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TABLE OF CONTENTS

What We Know, Think We Know, or Are Starting to Know	03
The Study	04
Results	04
The Critical Breakdown	05
Key Characteristic	05
Interesting Finding	06
Relevance	07
Application to Practice	08
References	09

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What We Know, Think We Know, or Are Starting to Know

In a [previous Deepdive](#) on genetic associations with dietary intake, we discussed how behaviours and the environment influence diet to a greater extent than genetics. This is an important concept, because while genetics are often viewed as deterministic, behaviours – although not necessarily easy to change – are, ultimately, malleable.

Because the conditions for which nutrition research is targeted are chronic and develop over decades, most of the lens is focused on the mid-to-late life stages. However, we are starting to understand more in relation to the how nutrition habits during childhood and adolescence may form and sustain into adulthood ⁽¹⁻⁵⁾.

In another [prior Deepdive](#), we covered family meal frequency during adolescence, which was associated with less fast food intake and unhealthy weight-control behaviours in adulthood. We also delved into the prospective findings [from the Project EAT cohort](#), which showed that higher intuitive eating scores in adolescence was associated with better psychosocial wellbeing and less unhealthy weight-control behaviours in young adulthood.

While much of this research area remains in its relative infancy, it all points to the importance of the transitional period of adolescence in the formation of behaviours that may persist into adulthood. But what of personality traits? As characteristics of individuals that influence behaviours, personality traits in adolescence may influence dietary behaviours, with relevance for longer term health habits ^(6,7). The present study investigated the associations between adolescent personality traits and fruit and vegetable intake.

The Study

Two samples of male and female undergraduate university students were recruited from the University of Otago in New Zealand. Participants in both samples completed a personality test assessment of the 'Big Five' personality traits:

- Extraversion [talkative, assertive, energetic]
- Agreeableness [good-natured, cooperative, trustful]
- Conscientiousness [orderly, responsible, dependable]
- Emotional Stability [versus neuroticism, i.e., calm, not easily upset, not neurotic]
- Openness [intellectual, independent-minded]

Participants also completed a daily online dietary survey where they were asked to report their fruit and vegetable intake that day, and to report intake of potato chips, fries, cookies and candy. In Sample 1, participants completed the daily diet diary for 21 consecutive days. In Sample 2, due to a much larger sample size, participants recorded daily diet for 13 consecutive days.

Intake of fruit, vegetables, chips/fries and cookies/candy were averaged, and classified as four distinct dietary outcome variables. The analysis tested the associations with each of the Big Five personality traits and intakes of each of the four dietary outcomes.

Results: The average age of participants was 19yrs [range: 17 to 25yrs]. Sample 1 contained 281 participants [54.4% female], and Sample 2 contained 792 participants [72.6% female]. Total fruit and vegetable intake in both samples averaged 4-5 servings per day [range: 0 to 7 servings].

- **Extraversion:** Higher extraversion scores were associated with 0.34 and 0.52 more daily fruit servings in Sample 1 and 2, respectively. In Sample 2 only, higher extraversion was also associated with 0.40 more vegetable servings per day. This effect was not modified by sex.
- **Agreeableness:** There were no associations between the trait of agreeableness and fruit or vegetable intake in either study samples.
- **Conscientiousness:** In Sample 2 only, higher conscientiousness was also associated with 0.22 and 0.38 more servings of fruit and vegetables, respectively, per day. This effect was not modified by sex.
- **Emotional Stability:** There were no associations between the trait of emotional stability [neuroticism] and fruit or vegetable intake in either study samples.
- **Openness:** Higher openness scores were associated with 0.26 and 0.26 more daily fruit servings in Sample 1 and 2, respectively, while also 0.38 and 0.36 more vegetable servings per day in Sample 1 and 2, respectively. This effect was not modified by sex.

The Critical Breakdown

Pros: The aims of the study were masked to participants during recruitment. The use of two different samples from the same population allowed for consistency in the measures and outcomes to be determined, strengthening the generalisability of the findings to that wider population. There were a large number of completed total daily food diaries, with 4,593 in Sample 1 and 7,548 in Sample 2. Participants were prompted with serving size estimates to enhance the accuracy of fruit and vegetable reported intake. The ethnic distribution matched the distribution of the university from which the participants were recruited. The reliability measures of the personality tests showed good consistency between both samples and were similar to the validation scores for the Big Five factors ⁽⁸⁾ [more under **Key Characteristic**, below].

Cons: There is scant detail on the dietary assessment method, other than “Internet-based daily diary” that was completed online between 3-8pm, and no detail is provided in relation to validation of this dietary assessment instrument. The diary apparently prompted participants to report “two unhealthy foods” consumed that day “for comparison purposes”, but there is no rationale given for the amount [why not three?!] or definition for “unhealthy”. For example, in Sample 1 participants were asked to record intake of potato chips and cookies; in Sample 2 this was fries and candy. In this way the investigators subjectively constrained the definition

Key Characteristic

Conducting research using scales, particularly for measuring dimensions like personality, presents challenges for ensuring validity and reliability of the measurement tool. Let’s recap on the distinction between these concepts: validity is the accuracy with which an instrument measures what it intends to measure; reliability is the consistency of that instrument in measuring what it intends to measure. This is crucial for things like food-frequency questionnaires and other methods of dietary assessment, but it is equally important for psychometric testing.

For psychometric scale and test measurements, reliability is assessed using what is known as Cronbach’s alpha [Cronbach α], which is a measure of internal consistency expressed on a scale from 0 to 1. “Internal consistency” is the extent to which the items [or questions] in a test measure the same construct or dimension. For example, you might have 10 questions that are all intended to assess extraversion, and conducting an analysis using Cronbach α would allow you to determine the consistency of the scale measures in your study sample.

Note that it is the consistency of the measure *in your sample*, not individually. This means Cronbach α should be calculated each time a measurement instrument, like a psychometric test, is used. This is because unlike measures like weight or height, there are no population averages for personality test scores, i.e., scores will always reflect the context of the specific study cohort, as an average against all participants who completed the study.

For the validation study of the Big Five personality traits, Cronbach α were .87 for Extraversion, 0.82 for Agreeableness, .79 for Conscientiousness, .86 for Emotional Stability, and .84 for Openness. In the present study, the Cronbach α for Samples 1 and 2, respectively, was 0.76 and 0.80 for Extraversion; 0.73 and 0.76 for Agreeableness; 0.85 and 0.86 for Conscientiousness; 0.88 and 0.86 for Emotional Stability [Neuroticism]; and 0.71 and 0.74 for Openness. This

shows good internal consistency in both study samples, and similar consistency between both samples. This is important for considering the final analysis, because it allows to see that between the measurement of personality and the measurement of diet, it is the latter that is likely less reliable and imprecise [expanded under **Interesting Finding**].

Interesting Finding

In reading research, you will have no doubt come across the statistical analysis method known as multiple regression, also called multivariate regression. If you have yet to watch the [Research Lecture Introduction to Common Statistical Methods](#), then you may find that helpful. This statistical approach is used to make predictions and determine strength of associations. Typically, this is represented as a change in the outcome variable per 1-unit change in the predictor variable.

For example, let's say we are interested in predicting marathon running time, which is our outcome or dependent variable, based on number of training sessions per week, training session intensity [measured as heart rate], and training session duration [in minutes], which are our predictor or independent variables. In a normal multivariable regression, we would enter each of these predictor variables together. However, there is another same-same-but-different approach, known as a hierarchical or sequential regression, which the analysis in the present study used.

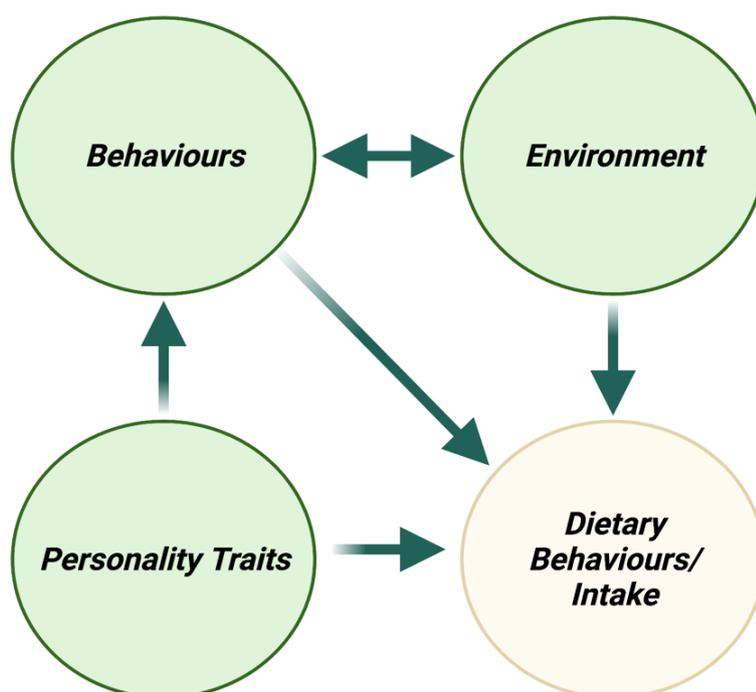
In a hierarchical regression, each of your predictor variables are added sequentially to see how much of the variation in the outcome is explained by each [if we added all of them in together in a normal multiple regression, we could get the sum total effect of all, rather than distinguishing the unique contributions of each]. In our hypothetical example above, this could show that number of training sessions per week explained 22% of the variance [‘variance’ meaning of all variables included in the analysis] in marathon times, training intensity explained 16%, and training duration explained 10%.

In the present study, the analysis indicated that personality traits explained an additional 5-6% of the variance in fruit and vegetable consumption, above factors like age, sex, and BMI. This is a modest finding, and it indicates that there is a lack of precision in the predictive value of personality traits on fruit and vegetable intake in this study sample.

Relevance

It is important to hold that in a study like this, the findings are very much a reflection of the particular study sample. This does not mean that the additional variance in fruit and vegetable intake of 5-6% would necessarily hold invariantly, i.e., in another sample from another population. And it does not necessarily mean that the specific personality traits associated with fruit and vegetable intake in this cohort would also predict intake in, for example, a sample of UK university students.

In a Korean sample of adolescents, positive personality traits were associated with tendency to try new foods ⁽⁷⁾. In Australian girls aged 12-14, higher conscientiousness scores were associated with more fruit and vegetable intake, less high fat and sugar food intake, and lower risk of partial syndrome bulimia nervosa ⁽⁹⁾. Conversely, higher levels of neuroticism [i.e., lower emotional stability] was associated with more frequent meal skipping and higher risk of partial syndrome bulimia nervosa ⁽⁹⁾.



Convergence of personality traits, behaviours, and the environment, to influence dietary behaviours and intake. Personality traits influence wider behaviour beyond diet, which also have a bearing on dietary outcomes, e.g., sleep-related behaviours may impact on dietary choices. The environment interacts to influence behaviours and directly influences diet, i.e., food availability. Personality traits may themselves be associated directly with dietary behaviours and intake.

Overall, the literature more consistently appears to associate personality traits of neuroticism with negative dietary behaviours, but there are paradoxes where, for example, neuroticism is also associated with choice of vegetarian diets ⁽⁶⁾. For adolescents, there are numerous factors intertwined with personality traits that may influence diet. For example, in American freshman college students, higher neuroticism scores were associated with more depressive symptoms and poor sleep quality ⁽¹⁰⁾. Many of the available analyses on personality traits and diet do not measure or include these other important factors, so at this point it is not possible to truly determine what extent personality traits *per se* influence diet.

Application to Practice

There are no hard and fast conclusions to be determined from this area of research. Similar to the point made about avoiding thinking in terms of genetic determinism and diet, we should also avoid thinking deterministically about personality traits and dietary intake and related behaviours. Nevertheless, encompassing wider considerations beyond the tradition research parameters of diet>risk factor>disease is important. These areas of research help us draw on different concepts to see paint a bigger picture of the myriad factors that influence food choice.

The reality is that food choice is complex, influenced not just by the environment and behaviours, but also by a spectrum of motivations including expression of personal identity, ethics/moral constructs, and indeed, health considerations. These factors may just be beginning to develop through adolescence. In practice, we may not be able to modify whether someone is higher on openness or neuroticism, but we should always bear in mind that behaviours and diet are modifiable [although this does *not* mean easy]. What it does mean, however, is that we can always work with meeting people where they are at.

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