The Contribution of Food Consumption to Well-Being

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“Good food is the foundation
of genuine happiness.”
Auguste Escoffier

Key Messages

- High well-being is associated with many benefits, including increased longevity, improved immune functioning, better personal relationships, and increased career success.
- Correlational, longitudinal, and experimental studies link the consumption of fruits and vegetables with enhanced well-being.
- The mechanisms for why food intake may enhance well-being are not yet clear.

Keywords

Happiness · Life satisfaction · Positive psychology · Well-being · Positive affect · Negative affect · Food intake · Health · Fruits and vegetables · Fast food

Abstract

The newly emerging field of positive psychology focuses on the positive facets of life, including happiness, life satisfaction, personal strengths, and flourishing. Research in this field has empirically identified many important benefits of

enhanced well-being, including improvements in blood pressure, immune competence, longevity, career success, and satisfaction with personal relationships. Recognizing these benefits has motivated researchers to identify the correlates and causes of well-being to inform them in the development and testing of strategies and interventions to elevate well-being. As positive psychology researchers throughout the world have turned their attention toward facets of food intake, a consensus is developing that the consumption of healthy foods can enhance well-being in a dose-response fashion. The link between unhealthy foods and well-being is less clear. Some studies suggest that under certain conditions, fast food may increase happiness, though other studies demonstrate that fast food can indirectly undermine happiness. The positive impact of food consumption on well-being is not limited to what people consume but extends to how they consume it and social factors related to eating. Though the research suggests that our food intake, particularly fruits and vegetables, increases our well-being, this research is in its infancy. Research specifically focused on subpopulations, including infants and pregnant mothers, is mostly lacking, and the mechanisms that underlie the relationship between food consumption and well-being remain to be elucidated.

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Table 1. Benefits associated with high levels of well-being and its components

Component of well-being	Benefit	References
Greater positive emotions	Lower blood pressure	[9]
Increased vigor and optimism	Improved immune functioning	[10, 11]
Increased positive affect, life satisfaction, optimism	Increased longevity	[14–16]
Increased overall well-being, positive affect, life satisfaction, happiness, optimism	Enhanced career success	[21, 24]
Happiness, life satisfaction	Improved social relationships	[18–22]
Increased happiness, resilience, overall well-being, positive affect	Improved romantic relationships	[52]

The Emergence of Positive Psychology

Research in many health-related fields, including medicine, neuroscience, and psychology, has adopted the medical model and focused on deficits, disease, and dysfunction. This focus has been pivotal in understanding and alleviating ill-being, but it has also led to a limited conceptualization of health and health care as primarily a reduction or absence of ill-being [1, 2]. Relatively recently, the concept of health has been expanded to include the promotion of well-being, which includes happiness, life satisfaction, and flourishing. The World Health Organization [3] has endorsed this expansion as its mandate now reaches beyond only eradicating disease or infirmity, to include promoting well-being.

This expansion is at the core of a complementary approach to psychology referred to as positive psychology. Positive psychology places well-being at the center of its field of study by elevating the importance of empirically understanding and promoting happiness, satisfaction, strengths, positive experiences, positive traits, and other facets of human thriving [4–6]. The aim of positive psychology is not to replace traditional psychology or view the focus of traditional psychology as exclusively negative. Rather, positive psychology's mandate is to expand traditional psychology's focus on what is wrong with people and how we address these problems, with a complementary focus on what is right with people and what evidence-based interventions we can employ to assist people to thrive and flourish [1].

The importance of positive psychology's mandate is supported by research that empirically demonstrates many benefits associated with high levels of well-being as summarized in Table 1. For example, increasing positive feelings may play a role in improving health [7, 8], as en-

hanced well-being is associated with lower blood pressure [9], increased immune functioning [10, 11], and increased telomere length [12], though not all studies report this increase in telomere length [13]. Additionally, longevity is positively correlated with well-being [14, 15], and self-reports of high levels of well-being are associated with exceptional longevity [16] and reduced mortality [17]. In addition to health, well-being is associated with improved social relationships. This association may be bidirectional [18, 19]. Happier people report that their relationships are of higher quality [20], more satisfying [11], and stronger [21]. In addition to health and relationships, work and school success are linked to well-being. For example, happier people are more likely to enjoy greater career [11] and academic success [22]. Research suggests that well-being often precedes greater career performance [23]. The increased work and career success may be attributable to increased cognitive functioning [24] including enhanced creativity in problem solving [25] following increases in well-being.

The Relationship between the Consumption of Healthy Food and Well-Being

Given the many important possible benefits of well-being, and the finding that across cultures and countries people desire happiness [26], researchers have begun to explore factors and interventions that can enhance happiness, life satisfaction, and flourishing. As summarized in Table 2, research from across continents has shown an emerging pattern that factors related to food consumption can enhance well-being. For example, university students self-reported their well-being along with aspects of their eating habits [27]. The results showed that eating

Table 2. Examples of relationships between food consumption and well-being

Food consumed or environment	Component of well-being	Methodology	Reference
Eating breakfast, meals, and snacks	Overall well-being	Correlational	[28]
Fruits and vegetables	Life satisfaction, happiness and overall well-being	Correlational	[30]
	Positive affect but not life satisfaction	Correlational	[31]
	Overall well-being, positive affect, feelings of curiosity and higher creativity	Correlational	[33]
	Life satisfaction and happiness	Longitudinal	[34]
	Vitality, flourishing, motivation	Experimental	[48]
Apple and chocolate bar	Increased positive mood	Experimental	[35]
Eating dinner with family	Increased well-being	Correlational	[44]

breakfast regularly, consuming more meals and snacks, and eating more fruits and vegetables were all associated with greater well-being. Though the authors reported that food intake was linked to happiness, they employed the Oxford Happiness Questionnaire which has been criticized as a measure of happiness [28]. The Oxford Happiness Questionnaire consists of 29 items that assess much more than happiness. Thus, these findings can be better understood as showing the link between food intake and aspects of overall well-being. Similarly, in a large cross-sectional study in Britain, increased consumption of fruits and vegetables was associated with increased self-reports of life satisfaction, happiness, and well-being [29]. The relationship between fruit and vegetable intake and positive mental states was maintained even after controlling for demographic and economic factors, and the relationship appeared to follow a dose-response function. In a complementary study of American university students, fruit and vegetable consumption was correlated with positive affect, though not life satisfaction [30]. This relationship remained significant even after controlling for demographic variables, health-related behaviors (sleep, smoking, and exercise), and the consumption of other foods (sugar drinks, fats, tea, and coffee). However, given these studies used correlational methods, the causal direction of the relationship between the intake of fruits and vegetables and levels of well-being is unclear. Participants who experience high well-being may be more prone to eat fruits and vegetables rather than the intake increasing well-being.

Many of the studies of the contribution of fruit and vegetable consumption to well-being have focused on hedonia. Hedonia is related to the pleasure gained from high levels of positive affect and low levels of negative af-

fect and is typically assessed with measures of happiness (an affective rating of one's life) and life satisfaction (a cognitive rating of one's life). Though research in positive psychology has tended to focus more on hedonia, assessing eudaimonia is important to attain a more comprehensive understanding of well-being [31]. Eudaimonia is conceptualized as related to realizing one's full capacity by acting in concert with one's virtues, strengths, and potential. To examine whether food intake contributed to eudaimonia, in one study young adults recorded their intake (fruits, vegetables, sweets, and chips), their hedonia (positive and negative affect), and their eudaimonia (eudaimonic well-being, curiosity, and creativity) for 13 consecutive days [32]. As reported by other studies, positive affect and consumption of fruits and vegetables were positively correlated. Importantly, this study also showed that fruit and vegetable consumption was positively correlated with eudaimonic well-being, increased intensity of feelings of curiosity, and higher levels of creativity. On those days when consumption of fruits and vegetables was greater, the participants reported greater eudaimonic well-being, curiosity, and creativity. However, similar to the studies described above, the correlational method used in this study does not allow one to ascertain the causal direction of the relationship.

Though the conclusions that may be reached from these cross-sectional studies are limited given the correlational methodology they employed, other research designs point to similar conclusions. Based on their longitudinal study of the food intake diaries of over 12,000 Australians, Mujcic and Oswald [33] reported that as fruit and vegetable consumption increased from 0 to 8 portions per day, self-reports of life satisfaction and the percentage of time people reported feeling happy increased

as well. However, the increase in well-being may not be a direct and specific result of the fruit and vegetable consumption. Perhaps participating in any behaviors thought to be healthy and productive promotes components of well-being.

Although an experimental research design using random assignment and double-blind safeguards is generally considered the gold standard of research design, this design does not lend itself well to food intake studies with humans in part because it is impossible to have people consume fruits and vegetables in a normal fashion without them knowing it. One study that did employ an experimental method required participants to report their mood states twice each day for a week following eating an apple, a chocolate bar, or nothing [34]. Relative to eating nothing, participants reported an increase in positive mood following eating the apple, and an even greater increase after eating the chocolate. There was no difference in the level of satiation reported after consuming the chocolate and apple.

As described above, a developing literature reports that food intake, particularly that of fruits and vegetables, is associated with higher levels of components of well-being (Table 2). The conclusions reached from these studies are bolstered by the findings that increased fruit and vegetable intake results in increased well-being in a dose-response fashion. Additionally, recent research suggests that the reverse relationship is also present; levels of well-being can influence our responses to food. In a series

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of 3 studies, happy Japanese undergraduates showed greater emotional responses to food and pictures of food than their less happy counterparts [35]. These studies used the Subjective Happiness Scale to assess happiness. However, when Item Response Theory was applied to this scale to evaluate each of the scale's 4 items individually, the fourth item was identified as problematic [36]. If this item had been eliminated from the analyses, the relationship between food and emotional reactions, which was influenced by prior levels of happiness, might have been even stronger than the authors report.

The Relationship between the Consumption of Unhealthy Food and Well-Being

A growing literature indicates that increased consumption of healthy foods, particularly fruits and vegetables, is associated with higher levels of subjective well-being. Additional research has examined how unhealthy food may be linked to well-being. Researchers used a nationwide survey of 2- to 12-year-old Taiwanese children to explore the relationship between happiness and the consumption of fast food and soft drinks [37]. Though fast food and soft drinks are associated with a greater risk of obesity, the study reported that they were also associated with a decrease in unhappiness. However, we need to view these results as preliminary given that unhappiness was assessed with a single question ("How often does your child feel unhappy, sad or depressed?") with only 3 response options ("often," "seldom," or "never"), which was completed by the children's mothers. Children's self-reports of their own well-being and parental reports of their children's well-being are only modestly correlated [38], and happiness is not simply the opposite of negative affect.

A series of experiments concluded that the packaging used by the fast food industry can have an indirect effect on happiness [39]. American adults were recruited online to view photographs of food (coffee, burger, and fries) either served in ordinary ceramic tableware or in MacDonald's fast food packaging. There was no difference in levels of self-reported happiness following the 2 sets of photographs; however, there was an indirect effect. Following the viewing of the food pictures, participants viewed beautiful photos of nature that had been previously shown to increase happiness. The increase in happiness that typically follows viewing beauty in nature was more pronounced for the participants who previously viewed photos of food served in the ceramic tableware. This suggested that the capacity of participants to savor the beauty of nature was undercut by the fast food packaging images. In a companion study, a similar procedure was used, but beautiful music replaced the nature photos. Those participants who had viewed the fast food images first, reported more impatience and felt that the music lasted longer (time passed slower) than those who had viewed the ceramic tableware images. Together, these studies suggest that fast food images can indirectly lower our well-being and increase our impatience by undermining our ability to savor positive events in our lives. However, this conclusion is perhaps premature given that the researchers did not include a neutral control group (e.g., a group that viewed nonfood photos of geometric

shapes) to serve as a comparison to the 2 food image groups. It is possible that ceramic tableware images promoted savoring rather than fast food images undermined savoring.

The ability to savor small positive events is critical to one's well-being. Though we tend to believe that major life events deliver happiness [40], these events actually account for only a small amount of the variance in our happiness [41]. Smaller positive experiences may be better predictors of happiness because they occur more often and are less vulnerable to adaptation and shrinking marginal utility [42]. Thus, the finding that fast food images can dampen our ability to savor the small pleasures of life may be impactful on our overall and enduring happiness.

The Context of Food Intake and Well-Being

It is not only the quality and quantity of food consumed that influences positive mood and well-being, the manner and the conditions under which the food is eaten matter. For example, practicing mindfulness can increase the beneficial impact of food intake on well-being. Mindfulness involves a heightened awareness that may result from meditation or specific instructions designed to increase one's focus and attention. In one study, participants were given either a cracker or a chocolate and instructed to consume the food in a mindful or nonmindful way [43]. The instructions that were designed to increase mindfulness directed participants to focus their attention on the sensory qualities of the food as opposed to eating the food with little awareness. Participants reported an increase in positive mood following the mindful consumption of the chocolate compared to those who ate the chocolate nonmindfully or those who ate the cracker either mindfully or nonmindfully.

In addition to how we consume foods, the environment we eat in may influence food's impact on our well-being. In a large community sample of over 26,000 Canadians aged 11–15 years, the relationship between family dinners and well-being was explored [44]. Participants who reported eating more dinners with their family also reported greater emotional well-being and life satisfaction, as well as more prosocial behaviors. The positive dose-response relationship between the frequency of family dinners and enhanced well-being was noted across gender, grade level, and family income. However, the causal direction of the relationship between family din-

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nally promote well-being, which facet of the dinners is responsible for the relationship is not clear though social relationships are a likely candidate. Social relationships are known to be strongly linked to well-being, including in children [19], so this component of family dinners may help explain why family dinners contributed to the children's well-being. In fact, parent-adolescent communication explained 13–30% of the variance in the relationship between frequency of family dinner and well-being [44].

Food Intake Viewed as a Positive Psychology Intervention

Positive psychology has focused on the development and testing of interventions to enhance well-being. Studies have reported that a variety of interventions, including those focused on kindness, gratitude, and best possible self, can increase happiness. Two prominent meta-analyses concluded that positive psychology interventions can have a modest impact on increasing well-being and decreasing ill-being [45, 46]. However, when the methodological shortcomings of these analyses are addressed (e.g., small sample size bias), positive psychology interventions seem to have no effect or at most a small impact on ill-being and well-being [47]. In particular, the effect sizes approach zero when small sample size bias is accounted for. As a result, there is a need to revisit the development and testing of interventions designed to increase well-being and to incorporate new approaches. Included in these new approaches may be ones that focus on the role of factors related to food consumption in promoting well-being. In fact, in a study already described, the benefit of fruit and vegetable consumption on positive affect was substantial [30]. When comparing participants who consumed no fruits and vegetables each day to those who consumed 8 or more servings, the effect size was moderate.

When fruit and vegetable consumption was tested as a psychological intervention, the results were encouraging [48]. Participants were randomly assigned to 1 of 3 groups: normal diet, encouragement diet (text messages were sent to participants reminding them to eat more fruits and vegetables and a voucher was provided to purchase these

foods), and enhanced diet (in addition to their normal diet, participants were given 2 extra servings of fruits and vegetables each day). Only participants in the enhanced diet group showed increases in well-being (vitality, flourishing, and motivation). Measures of ill-being (depression, anxiety, and mood) were not impacted.

It is well established that a diet rich in levels of fruits, vegetables, and fiber is linked to many physical health advantages. For example, the increased consumption of fruits and fiber is associated with the reduction of a number of health issues, including type 2 diabetes, colorectal and lung cancer, asthma, and pulmonary disease [49]. This increased consumption also seems to contribute to promoting several healthy facets of life, including successful aging and increased bone density. However, the health benefits of eating a healthy diet are only realized in the long term and, thus, may not be as motivating for people, particularly children and adolescents, who are more impacted by immediate results. Research that shows that healthy food consumption is linked to enhanced well-being is important because it demonstrates an almost immediate benefit of this diet choice.

Strength of the Findings

Collectively, one can have confidence in the external validity of the research demonstrating a link between food intake and well-being because it has been investigated using different methodologies and has sampled from differently aged populations from many countries and cultures. This broad sampling is particularly important in studies of food intake because research has identified differences in components of food consumption across cultures. For example, compared to a city in the USA, citizens of a city in France spend more time preparing food and eating, and less time eating alone, and these differences were linked to aspects of their well-being [50].

The validity of this research is further strengthened because studies of the links between food intake and well-being have assessed multiple components of well-being, including happiness, life satisfaction, overall well-being, and flourishing. This is important because well-being is a multi-dimensional construct, and the correlates and causes of each dimension differ [51]. Conclusions that can be drawn from research on well-being are often limited because only one or a few domains of well-being are assessed. Kahneman et al. [51] found that life satisfaction and experienced happiness were only modestly correlat-

ed ($r = 0.36$), and this relationship notably weakened ($r = 0.21$) when depression was controlled for. To support the conceptualization that the components of well-being are somewhat independent, research has shown that the conditions of one's life (income, education, having a partner, living with children) account for greater variance in life satisfaction than happiness. Positive conditions accounted for 20% of one's life satisfaction but less than 2% of one's experienced happiness. In short, the different dimensions of well-being are independent, and to attain a comprehensive understanding of well-being multiple dimensions need to be measured.

However, the research linking food intake to well-being is incomplete. For example, the mechanisms underlying the relationship still need to be elucidated. One possible mechanism involves social factors. It is clear that the quality of social relationships, both friendships [19] and romantic relationships [52], is associated with increases in well-being. Eating is often a social activity, and eating in the company of others is associated with elevated positive well-being [50]. Another possible mechanism involves biological factors. For example, fruit and vegetable consumption may increase levels of vitamin C, B vitamins, and antioxidants, which may lead to increased synthesis of dopamine, serotonin, and oxytocin, which have been linked to eudaimonia [53].

The association between fruit and vegetable consumption may be indirect as well. For example, increased fruit and vegetable consumption may lead to better health, which in turn leads to greater well-being. Research has

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not strongly supported this indirect relationship. The link between well-being and fruit and vegetable consumption is still apparent even after physical health and daily exercise are accounted for [29, 30, 54].

The relationship between food intake and well-being may be largely in the reverse direction or bidirectional. Higher well-being may prompt people to select more fruits and vegetables. Research has found that experimentally elevating positive moods can increase individuals' selection of healthier food [55].

Conclusion

Research has identified many important benefits of increasing well-being. Using multiple methods and measures of well-being, and sampling from a wide range of populations, research demonstrates that food consumption, particularly of fruits and vegetables, is associated with increased well-being. Recent work has shown that the more strongly we adopt a view that our well-being is under our control and can be changed, the greater is our hedonic and eudaimonic well-being [56, 57]. Participants who were experimentally led to believe that they can make choices to change their well-being endorsed activities thought to enhance well-being more than those led to believe that their well-being was fixed and could not be changed [56]. If food consumption is shown to increase well-being, this knowledge can add to positive psychology interventions known to increase well-being and help

people believe that their choices can impact their well-being. Adopting this view can increase well-being and perhaps increase people's adherence to these interventions. Thus, the consumption of fruits and vegetables in a mindful way with others may represent a daily activity that people can engage in to increase their well-being and help them adopt a view that they can change their well-being. In turn, the subsequent increase in well-being may provide a host of benefits to the most important aspects of living, including better health, longevity, personal relationships, and career success.

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