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Development of the Cooking and Food Provisioning Action Scale (CAFPAS): A new measurement tool for individual cooking practice

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ABSTRACT

Researchers studying consumer food-behaviors, like cooking, in everyday life require better tools for assessment of food-related abilities. This study presents a measurement tool for assessing cooking and food-preparation practices: the Cooking and Food Provisioning Action Scale (CAFPAS). The CAFPAS is based on the "Food Agency" framework for understanding cooking behavior as sociological "agency" that emerges from the interaction individual abilities and skills and social structure (see Trubek, Carabello, Morgan, & Lahne, 2017; Wolfson et al., 2017). Thus, the scale seeks to measure the degree to which individuals are able to set and achieve cooking and provisioning goals. Potential scale items were generated and screened by experts (N = 7). The resulting 70 items, with demographic and validation items, were administered to a development sample of US adults through email listservs (N = 445) and administered to an independent validation sample of US adults through Amazon Mechanical Turk (N = 498) and both Exploratory Factor Analysis (EFA) and Structural Equation Modeling (SEM) were used to evaluate structural stability and generalizability. Composite scale scores were regressed against indicator variables – including the Food Involvement Scale (FIS) and self-reported meals cooked at home – to assess construct validity. Close model fit was achieved using 28 items on three subscales: Food Self-Efficacy, which comprises self-perceptions of cooking and provisioning abilities; Food Attitude, which comprises attitudes towards food and cooking; and Structure, the influence of non-food barriers on provisioning. The model was generalizable up to partial-scalar invariance across samples. In linear regression, CAFPAS scores significantly predicted reported meals cooked per week (+1 meal/week per unit increase in CAFPAS). Thus, the CAFPAS is a structurally valid tool, based in a novel paradigm, for evaluating cooking and food-preparation abilities.

1. Introduction

Evidence suggests that increased cooking skill and knowledge about food provisioning improves food choices, diet quality and health outcomes (Beets, Swanger, Wilcox, & Cardinal, 2007; B. J. Brown & Hermann, 2005; Crawford, Ball, Mishra, Salmon, & Timperio, 2007; Hughes, Bennett, & Hetherington, 2004; Larson, Nelson, Neumark-Sztainer, Story, & Hannan, 2009; Larson, Perry, Story, & Neumark-Sztainer, 2006; McGowan et al., 2015; Reicks, Trofholz, Stang, & Laska, 2014). This body of literature implies that improved eating and food outcomes stem from more than education about nutrition information, but the mechanism connecting these outcomes and cooking practice remain unelucidated. One key knowledge gap is the lack of a validated measurement tool for cooking and food-preparation ability; to date *ad hoc,* unvalidated scales are used (see the discussion in McGowan et al., 2015). One reason for this is the difficulty of adequately defining and theorizing cooking behavior (Wolfson, Smith, Frattaroli, & Bleich, 2016). Lack of a valid tool to measure food preparation ability makes evaluating and comparing the effectiveness of existing and increasingly numerous nutrition-intervention programs based on cooking education impossible (see Wolfson et al., 2017). Thus, an adequate measurement tool for cooking will clarify the mechanism by which home food preparation improves nutritional outcomes, allow assessment of cooking-intervention programs, and indirectly lead to better food choices and improved public nutrition.

The goal of the present study, therefore, is to develop and validate a measurement tool for cooking and food provisioning practices, based on a sound theoretical framework for understanding cooking, discussed below. Currently, the only broadly employed scale for assessing an individual's general orientation towards food preparation is the Food Involvement Scale (FIS, see Bell & Marshall, 2003; Marshall & Bell, 2004), but the FIS's focus – on general interest in food as part of life – is

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quite broad. Thus, this study aims to fill a demonstrable need in the sphere of public health nutrition for a scale to specifically focus on food preparation skills and capacities.

While there is now a considerable body of literature examining individual choices about food and cooking (Bisogni, Jastran, Shen, & Devine, 2005; Franchi, 2012; Kyutoku et al., 2012; Renner, Sproesser, Strohbach, & Schupp, 2012; Sobal & Bisogni, 2009; Sobal, Bisogni, & Jastran, 2014; Vabø & Hansen, 2014), much of it either assumes that these choices are a series of independent decisions made by individuals (Hartmann, Dohle, & Siegrist, 2013; Renner et al., 2012) or is framed in explicit opposition to this assumption by demonstrating how societal structures delimit these individual choices *a priori* (Bowen, Elliott, & Brenton, 2014). Both of these positions have produced important and compelling insights, but the intrinsic conflicts between them can stifle discussion and progress in understanding how and why individuals make food choices. Recently, a new framework for understanding how individuals set and achieve food-related goals has been proposed called "Food Agency" (Trubek, Carabello, Morgan, & Lahne, 2017; Wolfson et al., 2017), because it focuses on the *correspondence* between the individual (and their goals and desires) and the "structuring structures" (Giddens, 1979) of society – a correspondence which is best theorized in anthropological and psychological constructs of "agency" (Bandura, 2006; Hitlin & Elder Jr., 2007).

Effectively cooking and provisioning requires individuals to feel "empowered to act" (Trubek et al., 2017); in the anthropological literature, "agency refers to the socioculturally mediated capacity to act" (Ahearn, 2001, p. 110). Thus, "Food Agency" translates the concept of "agency" from its previous uses in sociology, anthropology, and social psychology (Bandura, 2006; Bourdieu, 1990; Giddens, 1979; Hitlin & Elder Jr., 2007; Merlan, 2016) to the fields of food and consumer sciences. Briefly, the individual capacity to set and achieve food-related goals involves a suite of emergent skills that are developed within social contexts, rather than solely involving intrinsic characteristics of the individual. Food Agency is a framework, therefore, that is consistent with recent research that examines food-related knowledge and skill as more than rote, mechanical action like "Food Literacy" (Vidgen & Gallegos, 2014) and "Food Choice Capacity" (Sobal & Bisogni, 2009), but see also "Eating Competency" for a somewhat different focus (Satter, 2007). Food Agency incorporates sociological agency in regard to food to help explain why knowledge, skill, practice, context, and repetition are all so key to translating food-related aspirations into actual practices. For a deeper discussion of the relationships between food, cooking, and agency, please see Trubek et al. (2017) and Wolfson et al. (2017).

Such a characterization fits well with the common observation that some individuals, while perhaps possessing a great deal of social (and actual) capital are unable to deal with everyday food decisions and activities, while others who may be objectively worse off are able to much better manage their food environment – and, of course, vice versa. In turn, this observation implies that some individuals "have more" agency in regards to food than others, and if difference exists it can be quantified and measured. The current study, therefore, employs the Food Agency paradigm (Trubek et al., 2017) as the basis for developing scale items accessing individuals' perceptions of their cooking skill and ability to prepare foods: the Cooking and Food Provisioning Action Scale (CAFPAS). The study uses the classic approach for scale development detailed by DeVellis (2012), in which experts propose scale items (affirmative statements), which are then administered to large, independent samples of subjects in order to determine the latent correlations between the scale items; finally, a scale is developed from the "best" subset of these items.

2. Materials and methods

2.1. Study design

A pool of potential scale items were generated from existing qualitative research (Carabello, 2015) which were reviewed by the authors and other experts. The revised item pool was administered to a development sample, and, using factor-analytic approaches, subscales were identified, individual items were retained or eliminated, and a final scale was proposed. Next, the same pool of items was administered to an independent validation sample so that the proposed scale could be evaluated for configural invariance and generalizability. Finally, the two samples were pooled and regressed against related measures to evaluate construct validity. Because of the intended multidisciplinary audience for the CAFPAS, this study employed both Exploratory Factory Analysis (EFA) and Confirmatory Factory Analysis (CFA)/Structural Equation Modeling (SEM). Statistical approaches are "best practices" from the methodological literature (T. A. Brown, 2015; DeVellis, 2012; DiStefano & Hess, 2005; Kline, 2016), while presenting results from both the EFA and CFA/SEM framework whenever possible to make the work accessible and valid for a broad audience.

2.2. Food agency framework and hypothesized scale structure

The conceptual framework of Food Agency has at least four potential dimensions (see Trubek et al., 2017): (1) self-perception of cooking and food-preparation skills (e.g. ability to prepare foods from scratch, follow a recipe or use particular preparation techniques), (2) attitude towards food and cooking (e.g. whether a person enjoys cooking or perceives it as a burden or chore), (3) self-efficacy beliefs (see Bandura, 2006) about food-related goals (e.g. confidence in provisioning and cooking abilities), and (4) individual experience of social structures as barriers or supports. These dimensions are operationalized into items that form subscales of a Cooking and Food Provisioning Action Scale (CAFPAS).

The "Structure" factor is an attempt to include individuals' experience of social structure in a scale that is necessarily evaluated on the individual level; therefore, this measurement tool explicitly does *not* include actual items that might represent social structure, such as income, sex, education level, and so on. According to both sociologists (Giddens, 1979) and psychologists (Bandura, 2006), social structures influence but do not necessarily determine individual actions; the dynamic interaction between social structure and individual choice is what we call here agency (Trubek et al., 2017). Thus, the structure scale is meant to measure an individual's perception of structure, not to measure structure "objectively" (see Appendix A). There are a huge variety of possible structural effects (everything from economic to family status; from time pressure to domestic kitchen capacity), and the goal was to allow individuals to express which mattered to them, rather than assume *a priori* that the authors understood the fraught relationship between cooking and social structures.

In addition, the dimensions (subscales) are not assumed to be independent (orthogonal); for example, attitude towards food preparation is, of course, affected by one's food self-efficacy beliefs or perceptions of structural constraint. In modeling, subscales were always allowed to correlate.

2.3. Item generation and selection

An initial item pool was developed based on existing qualitative research (Carabello, 2015) and published research on food and cooking behavior (Bell & Marshall, 2003; Bisogni et al., 2005; Bisogni et al., 2007;

Hartmann et al., 2013; Jastran, Bisogni, Sobal, Blake, & Devine, 2009; Marshall & Bell, 2004; Sobal & Bisogni, 2009; Sobal et al., 2014; Vidgen & Gallegos, 2014). This initial pool was comprised of 101 affirmative statements, of the form "I am inspired to cook for other people (family, friends, etc)." To adequately cover the theorized dimensions of Food Agency, items were generated in the following categories: "Meal Planning", "Food Shopping", "Cooking", "Eating", "Clean Up", "Food Self-Efficacy" (based on a general self-efficacy scale, see Schwarzer & Jerusalem, 1995), "Structure", and "Holistic Items". The full initial item pool with categories is available in Appendix A.

This initial item pool was reviewed by a group of 7 experts in varied food-studies fields: community nutritionists, chefs, food scientists, extension officers, and rural sociologists. Based on their feedback, 31 items were rejected outright and the remaining items were revised (see Appendix A). The remaining 70 items comprised the candidate pool of scale items. All items were presented with 7-point Likert scales, with response options from "Strongly Disagree" (coded as "1") to "Strongly Agree" (coded as "7"). Items that were theorized to be negatively correlated with Food Agency (e.g., "I feel like cooking is a waste of effort.") were coded in reverse (see Appendix A for details).

2.4. Development sample

Using a snowball/convenience sampling approach, 445 adults living in the United States (US), but not necessarily US citizens, were recruited to an online survey containing all 70 candidate scale items, the 12 item FIS scale (Bell & Marshall, 2003) as a validation measure, and demographic measures (see Table 1). Participants were recruited from email lists at the University of Vermont, the University of Maryland Extension Program, Drexel University, and several community-nutrition programs. Respondents were incentivized with the option to enter a raffle for 1 of 6 $50 Amazon.com gift cards. The survey was estimated to take 10–14 min to complete. All respondents were required to affirm that they were at least 18 years old. The Development Sample had no missing data.

2.5. Validation sample

To collect a validation sample that would be more demographically diverse (Buhrmester, Kwang, & Gosling, 2011), an additional 500 US adults were recruited using Amazon.com's Mechanical Turk (MTurk) "Human Intelligence Task" system. Respondents completed the same survey (70-item development pool, 12-item FIS scale, and demographic questions) as in the Development Sample (2.3, above). Research has validated the use of the MTurk system for recruiting research populations with more representative populations than are easily reachable through traditional, academic convenience sampling approaches (Buhrmester et al., 2011; Hunt, 2015; Paolacci, Chandler, & Ipeirotis, 2010). For this sample, quotas were instituted to ensure approximately equal proportions of male and female respondents. Using several of the features of the online survey system, duplicate submissions and responses that were completed in clear haste (i.e., in less than 240 s, or 40% of the estimated maximum time for survey completion) were rejected. The survey was estimated to take 10 min to complete, and all participants were paid $1.40 for their submission. All respondents affirmed that they were at least 18 years old.

The Validation Sample had less than 0.5% missing data, and a pattern analysis (not shown) indicated that the non-responses were Missing Completely at Random (MCAR) (Enders, 2010), allowing for the pairwise-deletion of missing values (in EFA) or Maximum Likelihood imputation where available (e.g., in CFA estimation through *lavaan*).

2.6. Data analysis

All data were entered into the R statistical analysis environment (R Core Team, 2015) for analysis. Exploratory Factor Analysis (EFA) was conducted using the *psych* package (Revelle, 2016), and Confirmatory Factor Analysis (CFA) was using the *lavaan* (Rosseel, 2012), *semPlot* (Epskamp, 2014), and *semTools* (*semTools Contributors., 2016*) packages. ANOVA and MANOVA to test relationships between CAFPAS and demographic variables with the 3 subscales were conducted using the base and *ez* packages (Lawrence, 2015), and plots were generated using *ggplot2* (Wickham, 2009). Linear relationships between CAFPAS, the Food Involvement Scale (FIS), and the number of meals cooked per week were explored using regression analyses in the base package.

Table 1
Sample demographics.

	Development Sample	Validation Sample
Sex		
Male	*294*	*212*
Female	*149*	*285*
Other	*2*	*1*
Age		
Mean	*34.8*	*35.4*
SD	*14.5*	*10.7*
Meals Cooked/Week		
Mean	*10.8*	*10.8*
SD	*6.6*	*5.9*
Income		
< $25K	*71*	*86*
$25K–$35K	*27*	*81*
$35K–$50K	*59*	*90*
$50K–$75K	*94*	*122*
$75K–$100K	*81*	*65*
$100K–$125K	*44*	*30*
$125K–$150K	*20*	*10*
> $150K	*49*	*14*
Education		
Some High School	*5*	*0*
High School/GED	*23*	*55*
Some College	*112*	*168*
College (Bachelor's) Degree	*84*	*192*
Some Graduate School	*61*	*16*
Graduate Degree	*160*	*67*
High School Education*	*28*	*55*
College Education*	*194*	*359*
Graduate Education*	*221*	*83*
Race/Ethnicity		
White/Caucasian	*381*	*352*
Black/African-American	*23*	*79*
Asian/Pacific Islander	*28*	*41*
Native American	*7*	*14*
Other (includes Hispanic/Latino)	*9*	*20*
Declined to Answer	*8*	*4*
Valid Responses		
N	*445*	*498*

*These are recategorizations of the response options above:
High School Education = Some High School + High School/GED.
College Education = Some College + College (Bachelor's) Degree.
Graduate Education = Some Graduate School + Graduate Degree.

2.6.1. Single-item statistics

Individual items were examined for problematic behavior: lack of response variance, high skew or kurtosis, and extreme multicollinearity. No items displayed behavior extreme enough to warrant elimination from initial consideration (DeVellis, 2012).

2.6.2. Extraction of initial factors

Based on the Food Agency framework, the CAFPAS should have a four-factor solution: self-efficacy to do with food ("Food Self-Efficacy"), meal preparation skills ("Skills"), attitude/affect towards food provisioning ("Attitude"), and perceived structural supports and barriers ("Structure").

Each of the initial items was generated to correspond to one of these dimensions (Appendix A). Thus, the Development Sample responses ($N = 445$) were submitted to an exploratory factor analysis (EFA) using Maximum-Likelihood estimation and oblique (promax) rotation with a target of four factors. Assigning each item to the factor on which it had the highest loading, these rough factors were examined for conceptual match to the theory above, and found to be reasonably coherent (initial factor assignment can be seen in Appendix A).

2.6.3. Item selection and scale re-specification

Following recommendations to build models from simple to more complex (T. A. Brown, 2015; Kline, 2016), each scale from the initial EFA was specified as a *separate* (one-factor) CFA model. These models were fitted to the Development Sample ($N = 445$) for re-specification using Robust Maximum Likelihood (RML) because several items displayed skew or kurtosis $\geqslant 2.0$ (DiStefano & Hess, 2005). Items were dropped from the scale that fit one or more of the following criteria (T. A. Brown, 2015):

1. The item had redundant content with another item in the same scale AND a model without the item showed significantly improved global fit (χ^2).
2. The item was a poor conceptual (theoretical) fit for the rest of the items in the scale.
3. Removing the item improved overall scale reliability (Cronbach's α) and average inter-item correlation.
4. Removing the item reduced local strain in the model fit (i.e., large correlation residuals).

In this analysis, model re-specification also allowed for error correlations of individual items within scales if the items were *not* redundant and if doing so significantly improved model fit. Formative and MIMIC models (Bollen, 2011) were fitted when theoretically justified (i.e., for the Structure factor, see 3.2.3). Model re-specification continued using the Development Sample until adequate fit was achieved.

2.6.4. Model validation and fit

It is possible that the apparent "good" fit for a CFA model takes advantage of the specific dataset to which it is initially fitted (Kline, 2016). To avoid this possibility, each subscale was tested for "measurement invariance" at both the configural (factor-pattern) and scalar (loading magnitude) levels (T. A. Brown, 2015) using CFA. If a model was close to or beyond criterion for scalar invariance, non-invariant items were identified through the "triangle heuristic" (item-level invariance, see Cheung & Rensvold, 1999).

Ultimately, a four-factor CFA model was specified using the individual scales developed above; however, the Self-Efficacy and Skill scales were redundant ($r > 0.99$ between these two scales), and so these were combined into a single-factor scale and re-specified as above (see discussion in 3.2.1). Thus, a revised three-factor solution (replacing the previous two factors with a single "Self-Efficacy" factors) was specified in the Full (combined Development and Validation) Sample. In addition, a three-factor, oblique (promax), Maximum Likelihood EFA was extracted from the items in the three final scales in the Development, Validation, and Full samples and statistics from the final EFA and CFA solutions were compared.

2.6.5. Construct validity

To supplement the internal validity tests described above, construct validity (DeVellis, 2012) was evaluated by inspecting relationships between the CAFPAS (and its subscales) and related measurements. A rough measure of CAFPAS was calculated as the scaled sum of the individual scales, e.g., for an individual with subscale scores as sums of scale items (where "sd" indicates standard deviation),

$$CAFPAS_i = \frac{Self\text{-}Efficacy_i}{\mathrm{sd}(Self\text{-}Efficacy)} + \frac{Attitude_i}{\mathrm{sd}(Attitude)} + \frac{Structure_i}{\mathrm{sd}(Structure)}$$

Relationships between CAFPAS and demographic variables were tested using MANOVA with the 3 subscales as criteria and ANOVA using the rough CAFPAS summary score as the criterion; unless equivalent tests differed in their conclusions (i.e., the significance of the relationship), the latter is reported in detail because of its broader interpretability.

2.7. Human subjects research

This study was approved by both the Drexel University Human Research Protection Program and the University of Vermont Committee on Human Research in the Behavioral and Social Sciences.

3. Results

3.1. Sample demographics and item-level statistics

Demographic data for the two study samples is available in Table 1. The Development Sample consisted of more male respondents than females. It was also extremely highly educated and Caucasian respondents were vastly overrepresented. The Validation Sample was collected with quotas in place to ensure more female respondents, and also had a broader range of education levels and race/ethnicity (see Table 1).

The correlation matrix and means for the indicators used in the final scale are below in Table 2 (statistics are from the Full Sample).

3.2. Scale development and specification

The 13-item Skill and Self-Efficacy, 10-item Attitude, and 5-item Structure factors can be seen in Fig. 1 with fully standardized path coefficients from the SEM, and the content of the indicators, as well as loadings from the final 3-factor EFA, are in Table 3. The models fit the data adequately: for the single-factor models, the global χ^2 statistics were significant, indicating a lack of exact fit, but fit indices like the RMSEA and CFI indicated close fit (see Table 4). There was evidence of both configural and scalar invariance when the model was fit to the Development and Validation samples as different groups, indicating that the structure and pattern of factor loadings were consistent across independent groups.

The Structure scale was modeled as a Multiple Indicators, Multiple Causes model (MIMIC, T. A. Brown, 2015) as the best theoretical fit (see Section 2.1). Note that 3 factors are formative (STR8, STR9, and STR10), and two are "normal" effects-indicators (STR4, ISMP1). This both allows for the identification of the model (T. A. Brown, 2015; Diamantopoulos & Papodopoulos, 2010) and makes sense, as these are more general outcomes of structural constraint, whereas the formative items are specific, proximate causes of structural constraint.

3.2.1. Overall cooking and food provisioning scale

A 3-factor Structural Equation Model (SEM) incorporating Self-Efficacy, Attitude, and Structure as described above, was fit to the Full sample data (Fig. 1). This model included regressions between latent variables, indicating a hypothetical path of effect between the factors of Food Agency: specifically, the model hypothesizes that Structure affects Attitude through Self-Efficacy (see Fig. 1). Because this model is complex, it is unsurprising that the χ^2 global-fit statistic showed a significant lack of exact fit (see Table 4); however, other fit indices like the RMSEA and CFI were acceptable. Overall, a hypothesis of close fit to the Full sample data is supported.

The final set of indicators comprising the 3 scales described above were also submitted to an (unguided, in contrast to the CFA solutions above) Maximum-Likelihood EFA with 3 factors and oblique (promax)

Table 2
Correlation matrix and means of indicators for final Cooking and Food Preparation Scale (CAFPAS) based on Full Sample set.

	Factor 1: Self-Efficacy													Factor 2: Attitude										Factor 3: Structure				
Code*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
FSE2	***1***																											
FSE6	***.57***	***1***																										
FSE7	***.57***	***.63***	***1***																									
FSE8	***.56***	***.67***	***.63***	***1***																								
ISCO1	***.61***	***.64***	***.66***	***.64***	***1***																							
ISMP5	***.58***	***.64***	***.64***	***.62***	***.62***	***1***																						
ISSH5	***.43***	***.51***	***.55***	***.56***	***.55***	***.52***	***1***																					
FSE3	***.31***	***.40***	***.40***	***.36***	***.35***	***.35***	***.28***	***1***																				
ISCO5	***.48***	***.55***	***.53***	***.52***	***.60***	***.48***	***.60***	***.29***	***1***																			
ISMP2	***.39***	***.42***	***.47***	***.42***	***.51***	***.46***	***.44***	***.28***	***.45***	***1***																		
ISMP3	***.35***	***.38***	***.42***	***.39***	***.45***	***.36***	***.47***	***.27***	***.48***	***.36***	***1***																	
ISMP7	***.33***	***.38***	***.44***	***.41***	***.38***	***.36***	***.43***	***.28***	***.38***	***.34***	***.43***	***1***																
ISSH4	***.43***	***.46***	***.49***	***.47***	***.44***	***.44***	***.43***	***.33***	***.42***	***.38***	***.39***	***.32***	***1***															
FSE16	*.28*	*.34*	*.28*	*.27*	*.29*	*.30*	*.18*	*.15*	*.21*	*.19*	*.18*	*.19*	*.24*	***1***														
FSE11	*.47*	*.50*	*.47*	*.48*	*.53*	*.43*	*.34*	*.23*	*.38*	*.35*	*.25*	*.28*	*.27*	***.33***	***1***													
FSE14	*.47*	*.39*	*.34*	*.41*	*.46*	*.35*	*.26*	*.21*	*.27*	*.28*	*.23*	*.19*	*.24*	***.34***	***.64***	***1***												
FSE15	*.36*	*.29*	*.31*	*.32*	*.39*	*.26*	*.25*	*.13*	*.26*	*.30*	*.19*	*.16*	*.17*	***.27***	***.54***	***.56***	***1***											
HO4	*.23*	*.29*	*.29*	*.25*	*.30*	*.25*	*.22*	*.21*	*.24*	*.31*	*.19*	*.24*	*.22*	***.10***	***.40***	***.31***	***.30***	***1***										
HO5	*.39*	*.30*	*.28*	*.28*	*.32*	*.27*	*.17*	*.19*	*.23*	*.28*	*.15*	*.18*	*.19*	***.26***	***.51***	***.53***	***.47***	***.39***	***1***									
ISCO3	*.43*	*.44*	*.41*	*.43*	*.46*	*.45*	*.26*	*.26*	*.30*	*.35*	*.24*	*.24*	*.27*	***.26***	***.52***	***.42***	***.35***	***.26***	***.36***	***1***								
ISCU4	*.38*	*.41*	*.41*	*.42*	*.49*	*.35*	*.32*	*.20*	*.36*	*.31*	*.25*	*.25*	*.24*	***.30***	***.56***	***.57***	***.48***	***.24***	***.47***	***.37***	***1***							
STR2	*.41*	*.43*	*.40*	*.43*	*.49*	*.41*	*.33*	*.16*	*.34*	*.34*	*.25*	*.23*	*.23*	***.22***	***.65***	***.48***	***.40***	***.34***	***.40***	***.43***	***.43***	***1***						
STR3	*.31*	*.30*	*.29*	*.31*	*.35*	*.26*	*.20*	*.16*	*.21*	*.18*	*.18*	*.15*	*.19*	***.32***	***.42***	***.49***	***.40***	***.17***	***.38***	***.30***	***.47***	***.35***	***1***					
STR4	*.29*	*.26*	*.24*	*.21*	*.23*	*.24*	*.17*	*.25*	*.20*	*23*	*.18*	*.16*	*.17*	*.19*	*.17*	*.24*	*.14*	*.04*	*.26*	*.23*	*.24*	*.07*	*.28*	***1***				
ISMP1	*.20*	*.10*	*.14*	*.07*	*.11*	*.14*	*.10*	*.17*	*.06*	*.11*	*.09*	*.10*	*.10*	*.08*	*−.03*	*.05*	*.04*	*−.07*	*.09*	*.03*	*0*	*−.10*	*13*	***.53***	***1***			
STR10	*.24*	*.23*	*.20*	*.20*	*.21*	*.20*	*.22*	*.21*	*.22*	*.29*	*.20*	*.16*	*.20*	*.14*	*.15*	*.26*	*.15*	*.08*	*.21*	*.14*	*.23*	*.05*	*.27*	***.64***	***.44***	***1***		
STR8	*.20*	*.19*	*.17*	*.15*	*.21*	*.12*	*.19*	*.15*	*.19*	*.18*	*.17*	*.1*	*.16*	*.17*	*.14*	*.20*	*.22*	*.11*	*.24*	*.12*	*.27*	*.04*	*.37*	***.38***	***.30***	***.42***	***1***	
STR9	*.25*	*.20*	*.16*	*.16*	*.22*	*.18*	*.23*	*.18*	*.24*	*.34*	*.20*	*.12*	*.21*	*.14*	*.10*	*.23*	*.17*	*.07*	*.24*	*.14*	*.21*	*.06*	*.21*	***.49***	***.36***	***.61***	***.42***	***1***
Mean	*5.0*	*5.5*	*5.5*	*5.7*	*6.1*	*5.6*	*6.2*	*5.1*	*6.3*	*5.9*	*5.8*	*5.7*	*5.6*	*4.6*	*5.5*	*5.2*	*5.1*	*5.4*	*4.8*	*4.8*	*6.2*	*5.3*	*5.5*	*4.2*	*3.4*	*4.7*	*5.6*	*5.2*

Blocks of **bold** correlations are from the same factor.
* See Table 3 for indicator item-content.

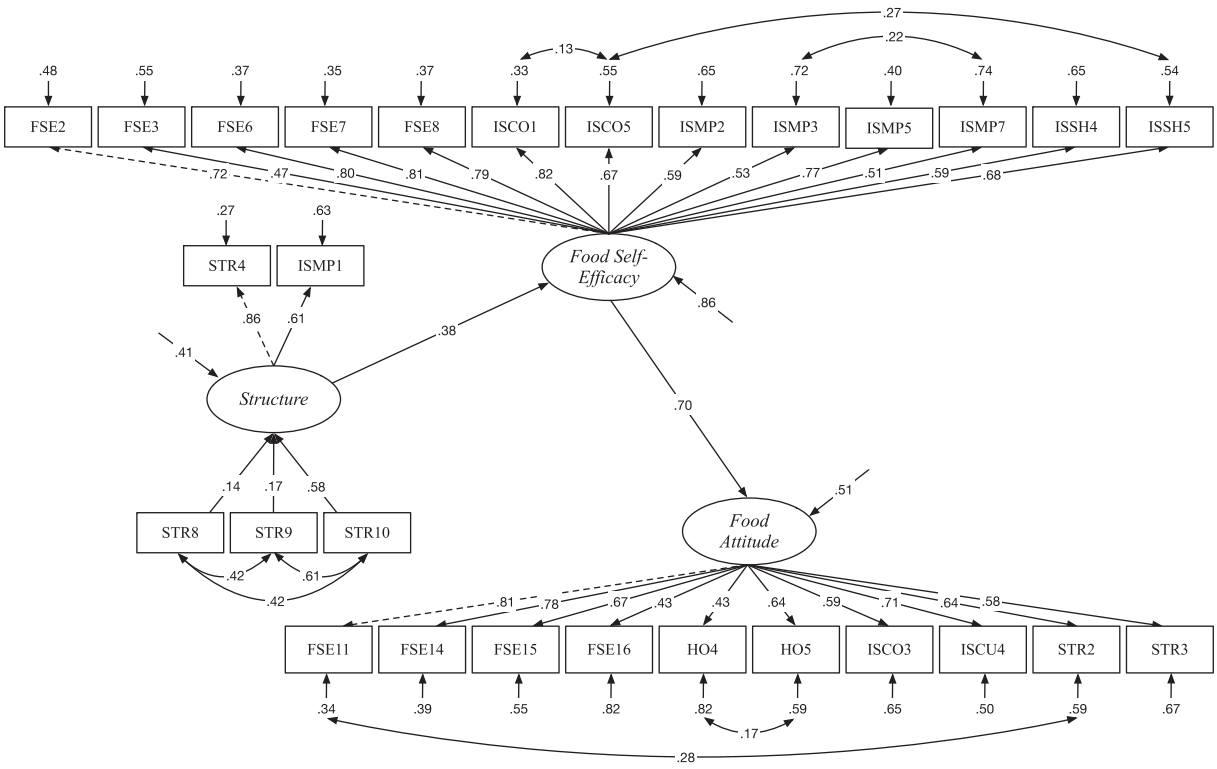

Fig. 1. Path diagram of 3-factor SEM for Cooking and Food Action Preparation Scale (CAFPAS) with fully standardized path coefficients. Abbreviations for items refer to item content in Table 3.

Table 3
Final Cooking and Food Preparation Scale (CAFPAS) with factor loadings from full (combined) dataset.

Code*	Content	Factor 1 (Self Efficacy)[a]	Factor 2 (Attitude)[a]	Factor 3 (Structure)[a]
FSE2	*I feel limited by my lack of cooking knowledge.*[†]	***0.54***	*0.21*	*0.08*
FSE3	*I can always manage to decide what I would like to eat at any given time.*	***0.45***	*−0.05*	*0.13*
FSE6	*When preparing food, I am confident that I can deal with unexpected results.*	***0.74***	*0.09*	*−0.02*
FSE7	*When preparing food it is easy for me to accomplish my desired results.*	***0.81***	*0.02*	*−0.04*
FSE8	*In preparing food, I can solve most problems with enough effort.*	***0.75***	*0.10*	*−0.07*
ISCO1	*I am comfortable preparing food.*	***0.71***	*0.19*	*−0.03*
ISCO5	*I know how to use the kitchen equipment I have.*	***0.73***	*−0.05*	*0.02*
ISMP2	*I am involved in daily meal preparation.*	***0.51***	*0.06*	*0.13*
ISMP3	*When I shop for food, I know how I will use the ingredients I am purchasing.*	***0.59***	*−0.10*	*0.07*
ISMP5	*I am confident creating meals from the ingredients I have on hand.*	***0.77***	*0.02*	*−0.03*
ISMP7	*Before I start cooking, I usually have a mental plan of all the steps I will need to complete.*	***0.57***	*−0.07*	*0.00*
ISSH4	*When presented with two similar products to purchase, I feel confident choosing between them.*	***0.64***	*−0.09*	*0.05*
ISSH5	*I know where to find the ingredients I need to prepare a meal.*	***0.77***	*−0.12*	*0.01*
FSE11	*I find cooking a very fulfilling activity.*	*0.14*	***0.78***	*−0.14*
FSE14	*For me, cooking is just something to get through as quickly as possible.*[†]	*−0.08*	***0.81***	*0.08*
FSE15	*Compared to other activities, cooking brings me little enjoyment.*	*−0.07*	***0.72***	*0.00*
FSE16	*If I try making a new type of food and it does not come out right, I usually do not try to make it again.*[†]	*0.13*	***0.30***	*0.07*
HO4	*I think a lot about what I will cook or eat.*	*0.16*	***0.36***	*−0.10*
HO5	*I prefer to spend my time on more important things than food.*[†]	*−0.12*	***0.69***	*0.13*
ISCO3	*If everything else is equal, I choose to cook rather than have food prepared by someone else.*	*0.28*	***0.41***	*−0.03*
ISCU4	*I feel like cooking is a waste of effort.*[†]	*0.08*	***0.63***	*0.06*
STR2	*I am inspired to cook for other people, like my family or friends.*	*0.23*	***0.60***	*−0.23*
STR3	*I feel burdened by having to cook for other people, like my family or friends.*[†]	*−0.08*	***0.56***	*0.21*
ISMP1	*I wish that I had more time to plan meals.*[†]	*0.02*	*−0.20*	***0.65***
STR4	*I have a hard time finding enough time to prepare the food I'd like to eat.*[†]	*−0.01*	*0.03*	***0.76***
STR8	*My family responsibilities prevent me from having time to prepare meals.*[†]	*−0.05*	*0.12*	***0.53***
STR9	*My social responsibilities prevent me from having the time to prepare meals.*[†]	*0.00*	*0.00*	***0.70***
STR10	*My job responsibilities prevent me from having the time to prepare meals.*[†]	*−0.03*	*0.00*	***0.82***

* Item codes refer to original item classification; see Appendix A.
[†] These items should be scored in reverse.
[a] Loadings are from Maximum Likelihood Exploratory Factor Analysis (EFA) with 3 factors and oblique rotation (promax) of the full (943 person) survey sample described in Sections 2.3–4. Largest loadings are in **bold** for clarity.

rotation using the Full Sample data. The solution was acceptable (variance explained: 47%; Root Mean Squared Residuals (RMSR): 0.03) and produced factor loadings (Table 3) that recapitulate – again, without researcher designation – the latent variables defined above (in Sections 3.2.1–3). Correlations between the 3 latent variables from EFA and CFA are shown in Table 5; their magnitude supports the hypothesis of divergent validity – each scale is measuring a separate construct.

To confirm the findings from CFA of measurement invariance (the

Table 4
Model-fit and measurement-invariance[†] statistics.

Model	Retained?	Comparison	$\chi^2_M(df)$	$\chi^2_D(df)$	*RMSEA* [90%*CI*]	*CFI* (Δ*CFI*)
Self-Efficacy						
Base (1)	*Y*	–	*159.8 (62)*	–	*0.041 [0.035, 0.047]*	*0.972*
Configural (2)	*Y*	*2 vs 1*	*235.9 (124)*	*76.1 (62)*	*0.044 [0.037, 0.051]*	*0.970 (0.002)*
Scalar (3)	*Y*	*3 vs 2*	*251.8 (136)*	*15.9 (12)*	*0.042 [0.036, 0.050]*	*0.969 [0.001]*
Attitude						
Base (1)	*Y*	–	*84.3 (33)*	–	*0.041 [0.032, 0.050]*	*0.977*
Configural (2)	*Y*	*2 vs 1*	*102.2 (66)*	*17.9 (33)*	*0.034 [0.022, 0.045]*	*0.985 (−0.008)*
Scalar (3)	*N*	*3 vs 2*	*139.0 (75)*	*36.8 (9)**	*0.043 [0.033, 0.052]*	*0.973 (0.012)*
Partial Scalar (4)[a]	*Y*	*4 vs 2*	*124.6 (73)*	*22.4 (7)**	*0.039 [0.028, 0.049]*	*0.978 (0.007)*
Structure						
Base (1)	*Y*	–	*2.42 (2)*	–	*0.015 [0, 0.067]*	*0.999*
Configural and Structural[b] (2)	*Y*	*2 vs 1*	*2.75 (4)*	*0.33 (2)*	*0.000 [0, 0.057]*	*1.000 (−0.001)*
Scalar (3)	*Y*	*3 vs 2*	*3.81 (5)*	*1.06 (1)*	*0.000 [0, 0.054]*	*1.000 (0.000)*
Slope (4)[b]	*N*	*4 vs 3*	*16.8 (8)*	*13.0 (3)**	*0.048 [0.016, 0.079]*	*0.985 (0.015)*
Partial Slope (5)[c]	*Y*	*5 vs 3*	*5.62 (7)*	*1.81 (2)*	*0.000 [0, 0.047]*	*1.000 (0.000)*
Full Cooking and Food Preparation Scale Model						
Base (1)	*Y*	–	*1064.5 (340)*	–	*0.048 [0.045, 0.050]*	*0.916*
Configural (2)	*Y*	*2 vs 1*	*1498.9 (680)*	*434.4 (340)**	*0.051 [0.047, 0.054]*	*0.909 (0.007)*
Partial Scalar/Slope (3)[d]	*Y*	*3 vs 2*	*1532.9 (702)*	*34.0 (22)*	*0.050 [0.047, 0.053]*	*0.908 (0.001)*

[†] For all invariance tests, models are fit to the Development ($N = 445$) and Validation ($N = 498$) samples as separate groups.
* Significant at the $p < 0.01$ level (Bonferroni correction for multiple comparisons).
[a] Using the method proposed by Cheung and Rensvold (1999), FSE16 and STR2 were identified as sources of non-invariance; in Model 4 they are estimated freely between groups, all other indicators are constrained to equality.
[b] These terms for formative indicators are from Diamantopoulos and Papodopoulos (2010).
[c] The regression slope between formative indicator STR8 and the factor is estimated freely between groups, all other formative indicators are constrained to equality.
[d] Because some of the subscale are known to be non-invariant, full scalar-invariance testing is not shown (the model is not retained). As in the individual scales, FSE16, STR2, and STR8 are allowed to freely vary between groups while all other indicators are constrained to equality.

Table 5
Correlations between latent variables in EFA and CFA solutions.

		EFA Solution			CFA Solution		
	Latent Variable	*1*	*2*	*3*	*4*	*5*	*6*
EFA Solution	Self-Efficacy	*1*					
	Attitude	*0.60*	*1*				
	Structure	*0.39*	*0.33*	*1*			
CFA Solution	Self-Efficacy	***1.00***[†]	*0.70*	*0.43*	*1*		
	Attitude	*0.71*	***0.99***	*0.38*	*0.70*	*1*	
	Structure	*0.38*	*0.31*	***0.95***	*0.17*	*0.11*	*1*

[*]Correlations between EFA and CFA scores are found between the regression of the observed item scores on the unobserved factor scores using the loadings from the factor analyses. See Revelle (2016) for details.

[†] Correlations between corresponding subscales from EFA and CFA are in **bold**; note the nearly perfect correlation.

same factor structure across different samples), Tucker's congruence coefficient (Lorenzo-Seva & Ten Berge, 2006) was calculated for the EFA fits for the Development and Validation Samples. According to empirical research (Lorenzo-Seva & Ten Berge, 2006), congruence coefficients >0.94 indicate measurement invariance between samples: this hypothesis was supported (Self-Efficacy: 0.96; Attitude: 0.94; Structure: 0.95).

The pair-wise estimated factor scores for the two methods are highly correlated (see Table 5), and the pattern of interfactor correlations is similar between the two solutions. The higher interfactor correlations in the EFA solution is because items are allowed to load onto multiple factors, increasing shared variance. Thus, the EFA and CFA models offer convergent support of the hypothesized model of Food Agency as a represented by Self-Efficacy, Attitude, and Structure latent variables.

3.3. Reliability

Cronbach's α (DeVellis, 2012), which measures the internal consistency of a scale, is reported in Table 6 along with raw average interitem correlation, calculated for the scales from the Development, Validation, and Full Sample data. The scales defined here exceed $\alpha > 0.70$ in all cases; in most cases they achieve levels of α that demonstrate excellent internal consistency.

3.4. Scale scoring

To check the utility of the summary CAFPAS score (see 2.6.5), its correlation with a 1-factor principal component analysis (PCA) of the Self-Efficacy, Attitude, and Structure scores (calculated by regression from the EFA solution) for all individuals in the Full Sample was calculated and found to be highly significant (the first PC accounted for 62% of the variance in the three scales, and between PC1 and CAFPAS, $r = 0.99(95\%CI: [0.99,1.00]), p < 0.05$). Thus, this score is an appropriate rough measure for studies in which a single criterion is desired.

Table 6
Internal consistency statistics.

	Cronbach's α [95% CI]	Interitem $\bar{r}$
Development Sample		
Self-Efficacy	*0.90 [0.89, 0.92]*	*0.44*
Attitude	*0.87 [0.85, 0.88]*	*0.40*
Structure	*0.75 [0.71, 0.78]*	*0.37*
FIS[*]	*0.68 [0.63, 0.68*	*0.16*
Validation Sample		
Self-Efficacy	*0.92 [0.91, 0.93]*	*0.48*
Attitude	*0.86 [0.85, 0.88]*	*0.39*
Structure	*0.84 [0.82, 0.87]*	*0.52*
FIS[*]	*0.76 [0.73, 0.79]*	*0.22*
Full Sample		
Self-Efficacy	*0.91 [0.90, 0.92]*	*0.46*
Attitude	*0.86 [0.85, 0.88]*	*0.39*
Structure	*0.81 [0.79, 0.83]*	*0.46*
FIS[*]	*0.74 [0.71, 0.76]*	*0.20*

* Internal consistency measures for FIS scores (Bell & Marshall, 2003) are provided for comparison against the scales developed in this paper.

Table 7
Correlations between subscale scores, total rough CAFPAS, and FIS.

	1	2	3	4	5
Self-Efficacy	*1*				
Attitude	*0.66*	*1*			
Structure	*0.43*	*0.37*	*1*		
CAFPAS	*0.84*	*0.81*	*0.76*	*1*	
FIS	*0.58*	*0.76*	*0.27*	*0.65*	*1*

3.5. Criterion-related validity

3.5.1. The Food Involvement Scale (FIS)

Table 7 shows the correlations in the Full Sample between FIS (Bell & Marshall, 2003) and the Self-Efficacy, Attitude, and Structure scale scores (calculated as above from the EFA solution), as well as the total CAFPAS score. There is a strong correlation between FIS and the CAFPAS ($r = 0.65[0.61,0.69]$), demonstrating criterion-related validity: as would be expected, CAFPAS and FIS increase together. All correlations are significant because of the large sample size; however, the correlations between the FIS and the Structure and the Self-Efficacy scales are much lower in magnitude.

3.5.2. Prediction of home cooking

On average, participants in both samples reported cooking 10.8 meals at home per week, although there is a fair amount of variability around this average (see Table 1). Fig. 2 shows results from a linear regression in the Full Sample data (omitting outliers of more than 21 meals cooked per week, reported by 34 subjects, did not change results), an increase in rough CAFPAS score by 1 point predicts an increase of 0.96 meals cooked at home per week by the participant ($\beta = 0.96, t_{904} = 11.7, p < 0.05; R^2 = 0.13$). Multiple regression with the individual components of the scale provide parallel conclusions (results

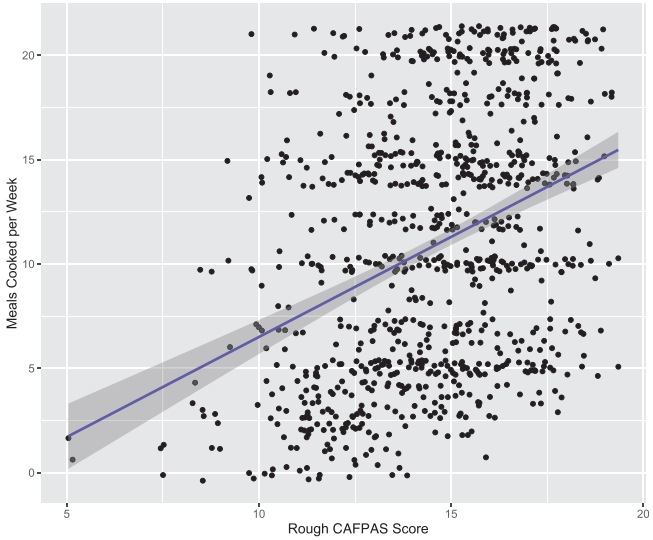

Fig. 2. Linear relationship between the Rough CAFPAS score and Meals Cooked per Week; blue line represents a simple linear regression. Note that this figure omits extreme outliers (more than 21 meals per week) for clarity. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

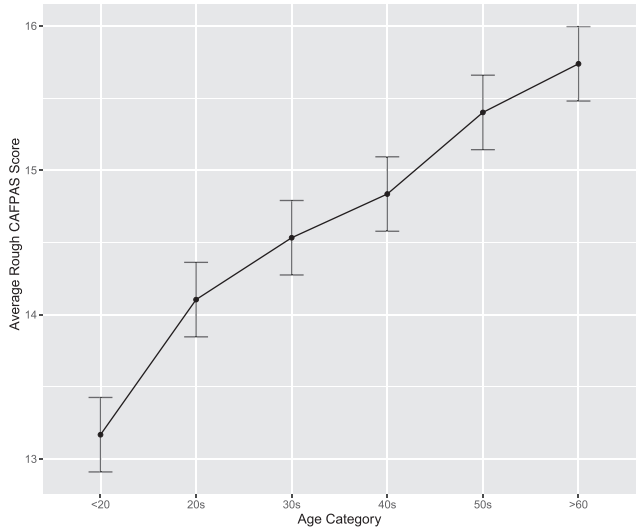

Fig. 3. Relationship between Age (categorized by decade) and Rough CAFPAS score. Error bars are Fisher's LSD based on average *N* per group.

not shown).

Results from a multiple regression model with Meals Cooked per Week as the outcome and CAFPAS and FIS as independent variables fitted to the Full Sample Data demonstrate that the predictive ability of this model was the same as with CAFPAS alone ($R^2 = 0.13$) and only CAFPAS was a significant predictor of number of meals cooked ($\beta = 1.08, t_{802} = 2.01, p < 0.05$); neither FIS nor its interaction with CAFPAS significantly predicted meals cooked.

3.5.3. CAFPAS association with demographic variables

In the Full Sample, Age is significantly related ($\beta = 0.059, t_{938} = 8.06, p < 0.05$), albeit weakly ($R^2 = 0.064$) to CAFPAS. If Age is categorized by decade (e.g., "20 s" includes anyone age 20–29), there is a clear and linear relationship between CAFPAS and age (Fig. 3). Both ANOVA and MANOVA analyses showed significant relationships between income and Food Agency (univariate ANOVA: $F_{7,932} = 3.28, p < 0.05$). This significant difference appears driven largely by low CAFPAS scores in both extremely low- and high-income respondents (See Fig. 4). It is possible that this pattern is driven by relatively low cell counts for the $125–$150 K income group ($N = 30$), but since the highest income group also shows this pattern it is impossible to discount completely. Results for associations between the CAFPAS and sex, race or education were not significant.

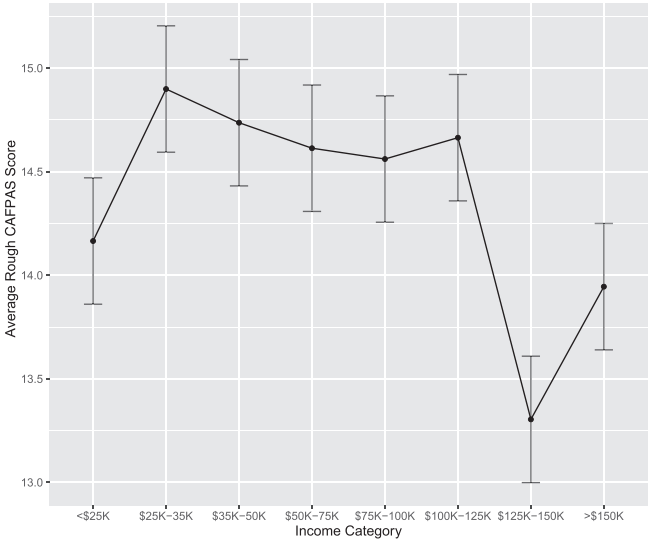

Fig. 4. Relationship between Income and Rough CAFPAS score. Error bars are Fisher's LSD based on average *N* per group.

4. Discussion

4.1. Using the Cooking and Food Provisioning Action Scale (CAFPAS)

This research operationalizes a measurement tool based on the paradigm of Food Agency as "an individual's relative capacity to intentionally produce the food that she envisions… being able to act throughout the planning and preparing of meals within a particular food environment" (Trubek et al., 2017, pp. 303–304). Thus, the Cooking and Food Provisioning Scale attempts to widen the frame for cooking research by investigating what makes an individual "empowered to act" in regard to home cooking and provisioning. The CAFPAS includes three, non-orthogonal subscales that measure aspects of an individual's self-perceived ability to set and achieve food-related goals. The Self-Efficacy subscale measures whether an individual considers their abilities and skills surrounding cooking adequate; the Attitude subscale measures an individual's affective stance towards food, cooking, and provisioning in a number of areas; and the Structure subscale attempts to measure the ways in which external, structural factors (Bowen et al., 2014; Giddens, 1979) might hinder or support the individual's cooking and provisioning actions and goals.

The main product of this research is a validated, measurement-invariant scale for measuring Food Agency. The scale consists of the 28 items, which are to be administered with responses chosen from a 7-point, bipolar, Likert scale as described in Section 2.2. Subscale scores for an individual are to be determined by coding response options as 1–7, reversing items as necessary (see Table 3), summing all items from a particular scale, and then dividing by the standard deviation of the sample population's scores on the subscale. An overall "CAFPAS Score" can then be determined, as described in Section 2.5.6, by summing the individual subscales. A scalar invariant sub-scale can be obtained by omitting the scores for FSE16, STR2, and STR8 (see Table 4), although all items *should be* collected, and scores with and without these items can be compared (Cheung & Rensvold, 1999; Kline, 2016). These scores – both overall CAFPAS and Self-Efficacy, Attitude, and Structure – can then be included as variables in further studies.

4.2. Limitations

One of the main limitations of this study is the way in which the two survey samples were recruited. While the Validation Sample improved upon the Development Sample, neither were fully representative samples for the US population. Structurally disadvantaged (in terms of income and education) and non-Caucasian respondents were all underrepresented in the sample. Thus, it is impossible to assess measurement invariance over those populations beyond simple univariate statistics as reported in the results; for example, the configural or loading invariance of the scales between different racial groups or education levels cannot be confirmed because there are insufficient respondents in some cells in the study.

In addition, important predictor variables or covariates, like socioeconomic status (SES), were not collected and these might be important indicators for confirming generalizability of the CAFPAS. A more complete structural model including such variables (presumably as additional latent factors in SEM) may do a better job of explaining the variability in responses. Identifying these important covariates and collecting a more representative sample that includes measurement of the new variables will address this limitation.

These additional indicators may help to better include a full picture of "Structure" in the model. It is clear from the results – good explanatory power in terms of meals cooked per week, face and content validity – that the current model accurately captures the experience of

Food Agency for individuals. However, most of the discussion of Structure is in terms of "time poverty": all of the items in that factor address the desire to have more time to cook or do food-related activities. While this may be an accurate picture of the *personal* experience of structural barriers, it is unlikely that it is a complete one: obviously, socioeconomic, cultural, and infrastructure (e.g., food deserts) factors shape an individual's Food Agency, to name just a few. The focus in the current research was to identify items related to structure that an informant could reliably self-report; perhaps time poverty is the effect of social structure that is most proximate to the subject, but clearly time poverty may be caused by, for example, having to work multiple jobs, drive long distances to obtain food, or care for multiple dependents – important structural factors that are not directly identified in the scale. Identifying and including these variables in future studies, whether as part of an updated scale or as important covariates or causal variables, will improve the ability of this measurement device to capture lived experience.

4.3. Future work

This paper represents a preliminary step in a broader body of research that can and should be carried out to refine the quantitative measurement of cooking and food preparation practices. A first important piece of work for the further validation of the CAFPAS is to administer it, along with validation measures, to a geographically stratified, representative sample with appropriate cell counts at all intersections of race, sex, income, and education. Such work can confirm whether any of the demographic predictors of CAFPAS are artifacts of the sample or structural features of the scale that need to be either explained or modified. With appropriate sample sizes, CFA-based measurement-invariance tests can be carried out for these demographic variables. Incorporation of survey methodology expertise in this work (e.g., to identify differing response styles between sexes or racial groups) should help build confidence in the scale's validity.

So far, all criterion-validity evaluations of the scale have been through survey-based self reports. A rigorous method for further bolstering the CAFPAS' validity will be to administer it to a group that can also be observed ethnographically by researchers working in the Food Agency framework. Positive correlations between (qualitative) observed agency related to food as reported by the researchers and CAFPAS scores as reported by the scale would establish that the scale not only measures internal perceptions but external behavior.

A necessary final step in research with the CAFPAS is to investigate its relationships to nutrition-related measures (fruit and vegetable intake, dietary variety and adequacy, food security, etc) and, should those relationships hold, determine whether the CAFPAS can be used to assess intervention programs meant to improve nutrition and/or cooking skills. The CAFPAS should also be usable as an independent predictor or covariate in many nutrition and consumer-science studies that aim to explain food choice and preference.

5. Conclusions

This paper presents a psychometrically valid scale for measuring food provisioning and preparation (CAFPAS) based on Food Agency, a conceptual framework explaining how and why subjects are empowered to make food-related choices. The final CAFPAS consists of 28 items that form three internally consistent, correlated scales. These scales have good face validity with theorized elements of Food Agency: Food Skills and Self-Efficacy (13 items), Attitude towards Food (10 items), and Structural Elements (5 items). Furthermore, a scaled sum of response scores on these scales is strongly related to measures of interest: meals cooked per week and scores on the Food Involvement Scale (FIS). Because FIS is a non-significant preditor of meal outcomes when included in a multiple linear regression model with CAFPAS (see 3.5.2), the new scale can be said to provide more and new information about cooking practice. In several ways – as both a scale and a predictor of other variables – the CAFPAS seems to improve upon the FIS in its ability to capture various components of food preparation skills, capacities and behavior.

The use of structural, skill-related, and self-efficacy items in the CAFPAS provides a broad and theoretically sophisticated picture of individual cooking behavior. The CAFPAS significantly predicts meals cooked per week at home, and multiple regression indicates that CAFPAS subsumes FIS as a measurement tool for this key variable of interest. CAFPAS provides a quantitative tool for measuring a practice-based conception of cooking, like Food Literacy (Vidgen & Gallegos, 2014) and Food Choice Capacity (Sobal & Bisogni, 2009), which have previously been qualitative frameworks. While further work on cross-cultural validation is necessary (see Section 4.3), it is also meant to be non-specific and usable in multiple contexts (Hartmann et al., 2013). Therefore, the CAFPAS is a significant contribution to the field for studying human cooking and food-preparation behavior.

The Cooking and Food Provisioning Action Scale represents a new method for understanding food-related behavior. It quantifies the degree to which individuals perceive themselves as able to set and achieve food-related goals (Self-Efficacy), how they feel about food as a sphere of their lives (Attitude), and to what degree they feel their food activities and goals are constrained by structural elements outside of their control (Structure). As a dependent variable, the CAFPAS can be used to assess interventions and how different groups deal with food; as an independent variable, the CAFPAS could be used to understand why some individuals struggle with the food environment while others seem to thrive. Additional work is required to further validate, explore, and deploy the CAFPAS; the current study provides the framework for doing so by demonstrating that it the scale is structurally valid and showing some initial correlations with cooking frequency.

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Authorship

JL designed the research, conducted survey-data collection, analyzed the data, and drafted the manuscript. JAW analyzed the data and drafted the manuscript. AT designed the research and drafted the manuscript.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.foodqual.2017.06.022.

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