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ORIGINAL ARTICLE

Do nutrition knowledge, food preferences, and habit strength moderate the association between preference for intuition and deliberation in eating decision-making and dietary intake?

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Abstract

An intuitive style in eating decision-making, for example, basing decisions on one's gut feeling, has been related to a less healthy diet, whereas deliberately deciding what to eat, such as making plans about eating behavior, has been related to a healthier diet. The present study investigated whether nutrition knowledge, food preferences, and habit strength for healthy and unhealthy eating moderate these relationships. In total, 1245 participants took part in a preregistered cross-sectional online survey. Results revealed that neither nutrition knowledge, nor liking of healthy or unhealthy foods, nor habit strength for healthy or unhealthy eating interacted with the preference for intuition or deliberation in eating decision-making in affecting dietary intake ($\beta s \leq |.06|$; $ts \leq |2.11|$; $ps \geq .035$). Instead, including the potential

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moderating variables in analyses rendered the effect of a preference for intuition largely non-significant. In contrast, the positive effect of a preference for deliberation was largely stable even when including the potential moderating variables. Thus, the present study confirms the general health-promoting effect of a preference for deliberation in eating decision-making. In contrast, results speak in favor of a generally minor role of a preference for intuition for healthy or unhealthy eating.

KEYWORDS
deliberation, habits, healthy eating behavior, intuition, nutrition knowledge, preference

THEORETICAL BACKGROUND

Unhealthy diets are widespread across the world and "pose a greater risk to morbidity and mortality than does unsafe sex, and alcohol, drug, and tobacco use combined" (Willett et al., 2019, p. 447). Hence, it is important to understand the factors influencing whether people show a more or less healthy diet to develop interventions to change dietary patterns. Many different factors influencing eating behavior have been identified in the literature (e.g., Renner et al., 2012). For instance, past research has suggested that deliberately deciding what to eat, such as making plans about eating behavior, is related to a healthier diet (e.g., Zhang et al., 2019). Such deliberate constructs are typically reflected in social-cognitive theories of health behavior such as the Health Action Process Approach (Schwarzer, 2008). In contrast, an intuitive decision style, for example, basing decisions on one's gut feeling, has been related to a somewhat less healthy diet (König, Sproesser, et al., 2021).

The idea that people differ in the way they make decisions, with some preferring intuitive decision making and some preferring a deliberate, reflective style, was guided amongst others by the cognitive-experiential self-theory (Epstein, 1991). Several studies have provided evidence for the trait-like nature of these preferences (Betsch, 2004; Epstein et al., 1996), with, for example, satisfying test–retest reliabilities (e.g., Richetin et al., 2007). Moreover, studies indicate that preference for intuition and preference for deliberation are two dimensions, and not two ends of a continuum (e.g., Betsch, 2004; Epstein et al., 1996; König, Sproesser, et al., 2021); some people thus might score relatively highly on both dimensions, whereas others show clear preferences for one decision-making style over the other (König, Sproesser, et al., 2021).

In the context of dietary intake, effects of a preference for intuition or deliberation were small (König, Sproesser, et al., 2021) (see also Phillips et al., 2016), raising the question whether these effects might depend on other variables. With regard to intuitively deciding what to eat, one might argue, first, that a negative effect on dietary healthiness might be buffered if people have adequate nutrition knowledge. Intuition could be regarded as internalized knowledge (see Nelissen, 2013, for a theoretical discussion); when making a decision, one thus needs to rely less on conscious reflection (cf., dual process models; see, e.g., Hofmann et al., 2008, for a summary). Indeed, intuitive forms of decision-making are generally considered to be effective when decision-makers have domain-related expertise (e.g., Salas et al., 2010), that is, when they have a high level of domain-related knowledge. Specifically, knowledge-dependent effects of intuitive decision-making effectiveness have been previously reported in other domains (e.g., Dane et al., 2012). Accordingly, nutrition knowledge might moderate the relationship between preference for intuition in eating decision-making and dietary intake: people with a strong preference for intuition and high nutrition knowledge may be more successful in eating healthily compared with people with a strong preference for intuition and less nutrition knowledge. In a similar vein, the beneficial effect of a deliberate eating decision style might be absent if nutrition knowledge is low because people simply lack the knowledge to make good deliberate decisions. This assumption is supported by social-cognitive theories. For instance, knowledge about actions that need to be taken in order to perform the desired behavior can be linked to both attitudes and perceived behavioral control in the Theory of Planned Behavior (Ajzen, 1991; see Chien et al., 2018, for an empirical test).

Second, it could be hypothesized that the association between a preference for an intuitive eating style and dietary healthiness might depend on people's preference for healthy or unhealthy foods, that is how much people like healthy and unhealthy foods. According to dual process models, liking of foods may act as a hedonic cue triggering the impulsive system, which may lead to overindulging in unhealthy foods. Indeed, liking of specific foods has been shown to impact the intake of these foods (Raynor et al., 2004), and many people report strong preferences for unhealthy foods due to their taste profiles (Liem & Russell, 2019). However, deciding intuitively what to eat might not be detrimental for healthy eating if people like healthy foods and dislike unhealthy foods. Although research has shown that unhealthy foods are generally assumed to taste good (Raghunathan et al., 2006), recent research has shown that healthy foods, such as fruit and vegetables, made people happier than unhealthy snacks (Franja et al., 2021) and accounted for the largest share in happiness after eating (Wahl et al., 2017). Moreover, Werle et al. (2013) have shown that unhealthy food is not tastier than healthy food for everybody. Thus, there seems to be individual variation in liking of healthy versus unhealthy foods, which might affect the relationship between an intuitive eating style and dietary healthiness.

Third, habit strength for healthy and unhealthy eating might impact the relationship between a preference for an intuitive eating style and dietary healthiness. Habit is defined as “a process by which a stimulus automatically generates an impulse towards action, based on learned stimulus-response associations” (Gardner, 2015, p. 280) and habit strength (i.e., the strength of the association between stimuli and responses) has been identified as an important predictor of behaviors, including healthy as well as unhealthy eating behavior (see Gardner et al., 2011, for a review). Moreover, habit strength moderated the association between intended and actual eating behavior, at least under some conditions (Gardner et al., 2011, 2020). De Bruijn et al. (2008) concluded that higher habit strength makes eating a less intentional behavior (see also de Bruijn, 2010). Hence, the question arises whether the positive association between a preference for deliberation and dietary healthiness also weakens if people have a stronger habit for healthy eating because eating situations or internal cues like hunger will automatically generate an impulse to eat healthy (rather than unhealthy) foods. Likewise, the question arises whether habit strength for healthy eating can buffer against detrimental effects of a preference for intuition in eating decision-making whereas habit strength for unhealthy eating might boost this effect.

Taken together, the association between an intuitive or deliberate eating decision style and dietary intake might depend on people's nutrition knowledge, liking of healthy or unhealthy foods, as well as habit strength for healthy and unhealthy eating. Yet, to date, no studies have investigated this. Hence, the present study aimed to fill this gap by investigating whether the relationship between preference for intuition or deliberation in eating decision-making and dietary intake is moderated by (1) nutrition knowledge, (2) liking of healthy or unhealthy foods, and (3) habit strength for eating healthy or unhealthy foods. To comprehensively investigate dietary intake, we aimed to target both effects on healthy as well as unhealthy eating. The 13 hypotheses were preregistered on the Open Science Framework (https://osf.io/trhz6) prior to data collection and are further specified in the supporting information. In short, we tested the following hypotheses:

Hypothesis 1 *The relationship between preference for intuition and healthy/unhealthy eating is moderated by nutrition knowledge.*

Hypothesis 2 *The relationship between preference for intuition and healthy eating is moderated by the liking of healthy foods. The relationship between preference for intuition and unhealthy eating is moderated by the liking of unhealthy foods.*

Hypothesis 3 *The relationship between preference for intuition and healthy eating is affected by the habit strength for healthy eating. The relationship between preference for intuition and unhealthy eating is affected by the habit strength for unhealthy eating.*

The analyses of the moderating effect of nutrition knowledge, liking of healthy or unhealthy foods, and habit strength for eating healthy or unhealthy foods on the relationship between preference for deliberation and dietary intake was exploratory; accordingly, no hypotheses were preregistered.

METHODS

The study was preregistered on the Open Science Framework (https://osf.io/trhz6) prior to data collection.

Sample

In total, $N = 1932$ adults from the general public in Germany were recruited to take part in a cross-sectional online survey (Unipark, questback, 2017) by a commercial panel provider (Respondi AG). Sixty-five participants did not complete the questionnaire. Participants were excluded if they (1) indicated to be younger than 18 years ($n = 3$), (2) failed two or more attention checks ($n = 121$); (3) completed the survey in less than half of the median response time ($n = 78$); or (4) exceeded the quotas for gender, age, household income, and level of education to result in a sample representative for the German population regarding these variables ($n = 420$); see Table 1 for details based on OECD and the German national office for statistics (Bundeszentrale für politische Bildung, 2020; OECD, 2021; Statistisches Bundesamt, 2021). Demographic and anthropometric characteristics of the sample are also listed in Table 1.

Concerning drop-out analyses, participants who failed two attention checks ($n = 121$) were younger ($t[1364] = 6.60$, $p < .001$, $d = 0.69$; $M_{excluded} = 37.71$, $SD_{excluded} = 12.02$; $M_{retained} = 47.22$, $SD_{retained} = 15.32$) than participants who did not fail the attention checks. Moreover, more male participants than expected had to be excluded because of failing two or more attention checks ($\chi^2[df = 2] = 16.57$, $p < .001$, Cramer V $= 0.11$). BMI did not differ between groups, $t(1346) = 0.64$,

TABLE 1 Demographic and anthropometric characteristics of the final sample and German national statistics used for quotas

Demographic variable	Final sample ($N = 1245$)	German national statistics used for quotas[c]
Gender (%)[a]	Women (51%)	
	Men (49%)	
	Non-binary (0.2%)	
Age (*M*, *SD*)[b]	47.22, 15.32	
Age groups (%)	18–35 years old (28%)	18–35 years old (30%)
	36–55 years old (38%)	36–55 years old (38%)
	56 years and older (34%)	56 years and older (33%)
Net monthly household income (median)[b]	2500€–3000€	
Net monthly household income (%)	2000€ or less (30%)	2000€ or less (30%)
	2000€–5000€ (48%)	2000€–5000€ (48%)
	5000€ or more (22%)	5000€ or more (22%)
Level of education (%)	Below upper secondary (15%)	Below upper secondary (14%)
	Upper secondary (61%)	Upper secondary (55%)
	Tertiary (24%)	Tertiary (31%)
BMI (*M*, *SD*)[b]	27.42, 6.59	

[a]For the quotas, a 50/50 split for men and women was assumed.

[b]Not used for quotas.

[c]Level of education according to OECD (2021); age groups according to Statistisches Bundesamt (2021); net monthly household income according to Bundeszentrale für politische Bildung (2020).

$p = .521$. Moreover, participants who were excluded because of responding too fast ($n = 78$) were younger ($t[1321] = 5.93$, $p < .001$, $d = 0.58$; $M_{excluded} = 36.33$, $SD_{excluded} = 21.42$; $M_{retained} = 47.22$, $SD_{retained} = 15.32$) than participants who were retained in the final sample. Additionally, more male participants than expected had to be excluded because of responding too fast ($\chi^2[df = 2] = 17.87$, $p < .001$, Cramer V $= 0.12$). BMI did not differ between groups, $t(1321) = 0.67$, $p = .505$. As no data were available from participants who did not complete the questionnaire ($n = 65$), who indicated to be younger than 18 years ($n = 3$), and who exceeded the quotas for gender, age, household income, and level of education ($n = 420$), no drop-out analyses could be performed for these participants.

Power analysis

To detect a small effect ($f^2 = 0.02$; Cohen, 1992) in a linear regression with seven predictors (age, gender, E-PI, E-PD, moderator, E-PI*moderator, E-PD*moderator), 725 participants are needed to achieve 80% power at an alpha-level of .05. Because a total of 13 hypotheses were tested, alpha was reduced to .003. Accordingly, 1200 participants were required for 80% power according to a power analysis using R version 4.0.3 and package pwr 1.3–0 (Champely et al., 2017).

Ethics

All participants consented to participate in this study by ticking a respective box at the beginning of the survey after being fully informed about the study. The study adhered to the guidelines of the German Psychological Society and the Declaration of Helsinki and was conducted in compliance with relevant laws and institutional guidelines. The study protocol was approved by the University of Bayreuth ethics committee.

Measures

Demographic and anthropometric data

We assessed age, gender (woman/man/non-binary), and household income with an 11-point scale with the following response options: (1) *less than 150€*; (2) *between 150€ and 300€*; (3) *between 300€ and 500€*; (4) *between 500€ and 1000€*; (5) *between 1000€ and 1500€*; (6) *between 1500€ and 2000€*; (7) *between 2000€ and 2500€*; (8) *between 2500€ and 3000€*; (9) *between 3000€ and 5000€*; (10) *between 5000€ and 10,000€*; and (11) *more than 10,000€*. Education was assessed with two items (highest school qualification and highest training qualification) and categorized into below upper secondary, upper secondary, and tertiary education according to International Standard Classification of Education 2011 (OECD et al., 2015). Also, participants reported their height and weight, based on which BMI was calculated.

Preference for intuition and deliberation in eating decision-making

Preference for an intuitive or deliberate style in eating decision-making (E-PID; König et al., 2018; König, Sproesser, et al., 2021) was measured with seven items. Preference for intuition was measured with three items (e.g., "When deciding what to eat, I rely on my gut feeling"). Preference for deliberation was assessed with four items (e.g., "Before I make eating decisions, I usually think about it."). Participants answered each item on a 5-point Likert scale from (1) *I do not agree* to (5) *I fully agree*. Internal consistency of the two subscales preference for an intuitive (E-PI; Cronbach's $\alpha = .74$; McDonald's $\omega = .74$) and deliberate (E-PD; Cronbach's $\alpha = .85$; McDonald's $\omega = .86$) style in eating decision-making were acceptable. Results of factor analyses are displayed in the supporting information.

Dietary intake

Dietary intake was assessed with a validated food frequency questionnaire (FFQ, Winkler & Döring, 1995, 1998; see also Szymczak et al., 2021). Participants were asked how often on average they eat food items from 24 different selected food categories (e.g., fresh fruit, salty snacks), with the response options (1) *nearly once a day* (coded as 7 times/week), (2) *multiple times per week* (coded as 3.5 times/week), (3) *approx. once a week* (coded as 1 time/week), (4) *multiple times per month* (coded as 0.5 times/week), (5) *approx. once a month or less* (coded as 0.25 times/week), and (6) *never* (coded as 0 times/week). As recommended by Winkler and Döring (1995), 15 of these categories were accumulated into a food frequency index reflecting healthy eating with a possible range of 0–30, higher values indicating healthier eating.

In addition, average portion sizes per consumption occasion was assessed for the 15 food groups. Response options and pictures of portion sizes were adopted from a food frequency questionnaire developed in the German health interview and examination survey for adults (DEGS study) of the German Robert Koch Institute (Haftenberger et al., 2010). The consumption frequency of each food group was multiplied by the amount consumed at a time to indicate amount consumed per week. For three food groups that are recommended for daily consumption (fresh fruit, salad and raw vegetables, cooked vegetables), portions per week were summed up. This resulted in portions of fruit and vegetables per week as an indicator of further healthy eating. For three food groups for which a rare consumption is recommended (chocolate, cake, and salty snacks), the amount consumed at a time was converted into grams (Kube, 2009). Consumed grams per week for these sweet and salty snacks were then summed up as an indicator of unhealthy eating (see also Krug et al., 2018).

Food preferences

Participants reported their liking of the 15 food groups included in the food frequency index on a 6-point Likert scale from (1) *I do not like it at all* to (6) *I like it very much*. Liking of fresh fruit, salad and raw vegetables, as well as cooked vegetables was averaged as a marker of people's preference for healthy foods. This is referred to as liking of fruit and vegetables in the results section. Likewise, liking of chocolate, cake, and salty snacks was averaged as a marker of people's preference for unhealthy foods. This is referred to as liking of sweet and salty snacks in the results section.

Habit strength

Habit strength was assessed with the Self-Reported Habit Index (SRHI) scale adapted to unhealthy and healthy eating (Verplanken & Orbell, 2003) (German translation Thurn, 2014). For each healthy and unhealthy eating, 12 items followed the generic stem "Eating (un)healthy foods is something …" (e.g., "I do automatically"). Responses were given on a 7-point Likert scale from (1) *do not agree at all* to (7) *fully agree*. Results of Verplanken and Orbell (2003) suggested a one factor structure for the SRHI and factor analyses confirmed this (see supporting information). Habit strength for healthy eating had a Cronbach's α of .93 and a McDonald's ω of .93. Habit strength for unhealthy eating displayed a Cronbach's α of .94 and a McDonald's ω of .94.

Nutrition knowledge

Nutrition knowledge was measured using an adapted version of the consumer nutrition knowledge scale (CoNKS) by Dickson-Spillmann et al. (2011) (see Koch et al., 2021). The 20 items were recoded with correct answers taking the value (1) and incorrect answers and "do not know" answers taking the value (0). Nutrition knowledge was calculated as the sum of the 20 items, with a possible range of 0 to 20 points; higher values indicating more nutrition knowledge. To validate the assessment of nutrition knowledge, nutrition expertise was assessed by asking participants whether they had a professional training in nutrition ($n=28$; 2.20%). Participants with professional training in nutrition ($M=13.00$, $SD=4.15$) had significantly higher nutrition knowledge than participants without professional training in nutrition ($M=11.06$, $SD=4.15$), $t(1241)=2.44$, $p=.007$, $d=0.47$.

Attention checks

To guard against inattentive responding, three attention checks were included in the questionnaire ("For attention control purposes, please choose 'I do not agree at all' ", "This is a control question. Please choose 'I do not agree' ", and "When you read this sentence, please choose 'I do not agree at all' ").

Statistical analysis

Analyses were performed in IBM SPSS Statistics (Version 28 for Windows) as well as IBM SPSS AMOS Graphics (Version 28 for Windows). The percentage of missing responses per variable was below 1%. Little's MCAR test (Little, 1988) revealed that the data was missing completely at random ($\chi^2=76.14$, $df=94$, $p=.911$). Hence, missing data was imputed using the Expectation–Maximization algorithm in IBM SPSS Statistics (Gold & Bentler, 2000). Hierarchical multiple regressions with dummy coded categorical variables and z-standardized continuous variables were performed to investigate the research questions. As control variables, gender (women coded as 1, men and non-binary participants as 0) and age were included in the first two steps. Non-binary participants had to be grouped with a different gender group because of the small group size, but we considered this approach more appropriate than completely excluding this gender group. In the third step, the two E-PID subscales were included; fourth the potential moderator variable (nutrition knowledge, food preferences, habit strength); and fifth the interactions between each of the two E-PID subscales and one of the moderator variables. In addition, one model including all moderators and interactions between the E-PID subscales and the moderators was calculated. This model can be found in Table S1. Because independent variables did not correlate above .70, no marked collinearity restrictions existed. Outliers with z-values larger than $|3|$ were excluded from respective analyses, resulting in varying sample sizes in the regression analyses (see Tables 3–5, S1, S2). Data were checked for linearity, normality, as well as homoscedasticity before regression analyses were performed.

RESULTS

Descriptive results

Means, standard deviations, as well as correlations for the investigated variables are displayed in Table 2. First, as expected a preference for intuition in eating decision-making was significantly associated with less healthy eating, both regarding the FFQ Index as well as regarding the weekly portions of consumed fruit and vegetables, although effect sizes were small (cf., Cohen, 1992). It was, however, unrelated to the weekly grams of consumed snacks. Second, a preference for deliberation in eating decision-making was significantly associated with a healthier eating pattern, both in terms of the FFQ Index as well as in terms of weekly portions of consumed fruit and vegetables with small to medium effect sizes. Additionally, it was significantly negatively associated with the weekly grams of consumed snacks, although the effect was small.

Is the relationship between a preference for intuition or deliberation and dietary intake moderated by nutrition knowledge?

Nutrition knowledge did not moderate the relationship between the two E-PID subscales and dietary intake, neither regarding healthy eating nor regarding unhealthy eating (see Table 3). Specifically, no effects occurred neither for the interaction terms between a preference for intuition in eating decision-making and nutrition knowledge, nor for the interaction terms between a preference for deliberation in eating decision-making and nutrition knowledge. Hence, results (Table 3) demonstrate that, contrary to the assumptions stated in Hypothesis 1, the relationship between preference for intuition and healthy/unhealthy eating was not moderated by nutrition knowledge. However, nutrition knowledge was significantly positively associated with healthy eating, both regarding the consumption frequency of several food groups (FFQ Index) as well as regarding the weekly portions of consumed fruit and vegetables with small effect sizes (cf., Cohen, 1992). Interestingly, nutrition knowledge was not related to the grams of consumed sweet and salty snacks per week.

TABLE 2 Means (*M*), standard deviations (*SD*), of E-PID subscales ($N = 1245$)

	M	*SD*	1	2	3	4	5	6	7	8	9
1. Preference for intuition in eating decision-making	3.56	0.82									
2. Preference for deliberation in eating decision-making	3.00	0.99	−.28***								
3. Dietary intake (FFQ index)	13.11	3.62	−.13***	.26***							
4. Portions of fruit and vegetables per week	13.20	9.93	−.11***	.25***	.56***						
5. Grams of sweet and salty snacks per week	337.22	416.66	.03	−.07*	−.29***	.03					
6. Nutrition knowledge	11.11	4.16	−.17***	.15***	.20***	.20***	−.05				
7. Liking of fruit and vegetables	5.12	0.94	.11***	.15***	.30***	.38***	−.13***	.08**			
8. Liking of sweet and salty snacks	4.77	1.07	.11***	−.02	−.18***	.02	.28***	.06*	.25***		
9. Habit strength healthy eating	4.60	1.29	.03	.38***	.39***	.43***	−.19***	.14***	.41***	−.03	
10. Habit strength unhealthy eating	3.69	1.43	.22***	−.28***	−.35***	−.23***	.31***	−.11***	−.20***	.22***	−.39***

*$p < .05$.

**$p < .01$.

***$p < .001$.

TABLE 3 Results from hierarchical multiple regressions testing nutrition knowledge as a potential moderator of the relationship between the two E-PID subscales and dietary intake ($N = 1245$)

	B	Lower CI	Upper CI	*SE*	β	*t*	*p*	R^2	*F* (*df*)	*p*
Dietary intake (FFQ index; n = 1231)								.11	22.68 (7, 1223)	<.001
Preference for intuition in eating decision-making (E-PI)	−0.18	−0.39	0.03	0.11	−.05	−1.73	.085			
Preference for deliberation in eating decision-making (E-PD)	0.85	0.65	1.05	0.10	.24	8.33	**<.001**			
Nutrition knowledge	0.58	0.39	0.78	0.10	.16	5.88	**<.001**			
E-PI*Nutrition knowledge	−0.08	−0.30	0.14	0.11	−.02	−0.73	.468			
E-PD*Nutrition knowledge	0.03	−0.17	0.23	0.10	.01	0.30	.764			
Portions of fruit and vegetables per week (n = 1220)								.11	22.47 (7, 1212)	<.001
Preference for intuition in eating decision-making (E-PI)	−0.35	−0.88	0.17	0.27	−.04	−1.31	.190			
Preference for deliberation in eating decision-making (E-PD)	1.95	1.44	2.46	0.26	.21	7.55	**<.001**			
Nutrition knowledge	1.56	1.07	2.05	0.25	.17	6.22	**<.001**			
E-PI*Nutrition knowledge	−0.40	−0.95	0.14	0.28	−.04	−1.45	.148			
E-PD*Nutrition knowledge	0.04	−0.47	0.55	0.26	.00	0.15	.877			
Grams of sweet and salty snacks per week (n = 1211)								.02	5.05 (7, 1203)	<.001
Preference for intuition in eating decision-making (E-PI)	13.81	−5.16	32.78	9.67	.04	1.43	.153			
Preference for deliberation in eating decision-making (E-PD)	−34.90	−53.08	−16.71	9.27	−.11	−3.77	**<.001**			
Nutrition knowledge	0.88	−16.85	18.61	9.04	.00	0.10	.922			
E-PI*Nutrition knowledge	7.19	−12.56	26.93	10.07	.02	0.71	.475			
E-PD*Nutrition knowledge	5.64	−12.60	23.88	9.30	.02	0.61	.544			

Note: All regressions were controlled for age and gender. Please note that, due to multiple testing, the alpha level for a significant result was set to $p = .003$; *p*-values below this threshold are set in bold; CI = 95% confidence interval.

TABLE 4 Results from hierarchical multiple regressions testing liking of (un)healthy foods as a potential moderator of the relationship between the two E-PID subscales and dietary intake ($N = 1245$)

	B	Lower CI	Upper CI	*SE*	β	*t*	*p*	R^2	*F (df)*	*p*
1) DV: Portions of fruit and vegetables per week										
a) Potential moderator: Liking of fruit and vegetables (LikFV; n = 1208)								.21	45.91 (7, 1200)	<.001
Preference for intuition in eating decision-making (E-PI)	−1.09	−1.59	−0.58	0.26	−.12	−4.23	**<.001**			
Preference for deliberation in eating decision-making (E-PD)	1.40	0.91	1.89	0.25	.15	5.58	**<.001**			
Liking of fruit and vegetables	3.76	3.22	4.29	0.27	.38	13.76	**<.001**			
E-PI*Liking of fruit and vegetables	−0.05	−0.61	0.51	0.28	.00	−0.17	.863			
E-PD*Liking of fruit and vegetables	0.28	−0.24	0.80	0.26	.03	1.07	.286			
b) Potential moderator: liking of sweet and salty snacks (LikSn; n = 1209)								.08	16.16 (7, 1201)	<.001
Preference for intuition in eating decision-making (E-PI)	−0.65	−1.18	−0.11	0.27	−.07	−2.36	.018			
Preference for deliberation in eating decision-making (E-PD)	2.11	1.59	2.62	0.26	.23	8.01	**<.001**			
Liking of sweet and salty snacks	0.38	−0.14	0.90	0.27	.04	1.42	.155			
E-PI*Liking of sweet and salty snacks	0.23	−0.30	0.76	0.27	.02	0.86	.391			

(Continues)

TABLE 4 (Continued)

	B	Lower CI	Upper CI	*SE*	β	*t*	*p*	R^2	*F* (*df*)	*p*
E-PD*Liking of sweet and salty snacks	−0.09	−0.63	0.46	0.28	−.01	−0.32	.748			
c) Potential moderator: liking differences score (LikFV – LikSn; n = 1210)								.13	27.37 (7, 1202)	<.001
Preference for intuition in eating decision-making (E-PI)	−0.66	−1.18	−0.15	0.26	−.07	−2.52	.012			
Preference for deliberation in eating decision-making (E-PD)	1.78	1.27	2.28	0.26	.20	6.92	**<.001**			
Liking differences score	2.25	1.73	2.78	0.27	.23	8.36	**<.001**			
E-PI*Liking differences score	−0.19	−0.68	0.31	0.25	−.02	−0.74	.457			
E-PD*Liking differences score	−0.20	−0.76	0.35	0.28	−.02	−0.71	.478			
2) DV: Grams of sweet and salty snacks per week										
a) Potential moderator: Liking of fruit and vegetables (n = 1201)								.03	5.58 (7, 1193)	<.001
Preference for intuition in eating decision-making (E-PI)	15.60	−3.61	34.81	9.79	.05	1.59	.111			
Preference for deliberation in eating decision-making (E-PD)	−30.81	−49.56	−12.07	9.55	−.10	−3.23	**.001**			
Liking of fruit and vegetables	−22.25	−42.81	−1.69	10.48	−.07	−2.12	.034			
E-PI*Liking of fruit and vegetables	0.51	−20.74	21.75	10.83	.00	0.05	.963			
E-PD*Liking of fruit and vegetables	−6.83	−26.65	13.00	10.10	−.02	−0.68	.499			

TABLE 4 (Continued)

	B	Lower CI	Upper CI	*SE*	β	*t*	*p*	R^2	*F* (*df*)	*p*
b) Potential moderator: liking of sweet and salty snacks (n = 1200)								.13	26.41 (7, 1192)	<.001
Preference for intuition in eating decision-making (E-PI)	3.73	−14.21	21.66	9.14	.01	0.41	.684			
Preference for deliberation in eating decision-making (E-PD)	−35.38	−52.56	−18.19	8.76	−.11	−4.04	**<.001**			
Liking of sweet and salty snacks	107.71	90.26	125.17	8.90	.33	12.11	**<.001**			
E-PI*Liking of sweet and salty snacks	−8.50	−26.04	9.04	8.94	−.03	−0.95	.342			
E-PD*Liking of sweet and salty snacks	−3.85	−22.10	14.40	9.30	−.01	−0.41	.679			
c) Potential moderator: liking difference score (PrefFV – PrefSn; n = 1202)								.14	27.82 (7, 1194)	<.001
Preference for intuition in eating decision-making (E-PI)	14.53	−3.09	32.15	8.98	.05	1.62	.106			
Preference for deliberation in eating decision-making (E-PD)	−16.87	−34.14	0.39	8.80	−.05	−1.92	.055			
Liking difference score	−115.84	−134.00	−97.68	9.26	−.35	−12.52	**<.001**			
E-PI*Liking difference score	−4.50	−21.29	12.29	8.56	−.01	−0.53	.599			
E-PD*Liking difference score	6.83	−12.29	25.95	9.75	.02	0.70	.484			

Note: All regressions were controlled for age and gender. Please note that, due to multiple testing, the alpha level for a significant result was set to $p = .003$; *p*-values below this threshold are set in bold. DV = dependent variable; CI = 95% confidence interval.

TABLE 5 Results from hierarchical multiple regressions testing habit strength for (un)healthy eating as a potential moderator of the relationship between the two E-PID subscales and dietary intake ($N = 1245$)

	B	Lower CI	Upper CI	*SE*	β	*t*	*p*	R^2	*F (df)*	*p*
1. DV: Dietary intake (FFQ index)										
a) Potential moderator: Habit strength for eating healthy foods (SRHI healthy; n = 1,231)								.19	40.99 (7, 1,223)	<.001
Preference for intuition in eating decision-making (E-PI)	−0.45	−0.65	−0.25	0.10	−.12	−4.39	**<.001**			
Preference for deliberation in eating decision-making (E-PD)	0.38	0.17	0.59	0.11	.11	3.53	**<.001**			
Habit strength for eating healthy foods	1.26	1.06	1.46	0.10	.35	12.15	**<.001**			
E-PI*Habit strength for eating healthy foods	−0.04	−0.22	0.14	0.09	−.01	−0.46	.643			
E-PD*Habit strength for eating healthy foods	−0.05	−0.22	0.12	0.09	−.02	−0.58	.564			
b) Potential moderator: habit strength for eating unhealthy foods (SRHI unhealthy; n = 1231)								.15	33.00 (7, 1223)	<.001
Preference for intuition in eating decision-making (E-PI)	−0.11	−0.31	0.10	0.10	−.03	−1.04	.300			
Preference for deliberation in eating decision-making (E-PD)	0.64	0.44	0.84	0.10	.18	6.24	**<.001**			
Habit strength for eating unhealthy foods	−1.04	−1.24	−0.84	0.10	−.29	−10.04	**<.001**			
E-PI*Habit strength for eating unhealthy foods	0.08	−0.10	0.26	0.09	.02	0.85	.397			
E-PD*Habit strength for eating unhealthy foods	0.08	−0.10	0.25	0.09	.02	0.85	.395			

TABLE 5 (Continued)

	B	Lower CI	Upper CI	*SE*	β	*t*	*p*	R^2	*F* (*df*)	*p*
c) Potential moderator: Difference score SRHI healthy - SRHI unhealthy (n = 1229)								.21	46.34 (7, 1221)	<.001
Preference for intuition in eating decision-making (E-PI)	−0.25	−0.44	−0.05	0.10	−.07	−2.45	.015			
Preference for deliberation in eating decision-making (E-PD)	0.33	0.12	0.53	0.10	.09	3.16	**.002**			
Difference score SRHI healthy - SRHI unhealthy	1.42	1.22	1.62	0.10	.39	13.79	**<.001**			
E-PI*Difference score SRHI healthy - SRHI unhealthy	−0.05	−0.23	0.13	0.09	−.01	−0.52	.602			
E-PD*Difference score SRHI healthy - SRHI unhealthy	−0.05	−0.22	0.13	0.09	−.01	−0.51	.609			
2. DV: Portions of fruit and vegetables per week										
a) Potential moderator: Habit strength for eating healthy foods (SRHI healthy) (n = 1220)								.22	50.16 (7, 1212)	<.001
Preference for intuition in eating decision-making (E-PI)	−1.11	−1.61	−0.62	0.25	−.12	−4.39	**<.001**			
Preference for deliberation in eating decision-making (E-PD)	0.60	0.08	1.11	0.26	.07	2.26	.024			
Habit strength for eating healthy foods	3.79	3.28	4.29	0.26	.42	14.71	**<.001**			
E-PI*Habit strength for eating healthy foods	−0.48	−0.93	−0.03	0.23	−.06	−2.11	.035			
E-PD*Habit strength for eating healthy foods	0.24	−0.19	0.66	0.22	.03	1.10	.273			

(Continues)

TABLE 5 (Continued)

	B	Lower CI	Upper CI	*SE*	β	*t*	*p*	R^2	*F* (*df*)	*p*
b) Potential moderator: habit strength for eating unhealthy foods (SRHI unhealthy; (n = 1220)								.11	22.52 (7, 1212)	<.001
Preference for intuition in eating decision-making (E-PI)	−0.30	−0.83	0.23	0.27	−.03	−1.12	.262			
Preference for deliberation in eating decision-making (E-PD)	1.68	1.16	2.21	0.27	.19	6.33	**<.001**			
Habit strength for eating unhealthy foods	−1.74	−2.27	−1.21	0.27	−.19	−6.46	**<.001**			
E-PI*Habit strength for eating unhealthy foods	0.27	−0.21	0.75	0.24	.03	1.11	.268			
E-PD*Habit strength for eating unhealthy foods	0.09	−0.37	0.55	0.24	.01	0.38	.701			
c) Potential moderator: Difference score SRHI healthy - SRHI unhealthy (n = 1218)								.19	40.39 (7, 1210)	<.001
Preference for intuition in eating decision-making (E-PI)	−0.49	−0.99	0.01	0.26	−.05	−1.91	.057			
Preference for deliberation in eating decision-making (E-PD)	0.83	0.30	1.35	0.27	.09	3.10	**.002**			
Difference score SRHI healthy - SRHI unhealthy	3.32	2.80	3.84	0.26	.36	12.56	**<.001**			
E-PI*Difference score SRHI healthy - SRHI unhealthy	−0.41	−0.88	0.05	0.24	−.05	−1.73	.083			
E-PD*Difference score SRHI healthy - SRHI unhealthy	0.02	−0.43	0.47	0.23	.00	0.09	.931			

TABLE 5 (Continued)

	B	Lower CI	Upper CI	*SE*	β	*t*	*p*	R^2	*F* (*df*)	*p*
3. DV: Portions of sweet and salty snacks per week										
a) Potential moderator: Habit strength for eating healthy foods (SRHI healthy) (n = 1211)								.04	8.78 (7, 1203)	<.001
Preference for intuition in eating decision-making (E-PI)	21.20	2.25	40.15	9.66	.07	2.19	.028			
Preference for deliberation in eating decision-making (E-PD)	−14.33	−33.96	5.31	10.01	−.05	−1.43	.153			
Habit strength for eating healthy foods	−49.30	−68.59	−30.02	9.83	−.16	−5.02	**<.001**			
E-PI*Habit strength for eating healthy foods	−3.72	−21.03	13.58	8.82	−.01	−0.42	.673			
E-PD*Habit strength for eating healthy foods	−2.45	−18.61	13.71	8.24	−.01	−0.30	.766			
b) Potential moderator: habit strength for eating unhealthy foods (SRHI unhealthy; n = 1211)								.11	22.08 (7, 1203)	<.001
Preference for intuition in eating decision-making (E-PI)	−2.03	−20.35	16.30	9.34	−.01	−0.22	.828			
Preference for deliberation in eating decision-making (E-PD)	−9.48	−27.38	8.43	9.13	−.03	−1.04	.299			
Habit strength for eating unhealthy foods	99.31	80.95	117.68	9.36	.32	10.61	**<.001**			
E-PI*Habit strength for eating unhealthy foods	0.63	−16.01	17.27	8.48	.00	0.07	.941			
E-PD*Habit strength for eating unhealthy foods	−8.24	−24.13	7.65	8.10	−.03	−1.02	.309			

(Continues)

	B	Lower CI	Upper CI	*SE*	β	*t*	*p*	R^2	*F* (*df*)	*p*
c) Potential moderator: Difference score SRHI healthy - SRHI unhealthy (n = 1210)								.10	19.69 (7, 1202)	<.001
Preference for intuition in eating decision-making (E-PI)	12.66	−5.67	30.98	9.34	.04	1.36	.176			
Preference for deliberation in eating decision-making (E-PD)	2.96	−15.97	21.90	9.65	.01	0.31	.590			
Difference score SRHI healthy - SRHI unhealthy	−95.31	−114.26	−76.36	9.66	−.30	−9.87	**<.001**			
E-PI*Difference score SRHI healthy - SRHI unhealthy	−6.76	−23.95	10.44	8.76	−.02	−0.77	.441			
E-PD*Difference score SRHI healthy - SRHI unhealthy	−1.37	−17.55	14.80	8.24	.00	−0.17	.868			

Note: All regressions were controlled for age and gender. Please note that, due to multiple testing, the alpha level for a significant result was set to $p = .003$; *p*-values below this threshold are set in bold. DV = dependent variable; CI = 95% confidence interval.

Is the relationship between a preference for intuition or deliberation and dietary intake moderated by liking of healthy or unhealthy foods?

Neither the liking of fruit and vegetables nor of sweet and salty snacks moderated the relationship between the two E-PID subscales and dietary intake. Specifically, no effect occurred for the interaction terms between a preference for intuition or deliberation in eating decision-making and liking of fruit and vegetables or of sweet and salty snacks, both regarding the weekly portions of consumed fruit and vegetables as well as regarding the grams of consumed sweet and salty snacks per week (see Table 4). Hence, results (Table 4) demonstrate that Hypothesis 2, that is, that the relationship between preference for intuition and healthy or unhealthy eating is affected by the liking of healthy or unhealthy foods, was not confirmed. However, the liking of fruit and vegetables was significantly positively associated with the weekly portions of consumed fruit and vegetables with a medium effect size (cf., Cohen, 1992). Similarly, the liking of sweet and salty snacks was significantly positively associated with the grams of consumed sweet and salty snacks per week with a medium effect size (see Table 4).

To follow up these analyses, we calculated a preference difference score, subtracting the liking of sweet and salty snacks from the liking of fruit and vegetables and investigated its moderating role. Results revealed that this preference difference score did also not moderate the relationship between the two E-PID subscales and dietary intake, neither regarding the weekly portions of consumed fruit and vegetables nor regarding the grams of consumed sweet and salty snacks per week (see Table 4). The preference difference score showed, however, a significant positive association with weekly portions of consumed fruit and vegetables (small to medium effect size) and a significant negative association with the grams of consumed sweet and salty snacks per week (medium effect size).

Furthermore, we explored the interplay between E-PID subscales and the liking of all individual food groups regarding the consumption of these individual food groups (see Table S2). Again, none of the interaction terms between a preference for intuition or deliberation in eating decision-making and the liking of a single food group had a significant effect on the consumption of this single food group (βs ≤ |.07|; *t*s ≤ 2.85; *p*s ≥ .004). There were, however, significant main effects of the liking of a single food group on the consumption for all the 15 single food groups (βs ≥ .24; *t*s ≥ 8.63; *p*s < .001; mostly medium effect sizes). For instance, a higher liking of meat was positively associated with the portions of meat consumed per week ($\beta = .40$; $t = 14.98$; $p < .001$). Moreover, preference for deliberation in eating decision-making had a significant main effect on the consumption of seven out of 15 food groups: It was negatively associated with the consumption of meat, cold cuts, and chocolate (βs ≤ −.10; *t*s ≤ −4.03; *p*s < .001; small effect sizes), and positively associated with the consumption of fish, raw vegetables, cooked vegetables, and fruit (βs ≥ .09; *t*s ≥ 3.22; *p*s ≤ .001; small effect sizes). Preference for intuition in eating decision-making had a significant main effect on the consumption of three out of 15 food groups: it was negatively associated with the consumption of raw vegetables, wholegrain bread, and oats (βs ≤ −.08; *t*s ≤ −2.99; *p*s ≤ .003; small effect sizes).

Is the relationship between a preference for intuition or deliberation and dietary intake moderated by habit strength for healthy or unhealthy eating?

Neither habit strength for healthy eating nor for unhealthy eating moderated the relationship between the two E-PID subscales and dietary intake. Specifically, no significant effects were found for all interaction terms between a preference for intuition or deliberation in eating decision-making and habit strength for healthy or unhealthy eating, both regarding the consumption frequency of several food groups (FFQ Index), the weekly portions of consumed fruit and vegetables as well as with regard to the grams of consumed sweet and salty snacks per week (see Table 5). Hence, results (Table 5) demonstrate that the Hypothesis 3, that is, that the relationship between preference for intuition and healthy or unhealthy eating is affected by the habit strength for healthy or unhealthy eating, was not confirmed. However, habit strength for healthy eating was significantly positively associated with the healthiness of dietary intake (FFQ Index; medium effect size; cf., Cohen, 1992) and the weekly portions of consumed fruit and vegetables (medium to large effect size); as well as significantly negatively associated with the grams of consumed sweet and salty snacks per week (small effect size). In contrast, habit strength for unhealthy eating was significantly negatively associated with the healthiness of dietary intake (FFQ Index; medium effect size) and the weekly portions of consumed fruit and vegetables (small to medium effect size); as well as positively associated with the grams of consumed sweet and salty snacks per week (medium effect size; see Table 5).

To follow up these analyses, we calculated a habit difference score, subtracting the habit strength for unhealthy eating from the habit strength for healthy eating and investigated its moderating role. Results revealed that this habit difference score did also not moderate the relationship between the two E-PID subscales and dietary intake, neither regarding the FFQ Index, weekly portions of consumed fruit and vegetables, nor regarding the grams of consumed sweet and salty snacks per week (see Table 5). The habit difference score showed, however, a significant positive association with the FFQ Index and weekly portions of consumed fruit and vegetables; as well as a significant negative association with the grams of consumed sweet and salty snacks per week (medium effect sizes).[1]

DISCUSSION

The present study investigated whether nutrition knowledge, food preferences, and habit strength moderate the association between the preference for intuition or preference for deliberation in eating decision-making and dietary intake. Results revealed that neither nutrition knowledge, nor the liking of healthy or unhealthy foods, nor habit strength for healthy or unhealthy eating interacted with the preference for intuition or preference for deliberation in eating decision-making in affecting dietary intake. Instead, including the potential moderating variables in analyses rendered the effect of a preference for intuition largely non-significant. In contrast, the positive effect of a preference for deliberation was largely stable even when including the potential moderating variables. Thus, the present study confirms the general health-promoting effect of a preference for deliberation in eating decision-making, which also supports the importance of social-cognitive variables in health promotion as postulated by social-cognitive theories of health behavior (see, e.g., Zhang et al., 2019). In contrast, results of the present study speak in favor of a generally minor role of a preference for intuition for healthy or unhealthy eating, which is in line with the absence of associations between a preference for intuition and health parameters (König, Sproesser, et al., 2021). Thus, somewhat in contrast to a common interpretation of dual process models (e.g., Hofmann et al., 2008), implicit processes do not automatically lead to unhealthy behaviors and subsequent detrimental effects on health.

Still, the present results do not mean that a preference for deliberation is always beneficial and a preference for intuition never effective. Specifically, according to dual system accounts, the reflective system includes higher order mental operations, such as executive functions, which enable goal pursuit and can inhibit impulses. However, these higher order mental operations are dependent on control resources. Thus, a preference for deliberation might not be predictive for healthy eating under specific boundary conditions under which impulsive precursors may better predict eating behavior (Hofmann et al., 2008). In contrast to the reflective system, the impulsive system is thought to be independent of attentional resources and act according to associative processes. Future research needs to elucidate the question whether a preference for deliberation is not predictive for healthy eating under certain boundary conditions as well as the question whether, under these conditions, a preference for intuition becomes more influential.

It is important to note that the E-PID aims to assess preferences in decision-making style (cf., Betsch, 2004; Epstein et al., 1996), but does not aim to assess which outcomes participants are optimizing for and what kind of internal cues they use for their intuitive decision making. With regard to the preference for deliberation in eating decision-making, people might not only deliberate on healthy eating, but also on other topics such as price (cf., Renner et al., 2012). However, previous research has shown a considerable relationship between E-PD and choosing food for

[1]To secure the found pattern of results, we repeated all analyses with the automaticity subscale of the Self-Report Habit Index (Gardner et al., 2012). These analyses revealed comparable results with regard to the analyses including the full Self-Report Habit Index.

health reasons (König, Sproesser, et al., 2021), which underlines that health concerns play an important role when deliberately deciding what to eat. Regarding the preference for intuition in eating decision-making, consuming healthier foods in response to physiological feelings of hunger seems preferable from a purely physical health perspective. However, eating intuition might also be influenced by "feel-good" heuristics which might be formed through past experienced pleasure, stress relief (Parker et al., 2006), or (socially learnt) information outside the immediate eating situation such as marketing (Jiang et al., 2014) which might promote unhealthier eating. Therefore, it is an interesting endeavor for future research to explore what kinds of intuitions people rely on (such as "This is good for my health" or "This is good for my mind") when they make intuitive eating decisions and how they understand terms like "gut feeling," "instinct," and "intuitive eater" (all E-PID items) in the first place. In a similar vein, the E-PID assesses eating decision-making as a trait-like preference that people have, whereas there might also be state-like situation-specific decision-making styles. Although previous research generally confirmed the notion of decision-making style preferences being rather traits than states (Richetin et al., 2007), at least some people might be able to switch flexibly between the styles, as indicated by some people scoring high on both subscales (Betsch, 2004) (see also König, Sproesser, et al., 2021 for a discussion). Future research therefore needs to examine whether and, if so, under which conditions, situational cues interact with stable interindividual differences in tendencies towards these behaviors to lead to the use of certain decision-making styles.

Another point for discussion is the conceptual overlap between a preference for intuition or a preference for deliberation in eating decision-making and habit strength. Chung (2015) has argued that habit strength reflects intuitive decision processes. Furthermore, the E-PID includes items such as "Before I make eating decisions, I usually think about it" (preference for deliberation subscale) which seems to be the opposite of items included in the Self-Report Habit Index (SRHI; Verplanken & Orbell, 2003), such as "Behaviour X is something I do without thinking." However, intuitive judgments are not a mere result of "purely" impulsive processing: rather, impulsive processes provide content for further reflective processing that is subjected to syllogistic reasoning, such as when a gut-feeling about what might feel good to eat is used as an argument in a deliberation about what to eat (Strack & Deutsch, 2004). This distinguishes intuitive decisions from habits which are automatized associations between a stimulus and a behavioral impulse (Gardner, 2015). Correlational results of our study are in line with the two concepts being different, showing that a preference for intuition or preference for deliberation in eating decision-making and habit strength for healthy and unhealthy eating correlate moderately at maximum. Yet the E-PID targets eating behavior in general, whereas we assessed habit strength for eating in specific ways, namely healthy or unhealthy eating. Further, the SRHI items related to the execution of behavior whereas the E-PID mainly relates to behavior instigation. These two aspects of behavior differ conceptually and relate differently to habit (Gardner, 2022; Gardner et al., 2016) and the moderate relationship between scales might therefore partly be explained by the discordance in wording. Thus, future research needs to elucidate the empirical and conceptual overlap between habit strength for eating in general and a preference for intuition or for deliberation in eating decision-making, separately for behavioral instigation and execution. It seems conceivable that preferences for deliberation or for intuition might relate differently to these two aspects of eating behavior.

The strengths of the present study include the large sample, which is representative for the German population. Thus, the present study adds to earlier studies reporting results of overly educated or healthy samples (e.g., de Bruijn, 2010; König, Sproesser, et al., 2021). Moreover, we comprehensively investigated eating behavior, taking into account the consumption of 15 food groups, including consumption frequency and amount consumed. Also, the present study adhered to open science principles, including preregistration. Still, there are limitations to mention. First, our cross-sectional design does not allow for causal inferences. Relatedly, we could not study any effects over time, for example how explicit nutrition knowledge might develop into eating intuitions which then translate into eating behavior. Second, as data were collected in Germany, we do not know whether results are generalizable to other countries (see Henrich et al., 2010). Finally, the study lacks external validity because it was cross-sectional and exclusively relied on questionnaires, also for assessing behavior, which have several shortcomings including recall bias (Naska et al., 2017; Thompson & Subar, 2017) that may distort the findings. A more in-depth recording of eating behavior, for example, using smartphone-based Ecological Momentary Assessment (König, Van Emmenis, et al., 2021; Shiffman et al., 2008), is needed to confirm the findings in real-life settings.

CONCLUSION

Although the present study did not find evidence for a moderating role of nutrition knowledge, food preferences, or habit strength, results add to previous research, finding positive associations of healthy eating with a preference for deliberation in eating decision-making (see also König, Sproesser, et al., 2021), nutrition knowledge (see also Spronk et al., 2014; Wardle et al., 2000), liking of healthy foods (see also Raynor et al., 2004), and healthy eating habits (see also Gardner et al., 2011). Moreover, our results extend previous findings by showing that the negative association between a preference for intuition and healthy eating largely disappears when taking nutrition knowledge, food preferences, or habit strength into account. Hence, there might be no need to counteract a preference for intuition. Instead, future experimental research needs to investigate the causal impact of a preference for deliberation on healthy eating. Such a causal impact has already been demonstrated for nutrition knowledge and healthy eating habits with promising results regarding interventions to increase healthy eating (Lakshman et al., 2010; Rompotis et al., 2014).

ETHICS STATEMENT

All participants consented to participate in this study by ticking a respective box at the beginning of the survey after being fully informed about the study. The study adhered to the guidelines of the German Psychological Society and the Declaration of Helsinki and was conducted in compliance with relevant laws and institutional guidelines. The study protocol was approved by the University of Bayreuth ethics committee.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The study was preregistered on the Open Science Framework (https://osf.io/trhz6) prior to data collection. Data and study materials are available for download (https://osf.io/j9xpd/?view_only=2977e85c009140b4aee386be3ba507fe).

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