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Psychometric properties and correlates of the German version of the Fear of Food Questionnaire

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Abstract

The Fear of Food Questionnaire (FFQ) is a self-report measure to assess fear and avoidance of foods and food-related social situations. This study aimed to provide a German version of the FFQ and to examine its psychometric properties and correlates. Two-hundred and thirty-three participants (76% female) completed the FFQ along other measures online and 110 participants completed the FFQ again after two weeks. The original FFQ's five factors could not be replicated but analyses supported a one-factor model of a shortened form with ten items. Internal and test–retest reliability coefficients were high for both the full version and the short form. Convergent validity was supported by associations with gastrointestinal diseases, emetophobic symptomatology, and symptoms of avoidant/restrictive food intake disorder. A medium-sized correlation with eating disorder psychopathology suggested limited discriminant validity. Female sex, disgust propensity, disgust sensitivity, and intolerance of uncertainty were identified as further correlates of fear of food. In conclusion, this study indicates that the German FFQ and its short form has high internal as well as test–retest reliability and provides support for its convergent validity. Indications for its factorial and discriminant validity were limited, which may necessitate further refinements in future studies.

Keywords Fear of food · Emetophobia · Eating disorders · Disgust · Anxiety

Introduction

Fear of food is a transdiagnostic concept referring to the avoidance of specific foods, food groups, and food-related social situations due to anticipated negative consequences (Zickgraf et al., 2022). While research on food restriction driven by weight and shape concerns and the desire to lose or maintain body weight is pervasive, food restriction motivated by other factors has received less attention. For example, people also avoid certain foods or food-related social situations because they fear having digestive problems (e.g., bloating, obstipation, diarrhea) or other issues (e.g., vomiting, choking, allergic reactions). Thus, there is a range of medical conditions and mental disorders that are potentially characterized by elevated fear and avoidance of foods such as chronic gastrointestinal diseases (e.g., irritable bowel syndrome, Crohn's disease, ulcerative colitis), phobias (e.g., emetophobia, phagophobia), and eating disorders (e.g., avoidant/restrictive food intake disorder [ARFID]).

To measure fear of food, Zickgraf et al. (2022) developed the Fear of Food Questionnaire (FFQ). They found that the FFQ had a five-factor structure representing gastrointestinal fears, food fears, food avoidance, social impairment, and loss of pleasure. Internal consistency of the total scale was high across several samples ($\alpha \geq 0.90$) as was test–retest reliability across two weeks ($ICC = 0.93$). Among other findings, the overall pattern of results indicated that higher FFQ scores related to higher gastrointestinal symptoms, emetophobic symptomatology, and ARFID symptoms with medium effect sizes.

The aim of this preregistered study (https://doi.org/10.17605/OSF.IO/KFVDG) was to provide a German version of the FFQ and to examine its psychometric properties and correlates. Specifically, we expected to replicate the FFQ's five-factor structure. However, as Zickgraf et al. (2022) also computed a total score of all items, we tested a hierarchical model that included both a second-order general factor and the five first-order factors. We expected that this model

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would have at least acceptable model fit, indicating that both subscale and total scores can be computed and interpreted meaningfully. Yet, we also planned to conduct a Haberman analysis (Haberman, 2008) to examine whether reporting the subscale scores actually has added value to reporting the total score and expected that it would not. Regarding internal and test–retest reliability, we expected to find comparable (i.e., high) coefficients.

Regarding correlates of the German FFQ, we hypothesized that higher FFQ scores would moderately correlate with higher emetophobic and ARFID symptomatology, as has been reported by Zickgraf et al. (2022). In addition, we examined associations with other constructs that were not included in the studies by Zickgraf et al. (2022), namely eating disorder psychopathology (i.e., restrained eating as well as eating, weight, and shape concerns), disgust propensity (i.e., how easily one is disgusted), disgust sensitivity (i.e., how negative one evaluates the experience of disgust), and intolerance of uncertainty (i.e., how negative one evaluates or tries to avoid uncertainty). As studies on emetophobia and restrictive eating disorders found positive relationships with disgust propensity, disgust sensitivity, and intolerance of uncertainty (Brown et al., 2017, 2022; van Overveld et al., 2008; Zhao, 2014), we similarly expected small-to-medium, positive correlations with the FFQ. As eating disorder psychopathology primarily refers to eating, weight, and shape concerns as well as restricted food intake because of these concerns, we expected no or a small, positive correlation with the FFQ.

Zickgraf et al. (2022) did not report whether FFQ scores related to age and sex. Thus, we additionally explored the correlation between FFQ scores and age for which we expected no or a small (positive or negative) correlation. As women have a higher prevalence of both anxiety (Farhane-Medina et al., 2022) and restrictive eating disorders (Qian et al., 2022), we expected that female participants would have higher FFQ scores than male participants. Finally, we also asked respondents about the presence of chronic gastrointestinal diseases (no vs. yes) and, in line with the findings by Zickgraf et al. (2022), hypothesized that respondents reporting to have ever been diagnosed with a chronic gastrointestinal disease would have higher FFQ total scores than respondents not reporting to have ever been diagnosed with a chronic gastrointestinal disease with a large effect size.

Methods

Participants and procedure

The study was approved the ethics committee at the University of Regensburg (reference number 24–3989-101). Participants were recruited in January and February 2025 through SurveyCircle (https://www.surveycircle.com), Psychology Today (https://www.psychologie-heute.de), pollpool (https://www.poll-pool.com), social media, and among psychology students at the University of Regensburg using the university's Sona System (https://www.sona-systems.com). Inclusion criteria were an age of at least 15 years and speaking German fluently. The study was advertised as a study about different aspects of human eating behavior and hosted by REDCap (https://project-redcap.org). Participants who completed the first part of the study and entered their e-mail address received an invitation to participate in a second part (which only included the FFQ) after two weeks. Among all participants who completed both parts of the study, 5 × €50 were raffled and psychology students at the University of Regensburg were credited with 0.5 participant hours.

Three-hundred and fifty-eight persons visited the website but 58 did not start the survey and 53 did not finish the first part of the study. Fourteen participants did not pass the attention checks (two instructed response items, cf. Muszyński, 2023). Thus, the final sample size was $N = 233$ (used for all analyses except test–retest reliability), of which $n = 110$ also completed the second part of the study (only used to examine test–retest reliability). Most participants were female ($n = 178$, 76.4%), had German citizenship ($n = 220$, 94.4%), had attained at least higher secondary education ($n = 200$, 85.8%), and did not report having a chronic gastrointestinal disease ($n = 216$, 92.7%). Mean age was 28.9 years ($SD = 12.9$, Range: 16–73) and mean body mass index was 23.6 kg/m² ($SD = 4.52$, Range: 15.4–43.9).

Measures

Sociodemographic and other information

Participants were asked to indicate their biological sex (male, female), age (in years), nationality (German, Swiss, Austrian, other), highest educational degree (still in school, lower secondary education, middle secondary education, higher secondary education, bachelor's degree, master's degree, completed vocational training), body height, current body weight, highest body weight (data of which are reported elsewhere, Meule et al., 2025), and whether they have ever been diagnosed with a chronic gastrointestinal disease (e.g., irritable bowel syndrome, Crohn's disease, ulcerative colitis).

FFQ

The FFQ (Zickgraf et al., 2022) measures fear and avoidance of foods in general with 18 items. Exemplary items are "The range of foods it feels "safe" to eat has grown pretty narrow," "My restricted diet makes it harder to go out and

socialize," "I can't enjoy food the way I used to," and "My restrictive diet frustrates me." Responses are recorded on a six-point scale from 0 = *not at all* to 5 = *absolutely*. Therefore, total scores (average of all item responses) can range between 0 and 5 with higher scores indicating higher fear and avoidance of foods. The English items were translated into German by the authors, back-translated by a bilingual speaker, and inconsistencies between the original version and backtranslation were discussed and parts of the translation were adjusted accordingly. Descriptive statistics and internal consistency are reported in Table 1.

Specific Phobia of Vomiting Inventory

The Specific Phobia of Vomiting Inventory (Veale et al., 2013) measures emetophobic symptomatology in the past week with 14 items and its German version (Hennemann et al., 2025) was used in the current study. Responses are recorded on a five-point scale from 0 = *not at all* to 4 = *all the time*. Therefore, total scores (average of all item responses) can range between 0 and 4 with higher scores indicating higher emetophobic symptomatology. Descriptive statistics and internal consistency are reported in Table 1.

Eating Disorder Examination–Questionnaire–8

The Eating Disorder Examination–Questionnaire–8 (Kliem et al., 2016) is a short version of the Eating Disorder Examination–Questionnaire (Fairburn & Beglin, 1994; Hilbert & Tuschen-Caffier, 2016) and measures eating disorder psychopathology in the past four weeks with 8 items. Responses are recorded on a seven-point scale from 0 to 6 with different response labels. Therefore, total scores (average of all item responses) can range between 0 and 6 with higher scores indicating higher eating disorder psychopathology. Descriptive statistics and internal consistency are reported in Table 1.

Eating Disorders in Youth–Questionnaire

The Eating Disorders in Youth–Questionnaire (Hilbert & van Dyck, 2016; van Dyck & Hilbert, 2016) measures symptoms of ARFID, pica, and rumination disorder in general with 14 items. Responses are recorded on a seven-point scale from 0 = *never true* to 6 = *always true*. Only the ten items that are averaged for creating an ARFID score were analyzed in the current study. Therefore, this score can range between 0 and 6 with higher scores indicating higher ARFID symptomatology. Descriptive statistics and internal consistency are reported in Table 1.

Questionnaire for the Assessment of Disgust Propensity–Brief

The Questionnaire for the Assessment of Disgust Propensity–Brief (Schienle et al., 2022) is a short version of the Questionnaire for the Assessment of Disgust Propensity (Schienle et al., 2002) and measures disgust propensity in general with ten items. Responses are recorded on a five-point scale from 0 = *not disgusting* 4 = *very disgusting*. Therefore, total scores (average of all item responses) can range between 0 and 4 with higher scores indicating higher disgust propensity. Descriptive statistics and internal consistency are reported in Table 1.

Scale for the Assessment of Disgust Sensitivity

The Scale for the Assessment of Disgust Sensitivity (Schienle et al., 2010) measures disgust sensitivity in general with seven items. Responses are recorded on a five-point scale from 1 = *never applies to me* to 5 = *always applies to me*. Therefore, total scores (average of all item responses) can range between 1 and 5 with higher scores indicating higher disgust sensitivity. Descriptive statistics and internal consistency are reported in Table 1.

Table 1 Descriptive statistics and internal consistencies of all questionnaire measures and correlations with the Fear of Food Questionnaire and its short form

N = 233	M	SD	Range	ω	Full version		Short form	
					r_{pb}	*p*	r_{pb}	*p*
Fear of Food Questionnaire (full version)	1.06	0.86	0.00–3.61	0.94	—	—	0.94	< 0.001
Fear of Food Questionnaire (short form)	0.86	0.94	0.00–4.10	0.92	0.94	< 0.001	—	—
Specific Phobia of Vomiting Inventory	0.49	0.55	0.00–2.71	0.92	0.33	< 0.001	0.30	< 0.001
Eating Disorder Examination–Questionnaire–8	1.86	1.60	0.00–6.00	0.96	0.44	< 0.001	0.50	< 0.001
Eating Disorders in Youth–Questionnaire	1.03	0.77	0.00–3.60	0.77	0.39	< 0.001	0.39	< 0.001
Questionnaire for the Assessment of Disgust Propensity–Brief	2.71	0.65	0.50–4.00	0.84	0.20	0.002	0.15	0.020
Scale for the Assessment of Disgust Sensitivity	1.71	0.78	1.00–4.71	0.94	0.32	< 0.001	0.31	< 0.001
Intolerance of Uncertainty Scale–18	2.72	0.88	1.00–4.89	0.95	0.33	< 0.001	0.33	< 0.001

Intolerance of Uncertainty Scale–18

The Intolerance of Uncertainty Scale–18 (Gerlach et al., 2008) is a short version of the Intolerance of Uncertainty Scale (Freeston et al., 1994) and measures intolerance of uncertainty in general with 18 items. Responses are recorded on a five-point scale from 1 = *not at all representative for me* to 5 = *completely representative for me*. Therefore, total scores (average of all item responses) can range between 1 and 5 with higher scores indicating higher intolerance of uncertainty. Descriptive statistics and internal consistency are reported in Table 1.

Data analyses

All analyses were conducted with R version 4.5.0 in RStudio version 2025.05.0. Descriptive statistics were computed with the *summarytools* package version 1.1.4. A confirmatory factor analysis testing a hierarchical model of the FFQ consisting of five first-order and one second-order factor was run with the *lavaan* package version 0.6–19 (Rosseel, 2012) using weighted least squares mean and variance adjusted as estimator (cf. DiStefano & Morgan, 2014; Li, 2016). Model fit was evaluated with the Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Tucker–Lewis Index (TLI; also called non-normed fit index) according to the guidelines by Schermelleh-Engel and colleagues (2003), who recommend interpreting RMSEA values between 0.05 and 0.08 and CFI/TLI values between 0.95 and 0.97 as indicating acceptable fit, and RMSEA values ≤ 0.05 and CFI/TLI values ≥ 0.97 as indicating good fit. Upon request of one of the reviewers, we additionally report the Standardized Root Mean Square Residual (SRMR), for which it has been suggested to interpret values between 0.05 and 0.10 as indicating acceptable fit and values ≤ 0.05 as indicating good fit (Schermelleh-Engel et al., 2003).

Internal consistencies of all questionnaires were examined with McDonald's ω (McDonald, 1999) obtained with the *psych* package version 2.5.3 (cf. McNeish, 2018). Test–retest reliability of the FFQ was examined with concordance correlation coefficient ρ_c (Lin, 2000) obtained with the *DescTools* package version 0.99.60 and Bland–Altman analysis (Bland & Altman, 1986) run with the *blandr* package version 0.6.0 (cf. Berchtold, 2016).

Relationships of FFQ scores with other questionnaires and age were examined with percentage bend correlation coefficients r_{pb} (Wilcox, 1994) obtained with the WRS2 package version 1.1–6.1 (cf. Mair & Wilcox, 2020). Differences between male and female participants as well as between participants with and without chronic gastrointestinal diseases were examined with Brunner–Munzel tests (Brunner & Munzel, 2000) run with the *brunnermunzel* package 2.0 (cf. Karch, 2021). This package computes the probability of superiority ($\hat{p}$) as effect size, for which a value of 0.5 indicates a null effect and larger deviations from 0.5 (i.e., values closer to 0 or 1, depending on how variables are coded and the direction of effects) indicate larger differences between groups. As values of 0.56 and 0.44 correspond to a Cohen's *d* of 0.2, values of 0.64 and 0.36 correspond to a Cohen's *d* of 0.5, and values of 0.71 and 0.29 correspond to a Cohen's *d* of 0.8, these may be applied as thresholds for interpreting effects as small, medium, and large (Cohen, 1988).

Because of the large sample size and numerous statistical tests, we considered effects as significant when $p < .005$, as has been recommended (Benjamin et al., 2018). The data and code with which all results can be reproduced can be accessed at https://doi.org/10.17605/OSF.IO/438GN.

Results

Factor structure

The hierarchical model did not fit the data well (CFI = 0.92, TLI = 0.91, RMSEA = 0.13, SRMR = 0.11). Because of this, the Haberman analysis (Haberman, 2008) outlined in the preregistration (https://doi.org/10.17605/OSF.IO/KFVDG) to examine whether the subscale scores have added value to reporting the total score was obsolete. Instead, we tested a more parsimonious one-factor model, which also did not fit the data well (CFI = 0.89, TLI = 0.87, RMSEA = 0.15, SRMR = 0.13). Standardized factor loadings and residual variances of this model are displayed in Fig. 1A.

One of the reviewers suggested creating a unidimensional short form by removing single items from item pairs with high modification indices. For this, we provided the *lavaan* output to an artificial intelligence tool (https://copilot.microsoft.com), prompting it to identify the best ten items for this, prioritizing those with high factor loadings and low residual variances, wide and ordered thresholds, and low modification indices. Testing a one-factor model of these ten items had an acceptable-to-good fit (CFI = 0.99, TLI = 0.98, RMSEA = 0.08, SRMR = 0.05). Standardized factor loadings and residual variances of this model are displayed in Fig. 1B. Note that this short form includes at least one item of each of the original version's subscales, thus providing a broad coverage of the fear of food construct. Mean scores of the short form highly correlated with mean scores of the eight excluded items ($r_{pb} = 0.77$, $p < .001$).

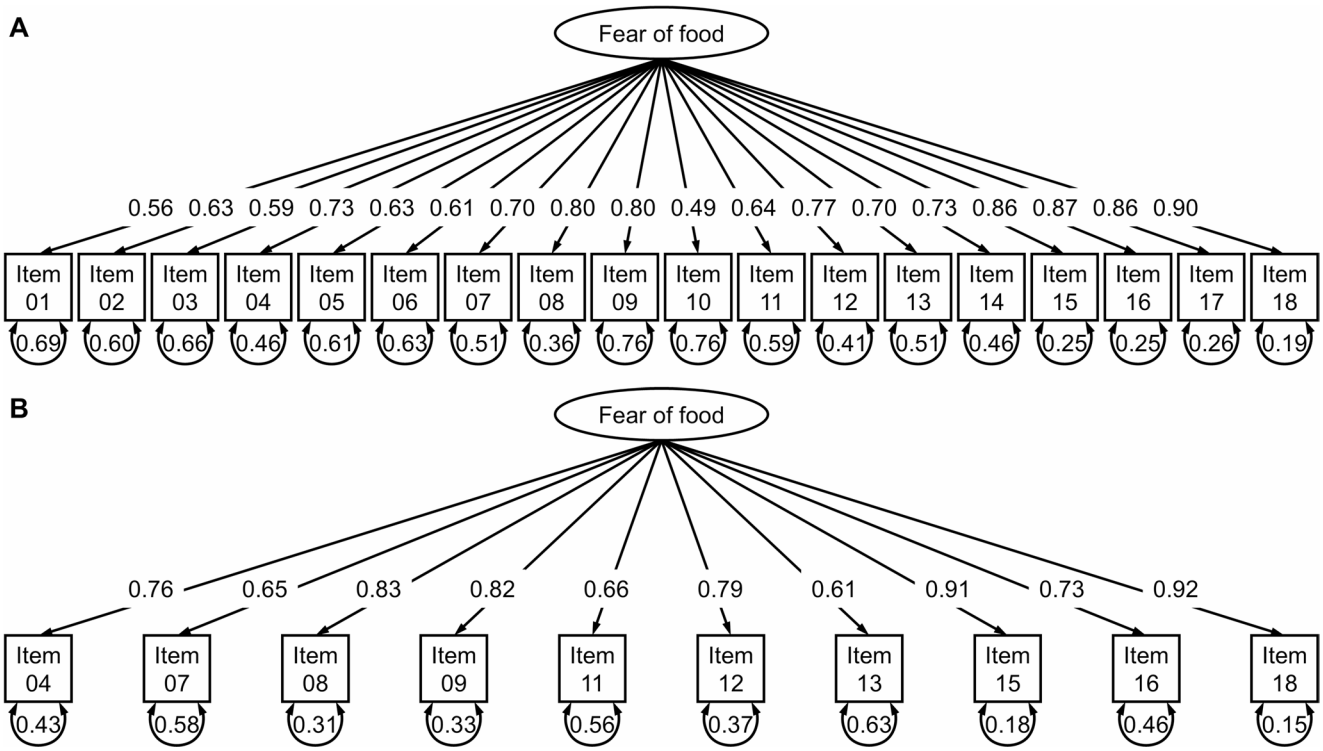

Fig. 1 Path diagram showing the standardized factor loadings (single-headed arrows) and residual variances (double-headed arrows) of the one-factor model (**A**) of the Fear of Food Questionnaire and (**B**) of a shortened version with ten items

Reliability

Internal consistency of the full version was ω = 0.94 both at the first and at the second measurement. Similarly, internal consistency of the short form was ω = 0.92 at the first and ω = 0.94 at the second measurement. Test–retest reliability of the full version was $\rho_c = 0.90$ (95% CI [0.86, 0.93]) and there was a high level of agreement between the two measurements as indicated by the Bland–Altman analysis (bias = 0.04, 95% CI [−0.03, 0.10]; Fig. 2A). Similarly, test–retest reliability of the short form was $\rho_c = 0.91$ (95% CI [0.87, 0.94]) and there was a high level of agreement between the two measurements as indicated by the Bland–Altman analysis (bias = 0.03, 95% CI [−0.04, 0.10]; Fig. 2B).

Correlates

Higher FFQ scores positively correlated with all other questionnaires with small-to-medium effect sizes (Table 1) and were unrelated to participants' age ($r_{pb} = -0.10$, $p = .146$). Correlation coefficients of the short form were largely similar to the full version (Table 1) and were also unrelated to participants' age ($r_{pb} = -0.08$, $p = .223$). Female participants ($M = 1.16$, $SD = 0.89$) had higher FFQ scores than male participants ($M = 0.71$, $SD = 0.65$, $p < .001$, $\hat{p} = 0.34$). Similarly, female participants ($M = 0.98$, $SD = 0.98$) also had higher scores on the short form than male participants ($M = 0.47$, $SD = 0.69$, $p < .001$, $\hat{p} = 0.32$). Participants with gastrointestinal diseases ($M = 1.83$, $SD = 1.06$) had higher FFQ scores than participants without gastrointestinal diseases ($M = 1.00$, $SD = 0.81$, $p < .001$, $\hat{p} = 0.75$). Similarly, participants with gastrointestinal diseases ($M = 1.60$, $SD = 1.18$) also had higher scores on the short form than participants without gastrointestinal diseases ($M = 0.80$, $SD = 0.90$, $p < .001$, $\hat{p} = 0.73$).

Discussion

The current study aimed to provide a German version of the FFQ and to examine its psychometric properties and correlates. Contrary to hypotheses, a hierarchical model including a second-order general factor and five first-order factors did not fit the data well. Furthermore, a one-factor model also did not fit the data well. The reason for this is elusive as it may relate to methodological (e.g., sample selection), cultural, or linguistic aspects. Thus, the current findings provide limited support for factorial validity of the German FFQ. However, a shortened version with ten items had good fit and both internal and test–retest reliability coefficients were high and in line with the findings by Zickgraf et al.

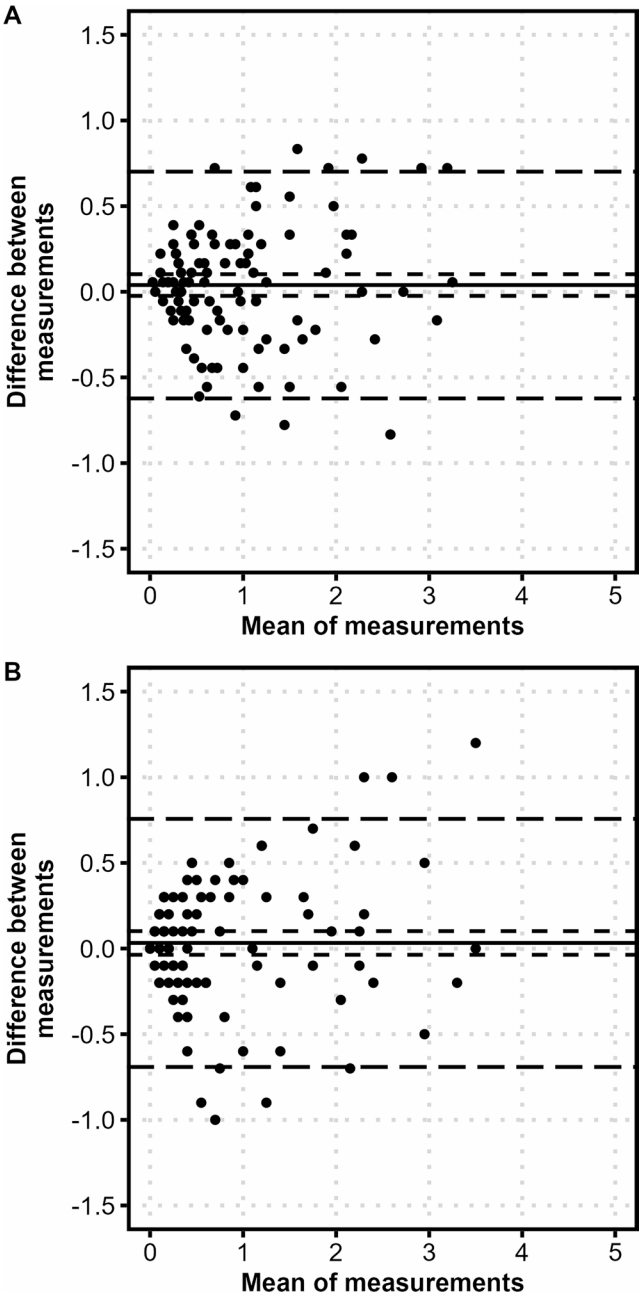

Fig. 2 Bland–Altman plots showing the level of agreement (**A**) of scores on the Fear of Food Questionnaire and (**B**) of scores of the short form at the first and second measurement. Averaged scores are plotted on the x-axis and difference scores are plotted on the y-axis. The dashed line in the purple-shaded area (95% CI) represents mean bias. The dashed lines in the green- and pink-shaded areas (95% CI) represent the upper and lower limits of agreement

(2022) for both the full version and the short form. This indicates that the German FFQ is internally consistent and produces stable scores across repeated measurements.

As hypothesized, participants who reported having ever been diagnosed with a chronic gastrointestinal disease had higher FFQ scores than those who did not report having ever been diagnosed with a chronic gastrointestinal disease with a large effect size and higher FFQ scores moderately correlated with higher emetophobic and ARFID symptomatology. These findings are in line with results reported by Zickgraf et al. (2022) and support convergent validity of the German FFQ and its short form. In contrast to hypotheses, higher FFQ scores moderately related to higher eating disorder psychopathology. This suggests that discriminant validity may be limited as persons who restrict intake of certain foods due to eating, weight, and shape concerns may also achieve high scores on the German FFQ.

Higher FFQ scores weakly-to-moderately related to higher disgust propensity, disgust sensitivity, and intolerance of uncertainty, suggesting that higher fear and avoidance of food relate to a more general tendency to be easily disgusted and to evaluate the experience of disgust as well as feelings of uncertainty as negative. This is in line with results from studies that examined the role of these constructs in fear of food-related conditions such as emetophobia and restrictive eating disorders (Brown et al., 2017, 2022; Kesby et al., 2017; van Overveld et al., 2008; Zhao, 2014). Findings further indicated that fear and avoidance of food is more pronounced in females but seems to be equally distributed across different age groups.

Interpretation of the current results is limited to the type of sample studied and the methods used. Specifically, although there was a large range in age, education, and body mass, most participants were highly educated women in early adulthood with a healthy body weight. Future studies may use the German FFQ in a sample that is more representative for the German population, which may allow for obtaining normative data to derive possible cut-off values that indicate when fear and avoidance of food may be clinically relevant. Moreover, all measures used in the current study were based on self-report, which may potentially be biased (e.g., by demand effects, social desirability, or recall bias). Thus, future studies may measure fear and avoidance of certain foods in daily life (e.g., by using ecological momentary assessment) to further examine the FFQ's correlates.

In conclusion, the FFQ was developed as a transdiagnostic measure to assess fear of food, and to help target therapy and evaluate treatment outcomes across different physical conditions and mental disorders such as chronic gastrointestinal diseases, phobias, and eating disorders. The current study indicates that the German FFQ and its short form have high internal as well as test–retest reliability when measuring this construct and provides support for their convergent validity. Indications for its factorial and discriminant validity were limited, which may necessitate further refinements in future studies.

Author contribution AM: Conceptualization, Formal analysis, Writing – original draft, Writing – review and editing; PAS: Conceptualization, Data curation, Investigation, Writing – review and editing; DRK: Conceptualization, Resources, Supervision, Writing – review and editing.

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Data availability The preregistration as well as the data and code with which all results can be reproduced can be accessed at https://doi.org/10.17605/OSF.IO/438GN.

Declarations

Ethics approval The study was approved the ethics committee at the University of Regensburg (reference number 24-3989-101).

Conflict of interest All authors declare that they do not have any conflicts of interest.

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