for fitness, we included a direct path from universalism to fitness, and tested for paths across domains (dashed lines in Fig. 1) to examine relations between the trait and motivation constructs (see Fig. 2). This model fit the data better than the preliminary model [$\chi^2(5, N = 201) = 8.60$, $p > .05$, NFI and CFI $> .95$, RMSEA $= .06$] and provided a better account of the variance of fitness ($r^2 = 21$). Consistent with the correlational analyses, a significant negative path was found between universalism and fitness. We explored the relationships across levels by freeing the correlations between general trait residual scores and value residual scores and the physical identity residual scores and the personal striving residual scores. We chose to examine the correlations among the residual scores at the first and second level of the model because we had no *a priori* reason to assume that these constructs were causally related. The inclusion of these analyses resulted in a positive relationship between PI extraversion and exercise striving importance. This suggests a positive association between being extraverted in the context of physical activity and placing importance on exercise goals.

We next examined an NST account of avoiding fat. Consistent with the findings of Goldberg and Strycker (2002), men scored significantly lower than women on avoiding fat [$t(196) = -5.84$, $p < .05$]. As a result, separate NST models of avoiding fat were examined for women and men.

In the preliminary model for avoiding fat, only paths were selected which conformed to the solid vertical lines in Fig. 1 (i.e., between adjacent levels within domain, not across the domains) and which were indicated by the correlation analyses. For women and men, the initial models did not fit the data very well [$\chi^2(6, N = 99) = 25.81$, $p < .05$, NFI and CFI $> .63$, RMSEA $= .18$; $\chi^2(6, N = 102) = 19.04$, $p < .05$, NFI and CFI $> .69$, RMSEA $= .15$, respectively, for women and men]. The preliminary NST model provided a small account of the variance of avoiding fat ($rs^2 = .10$ and .06, respectively, for men and women). For women, DI conscientiousness mediated the relationship between general conscientiousness and avoiding fat. General conscientiousness had a strong relationship with DI conscientiousness ($\beta = .51$, $p < .05$), and in turn DI conscientiousness positively predicted avoiding fat ($\beta = .19$, $p < .05$). A value of universalism had a nonsignificant positive relationship with the perceived future attainment of diet strivings ($\beta = .13$, $p > .05$), and, in turn, the perceived future attainment of diet strivings had a positive relationship with avoiding fat ($\beta = .25$, $p < .05$). For men, DI conscientiousness mediated the relationship between general conscientiousness and avoiding fat. General conscientiousness had a strong relationship with DI conscientiousness ($\beta = .50$, $p < .05$), and in turn DI conscientiousness positively predicted avoiding fat ($\beta = .22$, $p < .05$). A value of universalism had a significant positive relationship with the perceived future attainment of diet strivings ($\beta = .24$, $p < .05$), but the perceived future attainment of diet strivings had a nonsignificant positive relationship with avoiding fat ($\beta = .11$, $p > .05$).

In a second NST path model for avoiding fat, we tested paths across domains to examine relations between the trait and motivation constructs (see Figs. 3 and 4). Nonsignificant paths from the initial models of both genders were excluded from the second model. For both genders, these models fit the data better than the preliminary NST model [$\chi^2(4, N = 99) = 6.54$, $p > .05$, NFI and CFI $> .91$, RMSEA $= .08$; $\chi^2(3, N = 102) = 1.71$,

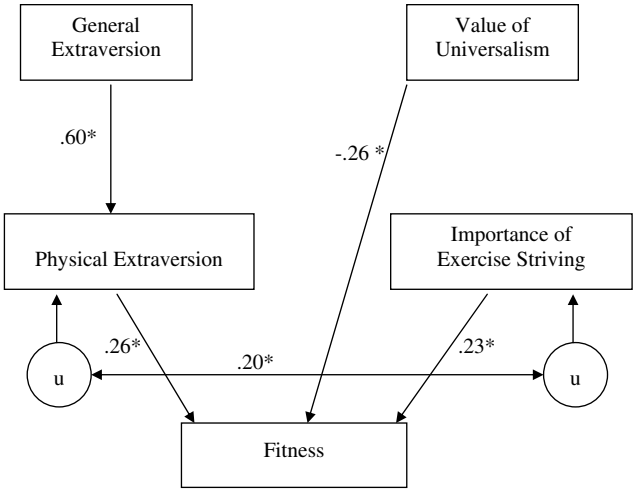

Fig. 2. A hierarchical model of personality and fitness. Specifically, this path model illustrates the mediated relationship between general level extraversion and fitness, and the direct pathway between a value of universalism and fitness. Relations between residual scores for physical identity ratings of extraversion and exercise striving importance are depicted with a double arrow. $^{*}p < .05$.

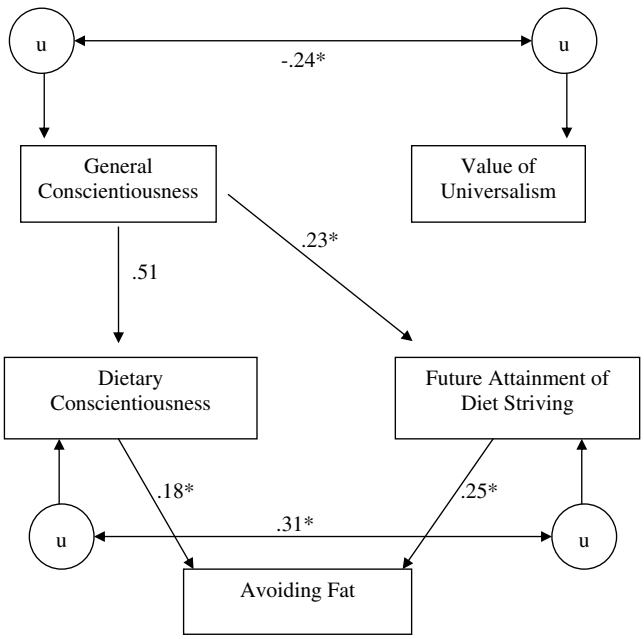

Fig. 3. A hierarchical model of personality and avoiding fat for women ($n = 99$). Specifically, this path model illustrates the mediated relationship between general level conscientiousness and avoiding fat. Relations between residual scores for general level conscientiousness and a value of universalism and dietary identity ratings conscientiousness and diet striving future attainment are depicted with a double arrow. $^{*}p < .05$.

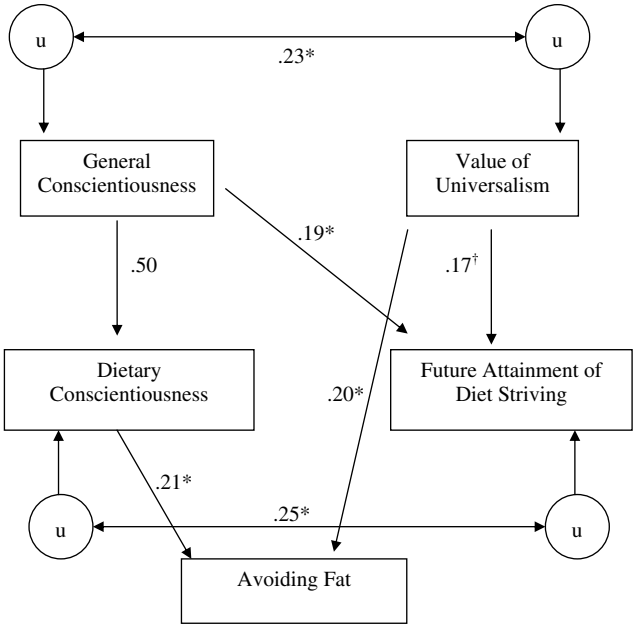

Fig. 4. A hierarchical model of personality and avoiding fat for men ($n = 102$). Specifically, this path model illustrates the mediated relationship between general level conscientiousness and avoiding fat, and the direct pathway between a value of universalism and avoiding fat. Relations between residual scores for general level conscientiousness and a value of universalism and dietary identity ratings of conscientiousness and diet striving future attainment are depicted with a double arrow. $^{*}p < .05$. $^{\dagger}p < .10$.

$p > .05$, NFI and CFI $> .97$, RMSEA $= .00$, respectively, for women and men]. These models also provided an improved account of the variance of avoiding fat ($rs^2 = .13$ and .10, respectively, for women and men).

An important addition to the preliminary models for avoiding fat is the positive relationship between the residual scores of DI conscientiousness and diet striving future attainment for both genders. This suggests a positive association between being conscientious in the context of diet and eating and having a positive view of one's ability to succeed in the striving in the future. Interestingly, a difference emerged between the genders for the relationship between the residual scores of general level conscientiousness and a value of universalism. For women, the relationship was negative, suggesting that women who reported being conscientious were less likely to value broad-mindedness, wisdom, and social justice. For men, the relationship was positive, suggesting that men who reported being conscientious were more likely to value universalism. In addition, for men, a significant direct path was found between a value of universalism and avoiding fat. This path was not found for women.

Finally, we examined an NST account of consuming fiber. No gender differences were found for consuming fiber [$t(196) -.31$, $p > .05$]. As a result, the NST models for consuming fiber do not examine differential patterns of relations based on gender.

In the preliminary NST model for consuming fiber, only paths were selected which conformed to the vertical lines in Fig. 1 (i.e., between adjacent levels within domain, not across the domains) and which were indicated by the correlation analyses. The model

did not fit the data very well [$\chi^2(6,\ N = 201) = 18.49,\ p < .05$, NFI and CFI $> .76$, RMSEA $= .10$] and only provided a small account of the variance of consuming fiber ($r^2 = .08$). DI openness to experience mediated the relationship between general openness to experience and consuming fiber. General openness to experience predicted DI openness to experience ($\beta = .36$, $p < .05$), and in turn DI openness to experience positively predicted consuming fiber ($\beta = .23$, $p < .05$). The perceived future attainment of diet strivings partially mediated the relationship between a value of achievement and consuming fiber. A value of achievement had a positive relationship with the perceived future attainment of diet strivings ($\beta = .25$, $p < .05$), and, in turn, the perceived future attainment of diet strivings had a positive relationship with consuming fiber ($\beta = .18$, $p < .05$).

In a second NST path model for consuming fiber, we tested for paths across domains to examine relations between the trait and motivation constructs (see Fig. 4). The model fit the data better than the preliminary model [$\chi^2(4,\ N = 201) = 5.72,\ p > .05$, NFI and CFI $> .93$, RMSEA $= .05$] and also provided an improved account of the variance of consuming fiber ($r^2 = .11$). Consistent with the correlational results, a significant positive path was found between achievement and consuming fiber. An important addition to the preliminary model is the positive relationship between the residual scores of DI openness to experience and diet striving future attainment. This suggests a positive association between being intellectual and philosophical in the context of diet and eating and having a positive view of one's ability to succeed in the striving in the future.

4. Discussion

In the present study, we investigated hierarchical relations among trait and motivation constructs in the prediction of health-related outcomes in a college-aged sample. Consistent with the Neo-Socioanalytic Theory of personality (Roberts & Wood, 2006), we found evidence for mediated (in the sense of intervening) relations between general level traits and health-related outcomes by contextualized trait measures of physical and dietary behavioral identities. We also found that general level motivation constructs were not systematically mediated by contextualized motivation constructs in the prediction of health-related outcomes. In addition, we addressed several questions related to how different levels of the hierarchy within the trait and motivation domains are related to each other and differ in the prediction of behavioral outcomes. We also identified patterns of gender differences in the prediction of avoiding fat in one's diet. The relations between broad and narrow trait and motive constructs and health-related outcomes, as well as the implications and limitations of the present study are addressed in the following sections.

4.1. How do traits and role identities predict health-related outcomes?

Previous research has suggested that conscientiousness and extraversion would be the best Big Five predictors of exercise (Bogg & Roberts, 2004; Courneya & Hellsten, 1998). However, our results showed that, using the Big Five trait measure, only extraversion was related to fitness. We expected our results at the behavioral identity level to be parallel to previous research at the general trait level. This prediction was confirmed for extraversion and was extended by showing that extraversion at the behavioral identity level was more strongly related to fitness than general level extraversion.

In contrast to the findings for extraversion, we did not find that those who exercised more rated themselves as more conscientious in general or in their exercise environment (at least not at a statistically significant level). The lack of replication for conscientiousness could be, in part, due to the nature of the fitness outcome in the current study. In the present study, the fitness outcome was largely based on actual physical performance, rather than on a retrospective self-report of behavior, as has been the case in previous research (e.g., Arai & Hisamichi, 1998; Courneya, Bobick, & Schinke, 1999; Courneya & Hellsten, 1998). The failure to replicate also may be due to the use of a general measure of conscientiousness. Such measures tend to assess attributes related to orderliness and organization (Roberts, Chernyshenko, Stark, & Goldberg, 2005). Previous research identified industriousness (i.e., being hard-working) and conventionality (i.e., being traditional) as the strongest conscientiousness-related correlates of physical activity (Bogg & Roberts, 2004). Future research should examine the general- and identity-level patterns of relations for these facets as well.

For trait relations to dietary habits, our results replicated previous findings that have suggested those who are more conscientiousness and open to experience eat a more healthy diet (Bogg & Roberts, 2004; Goldberg & Strycker, 2002). We extended these findings to extraversion, which showed relations to consuming fiber at both the general and behavioral identity levels. As with the fitness outcome, the correlational results for avoiding fat and consuming fiber showed the behavioral identity level trait measures for openness and conscientiousness, respectively, to be stronger predictors of diet behaviors than general level trait measures. These results provide evidence for a hierarchical arrangement of personality for trait domains.

Overall, the results for the trait domains suggest that the exercise and diet outcomes were more strongly related to the description of oneself in the context of eating and exercising than to the description of oneself generally. These results indicate an intervening role for behavioral identities and provide additional support for a Neo-Socioanalytic hierarchical arrangement of personality traits in the prediction of behavior.

4.2. How do values and goals relate to health-related outcomes?

Previous research has shown that valuing universalism is related to better health outcomes (Lindeman & Sirelius, 2001). We found evidence that a value of universalism is an important predictor of avoiding fat. This suggests that individuals who value wisdom, peace, social justice, and the natural world tend to eat less fat than individuals who do not hold these values in such high esteem. It may be the case that placing importance on such general motivation constructs informs an agenda that, among other things, encourages a diet devoid of unhealthy (e.g., fried) and unwise (e.g., not choosing lean meats) food choices.

In addition, we found that placing a high value on conformity predicted a healthier body composition. Valuing conformity is characterized by restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms (Schwartz, 1992). It seems likely that possessing an abstract value of restraint and moderation would permeate multiple life domains, including behaviors related to body composition, such as diet and exercise. The results of the present study suggest this to be the case.

In contrast to the positive relation of a value of universalism to diet, we found that a value of universalism negatively predicted overall fitness. This may speak to the cultural

nature of a value of universalism and its relation to diet. In other words, those who place a high value on universalism may not be necessarily consuming a healthy diet for health reasons alone (as described above), and may not be interested in physical fitness at all. Valuing wisdom, peace, social justice, and the natural world (i.e., universalism) does not preclude participation in exercise, but it may motivate activities (e.g., mobilizing an anti-war movement, exploring world philosophies, improving the lot of the indigent) that do not share much common ground with exercise.

Previous research also has shown that ratings of importance and achievement of recreational goals relates positively to overall health (Hooker & Siegler, 1993). Our results support this finding at the behavioral level. Exercise striving importance and perceived future attainment predicted fitness, while diet striving importance and perceived future attainment predicted avoiding fat and consuming fiber. We also were interested in how the amount of effort spent on achievement of exercise and diet-related strivings was related to health outcomes. As expected, we found that the amount of effort expended toward achieving diet strivings was negatively related to body composition. In other words, the more difficult it is to eat a healthy diet, the less healthy body composition tends to be. We also found diet striving importance to be positively related to unhealthy body composition, indicating that those individuals who rated diet strivings as important tended to have higher BMI and body fat percentages. This relation suggests that overweight and obese individuals tended to find diet-related strivings to be more important than individuals who had lower BMI scores and body fat percentages. The implication of this finding is that visible cues of body composition might accentuate the relevance and salience of strivings related to diet. In other words, it might be that healthy eating is not an important goal for someone who appears 'fit,' at least in terms of outward physical indicators.

4.3. NST hierarchical models of personality and health-related outcomes

As indicated by NST, Fig. 1 represents our hypothesized hierarchical model of personality and the health behaviors of exercise and diet. The data represented in Figs. 2–5 supported our hypothesized model reasonably well. As was mentioned above, intervening relations were largely absent among the motivation constructs. However, intervening relations were ubiquitous among the trait constructs, which is consistent with NST.

For the fitness outcome, the relationship between general-level extraversion and fitness was mediated by physical identity extraversion. The importance of the exercise striving did not mediate the relationship between a value of universalism and fitness. Rather, the importance of the exercise striving and a value of universalism were independent predictors of fitness. In addition, the relationship between the residual scores for physical identity extraversion and the importance of the exercise striving demonstrated the role of psychological proximity in the model. The finding of shared variance between these contextualized constructs provides support for the NST contention of meaningful relations across adjacent levels of domains—in this case, mid-level traits and motives. The results for fitness highlight the importance of a hierarchical approach within domain by demonstrating where in the topography of personality relations are being held with important outcomes. For traits, the relationship to fitness is being maintained at the behavioral identity level. For motives, it is being maintained at the broad level of a value of universalism *and* at the level of goal importance. The model for fitness also illustrates how goal importance and the view of oneself in the physical identity behavioral identity inform one another.

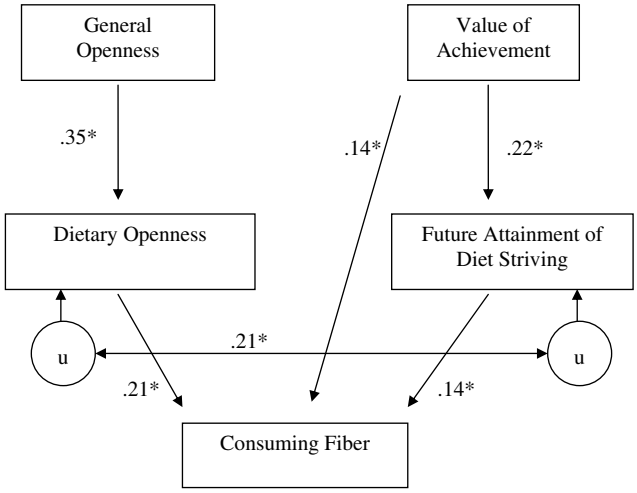

Fig. 5. A hierarchical model of personality and consuming fiber. Specifically, this path model illustrates the mediated relationships between general level openness to experience and consuming fiber, and the direct and indirect pathways from a value of achievement to consuming fiber. Relations between residual scores for dietary identity ratings of openness to experience and diet striving future attainment are depicted with a double arrow. $^{*}p < .05$.

The absence of mediation for the relationship between a value of universalism and the importance of the exercise striving might not so much represent a failing of NST so much as it might represent a failure to identify the important mid-level motivation constructs. At first glance, these results would seem to contradict a hierarchical arrangement of motivation constructs. While this is possible, it seems more likely that there is too much psychological distance between values and strivings. Unlike the trait measures, which were parallel except for contextual instructions, the values and strivings differed substantially in content. It is likely that intermediate constructs, such as life tasks or possible selves (Cantor & Langston, 1989; Markus & Ruvolo, 1989), lie between values and strivings, and would better illustrate the anticipated hierarchical relations among motivation constructs.

The hierarchical model for avoiding fat revealed different patterns of relations for women and men. For both women and men, the relationship between general-level conscientiousness and avoiding fat was mediated by dietary identity ratings of conscientiousness. For women, the relationship between general-level conscientiousness and avoiding fat also was mediated by future attainment of the diet, yielding two indirect pathways from general-level conscientiousness to avoiding fat. Another gender difference emerged in the account of the effect of a value of universalism on avoiding fat. For women, residual scores for a value of universalism were negatively related to residual scores for general-level conscientiousness. For men, this relationship was positive. For women, this means that the part of general-level conscientiousness not explained by its relations to dietary identity ratings of conscientiousness and the future attainment of the diet striving is negatively related to a value of universalism. For men, it means that the part of general-level conscientiousness not explained by its relation to dietary-self conscientiousness and the future attainment of the diet striving is positively related to the part of a value of universalism not

explained by its relation to avoiding fat and the future attainment of the diet striving. In addition, for men, there was a direct relation between a value of universalism and avoiding fat. This relation was not found for women. In contrast, similar magnitude positive relations were found between the residual scores for dietary identity ratings of conscientiousness and the future attainment of the diet striving for both men and women.

Overall, the results for avoiding fat suggest that the perceived ability to attain the diet striving and a value of universalism are differentiating motivational constructs for men and women. For women, future attainment was predictive of avoiding fat, whereas for men, it was not. In contrast, a value of universalism was a direct positive predictor of avoiding fat for men, but not so for women. In this way, the NST hierarchical approach to personality showed the differing patterns of predictive relations among trait and motive constructs for men and women and revealed pathways not readily discernable in more broad models of personality (e.g., Hooker and McAdams' triarchic model).

The NST model for consuming fiber showed a pattern of trait domain mediation similar to that observed for fitness and avoiding fat. In addition, the relationship between a value of achievement and consuming fiber was mediated by the future attainment of the diet striving—the only instance of hierarchical mediation for the motive constructs. In addition, there was a direct relation between a value of achievement and consuming fiber, as well as a positive relation between residual scores for the behavioral identity (physical identity openness) and the future attainment of the diet striving. As was the case with fitness and avoiding fat, the results for consuming fiber highlight the importance of the NST hierarchical approach within domain by demonstrating the value of greater coverage of the breadth and depth of personality domains. For traits, the relationship to consuming fiber is being maintained at the behavioral identity level. For motives, it is being maintained at the broad level of a value of universalism *and* at the level of future goal attainment. The model for consuming fiber also illustrates how goal attainment and the view of oneself in the dietary behavioral identity inform one another.

In sum, our path models are intended to represent the many possibilities for future research with personality measures in the prediction of behavior. While previous research has examined how personality constructs such as traits and goals are related (Emmons, 1995; King, 1995; Little, Lecci, & Watkinson, 1992; Roberts & Robins, 2000), more research is needed that uses multiple personality domains (i.e., trait and motivation constructs) in the prediction of actual behavior. The relations between the residual scores for some of the first and second-level variables illustrate one of the links between trait and motivation constructs. Nonetheless, there were relatively few relations between trait and motivation constructs at any level of the hierarchy, indicating that the effects of trait and motivation constructs on behavior are somewhat independent. However, although the domains are fairly distinct, the simultaneous assessment of trait and motivation constructs provided a far richer predictive account of important behaviors and outcomes.

4.4. Implications, limitations, and conclusions

The results of the current study provide initial support for the importance of a hierarchical assessment of personality based on the NST approach to the personality system. Furthermore, we have shown that it is not only important to study how different personality constructs are related to each other, but also how they work together (and independently of one another) to predict behavior. It is important to note that other factors that have been

shown to affect health, such as socioeconomic status, education, and age, were not assessed (Adler et al., 1994; Roberts & Bogg, 2004). The cross-sectional nature of the design and relatively homogeneous sample represent additional limitations of the present study.

Despite the limitations of the current study, it is clear that personality plays an important role in determining health behaviors, including exercise and diet. As the nation increases its girth, in large part due to increases in physical inactivity and unhealthy eating habits, mechanisms for more successful interventions should be investigated. Personality may be one such avenue. For instance, a NST hierarchical assessment of personality and behaviors allows for the identification of specific areas where change might best be facilitated. The results of the current study suggest one possible target is the identity level of the trait, which showed direct and indirect paths to the health-related outcomes. This is in contrast to more general risk factors that may be much more difficult for someone to change. For example, instead of trying to instigate change by advising someone "be more extraverted" or "be more conscientious," other possibilities could be to make smaller behavioral adjustments to their exercise and diet repertoires, such as encouraging someone to exercise with a partner or part of a small group, or encouraging an organized schedule of healthy eating for every other meal or even every other day. While these adjustments might not provide a wholesale shift in general levels of extraversion and conscientiousness, they might provide enough of a gain at the behavioral identity level to yield some positive benefit in exercise or dietary habits.

While personality is just one component of a broad framework of social environmental and lifestyle factors that affect health, it is clear that it plays an important role in why people enact risky health behaviors (or why they fail to enact beneficial health behaviors). Future studies investigating the nature of the personality-health relationship should not only incorporate multi-method multi-domain designs such as those indicated by NST, but also look to incorporate other factors known to affect health such as socioeconomic status, education, age, and race in their assessment (Adler et al., 1994; Roberts & Bogg, 2004). Factors such as these may represent potential mediators and moderators and, together, may help us come to an improved understanding of why unhealthy behaviors such as physical inactivity and unhealthy eating continue to be so pervasive.

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