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HEALTH PSYCHOLOGY | RESEARCH ARTICLE

Development of a measure to assess factors associated with college students' Willingness and Readiness to Act in a Food Allergic Emergency (WilRAFAE): A pilot

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Abstract: The rise of food allergies and anaphylaxis in the US population is an emerging public health concern. Individuals living with life-threatening food allergies may require assistance during an anaphylactic emergency to keep safe. In the absence of existing tools, the development of a measure to assess college students' Willingness and Readiness to Act in a Food Allergic Emergency (WilRAFAE) was sought as an initial step in identifying those willing and ready to act on a college campus. Data were collected from a convenience sample of college students enrolled in 2016–2017 school year in a suburban Catholic college in New York metropolitan area. Survey items were identified through literature review, and experts' opinions, and were completed by college students. Items were tested for reliability using total interitem correlation, with several items removed to reduce burden and to improve the alpha. Knowledge (.814) and Bystander's Likelihood to Respond (.874) scales had strong internal consistency reliability validities. The results were statistically significant with the knowledge mean scores for registered

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Olga Kagan, PhD, RN started her career as a registered nurse in a critical care setting in NYC-based hospitals. In 2002, she transitioned to an outpatient clinic as a Clinical Nurse Coordinator at the WTC Worker & Volunteer Medical Screening & Monitoring Program at Mt. Sinai Selikoff Centers for Occupational Health, the Department of Preventative Medicine. Dr. Kagan's research interest lies in serving the needs of individuals living with allergic conditions, and is aimed at prevention and action strategies through health policy, public health, and informatics. She has been working independently and collaboratively with other researchers on a variety of projects, and coauthoring research articles. She recently contributed to research publications in *Annals of Allergy, Asthma & Immunology* and *BMC Pediatrics*, and a case study to a book *Policy & Politics for Nurses*. She is a member of ANA, NYAM, HIMSS, ENRS, FAAMA, and Sigma Theta Tau International Honor Society. Dr. Kagan has been presenting poster abstracts of her original research at professional conferences since 2015, and currently serves as an abstract reviewer for ENRS.

PUBLIC INTEREST STATEMENT

The rise of food allergies and anaphylaxis in the US population is an emerging public health concern which has been at the forefront of policy-makers, researchers, and advocacy groups. Willingness and Readiness to Act in a Food Allergic Emergency (WilRAFAE) is a new measure developed to help identify individuals willing and ready to act in an anaphylactic emergency. This measure was pilot tested on a small sample of college students in one Catholic college in a suburban metropolitan NY area. Initial psychometric properties of this measure appear to be sound, but need to be further tested on a larger sample with additional analysis. This measurement tool might be of interest to institutions of higher education concerned with safety of individuals susceptible to a life-threatening anaphylaxis. It is helpful in identifying persons or groups willing and ready to help in a food-allergic emergency prior to development and implementation of new policies.

nurses (RNs) significantly higher than the mean scores for freshman nursing students. Construct validity testing using three known groups, yielded a statistically significant score for selected items. Based on the findings of this pilot study a full scale college-based study would be desired to further test WilRAFAE instrument.

Subjects: Food Science & Technology; Behavioral Sciences; Education; Health and Social Care; Medicine, Dentistry, Nursing & Allied Health

Keywords: WilRAFAE; food allergic emergency; college students; epinephrine autoinjector; allergy and anaphylaxis

1. Introduction

Food allergies have been on the rise among all age groups (Acker, Plasek, & Blumenthal et al., 2017; Dyer, Lau, Smith, Smith, & Gupta, 2015), and anaphylactic food reactions increased by 377% nationwide from 2007 to 2016 (Gelburd, 2017). Potentially life-threatening allergic reactions can be experienced by those with and without previously diagnosed allergies. Until a cure is found, avoidance of known allergens and immediate access to epinephrine to treat allergen-induced anaphylaxis, are two key strategies to keep safe. Use of epinephrine autoinjectors (EAI) by unlicensed health care professionals is becoming more common with increasing availability of EAI for use in an anaphylactic emergency, including daycare centers, schools, and other educational establishments. Individuals experiencing life-threatening anaphylaxis often require help from fellow citizens to keep safe, which is similar to other emergencies wherein bystanders intervene by either operating automatic external defibrillators (AEDs) during a cardiac arrest, or administering Naloxone (Narcan) in the case of a drug overdose. Food allergy advocates propel legislative actions to make epinephrine autoinjector more readily available in public places for use by trained unlicensed individuals. Whether previously diagnosed or not, those in need of the life-saving treatment, epinephrine, should be able receive it in a timely manner, either by self-injecting or be assisted by a Good Samaritan.

In 2017, the top complaint college students reported was either being treated or diagnosed with allergies within the last 12 months (American College Health Association, 2017a, 2017b). Several studies found that students with diagnosed allergies, on more than one college campus, had poor adherence rate in carrying prescribed EAI (Greenhawt, Singer, & Baptist, 2009; Herbert, Lin, Matsui, Wood, & Sharma, 2016; Jones et al., 2015; Karam, 2017; McLaughlin, 2018). Extrapolating from these data, teenagers and young adults remain to be a high risk group for potentially life-threatening allergic reactions. A primary focus of this pilot was to construct an instrument that would help institutions of higher education (IHE) identify individuals WilRAFAE on a college campus. Information gathered using the WilRAFAE instrument can be utilized by IHE in creating policies and practices to make tools and resources available for use in an allergic emergency on college campuses.

In 2014, a not-for-profit Food Allergy Research and Education (FARE) organization, in partnership with the National Foundation for Celiac Awareness, the National Association of College and University Food Services, food allergy experts, and stakeholders from 65 colleges and universities produced pilot guidelines (Food Allergy Research and Education, 2015). These guidelines focus on several areas, including, but not limited to food labeling, anaphylaxis medical forms, staff training, accommodations in dining halls, signage for cross contact with major allergens, and responsibilities of students in self-management of food allergies and maintenance of emergency medication. While the prevention plan focuses on preventing an allergic reaction through training, education, reasonable accommodations under the Americans with Disabilities Act and modification of the environment, the action plan includes steps needed to be completed in an anaphylactic emergency, including activation of 911 and administration of an epinephrine autoinjector. Being able to identify individuals who are willing and ready to act in an allergic emergency among members of a college community would provide a foundation to guide stock epinephrine autoinjector and

anaphylaxis policies, as well as training and education on a college campus. Currently, no comprehensive tools are available to measure college students' readiness or willingness to act in a food-allergic emergency. This study was designed to develop and evaluate a practical tool for IHE that can be useful prior to developing college-based safety policies aimed at availability and use of epinephrine autoinjector by trained unlicensed individuals.

There are several key terms that warrant a conceptual understanding of their meanings, including Food Allergic Emergencies (FAEs); Readiness to Act in an FAE; and Willingness to Act in an FAE. FAE is highly likely when one of the following three criteria are fulfilled: (1) ingestion of a known allergen is confirmed, even if a person is asymptomatic or experiences only mild symptoms; (2) more than one body system is affected; or (3) respiratory or cardiovascular symptoms present in absence of cutaneous or other symptoms (Sampson et al., 2005, 2006). For purposes of this study, *Readiness to Act (RTA)* is defined as being fully prepared for doing something; and *Willingness to Act (WTA)* is defined as being ready to do something by choice, to act or respond without being persuaded.

1.1. Theoretical frameworks

People living with food allergies rely on others within their environment for information to prevent serious allergic reactions, including ingredient disclosures and allergen cross contact. If prevention plan fails, an action plan needs to be carried out. In an allergic emergency support might be required to avoid potentially fatal outcomes, particularly, for those who become physically compromised and unable to self-inject. In the Roy Adaptation Model (RAM), the process of adopting a new role is termed "role transition" (Roy, 1991). In an allergic emergency, one must transition from a bystander to an active rescuer. Effective role transition occurs when the person at least partially meets the social expectations associated with the role, but requires knowledge, education, or role models to make the transition most effective. According to Prochaska and DiClemente (Prochaska, 2008), "a central principal of the transtheoretical approach is that different mechanisms or processes are most important in producing change at different stages of overcoming a problem." For instance, this includes developmental changes (age or stage of life) or environmental changes (social norms or laws) that occur in people's lives that can change their behaviors. A bystander's ability to change roles and quickly adapt to a situation is a highly desired response in an allergic emergency. Through the development and evaluation of an instrument this study could provide useful data in identifying ready and willing to act individuals, who could become first responders to an FAE.

1.2. Preparations for instrument development

Over the years, researchers within nursing, medicine, and psychology fields, have studied individuals acting as Good Samaritans in a variety of emergency situations, describing barriers and facilitators. Several researchers published on the use of EAI by family members of children with food allergies, (Kim, 2005) public school personnel (Chad, Ben-Shoshan, & Asai et al., 2013; Wahl, Stephens, Ruffo, & Jones, 2014; White, 2015), physicians (Wang, Young, & Nowak-Wegrzyn, 2014), nurses (Pistiner & Wang, 2017), emergency response workers (Chung, Gaudet, & Vandenberghe et al., 2014; Cristiano, Hiestand, & Gower et al., 2016), and pharmacists (McMillan, Hattingh, & King, 2012; Salter, Delfante, de Klerk, Sanfilippo, & Clifford, 2014). However, most of the research on willingness to act in an emergency situation came primarily from AEDs (Gonzalez, Leary, & Blewer et al., 2015; Lubin, Chung, & Williams, 2004; Sneath & Lacey, 2009), Cardio-Pulmonary Resuscitation (CPR)/Basic Cardiac Life Support (BCLS) (Chew & Yazid, 2008; Cho, Sohn, & Kang et al., 2010), and Narcan (Naloxone) (Bachhuber, McGinty, Kennedy-Hendricks, Niederdeppe, & Barry, 2015) literature. These well-regulated and widely used first response models provided the basis for construction of the items for the WiIRAFEA measure.

1.3. Item generation and tools selection

Several existing tools were identified through the literature that were adapted and modified in addition to the newly developed questions. New and modified scales were tested for validity and reliability during this pilot study.

Knowledge is one of the essential components needed for one to become ready to act in an FAE. Prochaska's Transtheoretical Model (TTM) of behavior change (Prochaska, 2008) and the Roy Adaptation Model (Roy, 1991) implicate knowledge as one of the stages in prompting one's change in behavior, leading to readiness. Therefore, knowledge was measured using a modified *The Chicago Food Allergy Research Survey* (Gupta et al., 2009). This survey was originally developed to assess the knowledge, attitudes, and beliefs around food allergy of parents of children with food allergies, which was developed by a panel of experts and consisted of 18 items. Permissions to use and modify the survey was requested and granted from the author. The modified version for this pilot consisted of 15-items (True/False/Don't Know), which was tested for validity and reliability.

It was anticipated that individuals who are more familiar with food allergies and EAI would be more willing and ready to act in an FAE compared to individuals who are less familiar or not familiar at all. Holmes' 12-item measure grading familiarity with a mentally ill person (Holmes, Corrigan, Williams, Canar, & Kubiak, 1999) was adapted to assess familiarity with persons living with food allergies. Reported interrater reliability was .83, with higher scores signifying more familiarity or personal contact (Holmes et al., 1999). Each statement is assigned a numeric rating from 1 to 12. For example, "I have never observed a person that I was aware had a food allergy" is assigned the lowest score of "1," and "I have food allergies" is assigned the highest score of "12." The higher the score, the more familiar one is with the condition.

While the adapted Holmes' measure provided information about familiarity with food allergies, a newly developed 10-item experience measure was developed to obtain information about individual's physical exposure to or experience with the injectable device. Respondents were asked to select Yes or No to a series of statements, such as "I injected my child at least once" or "I practiced with a trainer device." The total sum of scores was calculated for each respondent. Selecting Yes for multiple statements generated a higher total score. Based on the literature, one of the significant predictors of being "very confident" in using epinephrine autoinjector in children and adults was having previously experienced anaphylaxis two or more times (Daley et al., 2015). Similar predictors were observed for patients' confidence in others injecting them in case of anaphylaxis, and for receiving EAI training (Daley et al., 2015). It is possible that those who had previous experience with injectable devices will be more willing and ready to act in an allergic emergency. Therefore, self-reported questions assessing experience, training, and confidence were included in the final survey.

Bystander likelihood to respond to an emergency situation is essential for a successful outcome. It is likely that the presence of other people in a critical situation, such as a food-allergic emergency, may reduce the likelihood that an individual will help; however, factors such as a person in immediate danger may prompt action. According to the famous experiment conducted by Darley and Latane (Darley & Latane, 1968), the presence of other bystanders reduced the individual's feeling of personal responsibility. However, perception of immediate physical danger prompts faster response (Fischer, 2011). Thus, a new scale was developed to measure bystander's likelihood to respond (LTR) in an FAE. This five-point Likert scale, ranging from "definitely not," "probably not," "neutral," "probably yes," and "definitely yes," was based on a scenario and consisted of questions such as "I would help," or "Someone else should help," with reverse coded questions such as "I would walk away." This tool started as a 15-item scale, but after expert review and further reliability testing in the pilot study, items were reduced to 10, with several items revised for simplified wording.

Based on data gathered from survey responses, fear has been implicated as a barrier to action in an emergency situation. For example, the most common concerns with the use of AED were fear of using the equipment incorrectly (57%) and fear of legal liability (38%) (Lubin et al., 2004). These fears could be experienced with handling of epinephrine autoinjector devices. Other most commonly reported fears reported by parents of food allergic children were hurting the child, incorrect use of the EAI, or a bad outcome or death (Chad et al., 2013). Additionally, fear or phobia of blood and injections (Ost, 1992) may play a role in an emergency response. Thus, three fear-related self-reported analog scale from “not at all” to “always” questions were included in the survey. Sum of these fears is used to measure overall fear or lack thereof (fearless) among the respondents.

Individuals responding to surveys may answer questions in a way that are most socially desirable. To minimize this bias, confidentiality of responses was maintained during the survey administration. Additionally, the Marlowe–Crowne Social Desirability Scale–Form C was used to validate self-reported measures to ascertain truthfulness of the responses. The scale’s reported reliability is Kuder–Richardson-20 = .76. This tool was chosen because it is often used in health research and social sciences that utilize self-reported measures, similar to the self-reported measures within the WilRAFAE instrument. Self-reported analog scales ranging from “not at all”(1) to “very” (10) were developed to capture self-reported overall knowledge of FA and EAIs, experience injecting EAIs or other self-injectable medications (e.g. Insulin), willingness to be trained, confidence in recognizing and injecting EAI.

2. Methods

2.1. Tool development and pilot testing

The phases of tool development included development of the items and pilot of the tool. Pilot testing included several steps to formalize the final WilRAFAE measure, which consisted of true/false questions, several Likert scale questions, several analog scales and check boxes (Table 1).

2.1.1. Developing the items

Items were initially identified from the literature. Reverse-coded items were added to validate if the participants were responding to the survey attentively. In the development phase the items were edited and prepared for assessment of content validity. Five Master’s prepared Advanced Practice Registered Nurses reviewed the items, and any items not representative of the concepts or subconcepts were adjusted for the final version.

The content validity was established by expert review of the concepts and subconcepts. Two main concepts were identified from the literature: *Willingness to Act* and *Readiness to Act*. Several subconcepts were identified for each main concept. According to Prochaska’s Transtheoretical Approach (Prochaska, 2008), an individual must go through several stages, including the preparation stage to acquire a new skill or behavior and maintenance stage to sustain it to reach *Readiness to Act*. Therefore, knowledge, exposure/familiarity, experience, or prior training might be predictive of one’s ability to be ready to act. *Willingness to Act* is a second concept being measured by the tool. Based on the literature review, several factors may influence one’s willingness to act, including fear or lack thereof, as well as certain social and demographic factors such as age, career aspirations, or behaving in a way that is socially desirable.

A content validity grid was developed for expert review of the concept and additional input. A conceptual definition of concepts and subconcepts was included in the content validity grid for clarification of review. Each item had a scale from 1–4 indicating its representation of the concept. The numbers were described as 1 = the item is not representative of the concept, 2 = the item requires major revisions to be representative of the concept, 3 = the item requires minor revisions to be representative of the concept, and 4 = the item represents the concept. The items were numbered with a corresponding box adjacent to it with the 1–4 scale and a section for comments. A section for suggestions on how to improve any item was included.

Table 1. Instrument components with operational definitions

Overall variables of interest	Variable components—Definitions	Instrumentation
Readiness to Act (sum of 5 scores)	Knowledge of Food Allergies and Epinephrine autoinjectors (Sum score) OKFA (1–10 Self-Report Analog Scale) OKEA (1–10 Self-Report Analog Scale) 15-Item Knowledge Test KN1–15 (T/F/DK)	Modified from The Chicago Food Allergy Research Surveys for Parents of Children with Food Allergy. Gupta et al. (2009)
	Level of Exposure/Familiarity with Food Allergies and Epinephrine autoinjector (Highest score on item checked per original tool instructions) (the mean of rank order correlations summarizing interrater reliability = .83) Level_of_Exposure 1–12 (Checkboxes)	Adapted from Level of Contact (familiarity) Holmes et al. (1999)
	Experience self-reported (Sum score) EXPE1–10 (Y/N) EXP_EPI (1–10 Analog Scale) EXP_MED (1–10 Analog Scale)	Developed for this study
	Training self-reported (Yes/No) If Y, go to Checkboxes 1–6; If N, go to Willingness to Train (Analog Scale)	Developed for this study
	Confidence self-reported (sum score) CRAR (1–10 Analog Scale) CEPI (1–10 Analog Scale)	Developed for this study
Willingness to Act (sum of 2 scores, if both measures are correlated)	Bystander/Likelihood to Respond to Scenario LTR1–10 (five-point Likert Scale)	Developed for this study
	Fearless self-reported (sum score) Fear1, Fear2, Fear3 (1–10 Analog Scale)	Developed for this study
Social Desirability	Social Desirability (sum score) Marlowe-Crowne Social Desirability Scale—Form C (Kuder-Richardson-20 reliability = .76) Social1—Social13 (T/F)	Original Short Form: Marlowe-Crowne Social Desirability Scale—Form C Reynolds (1982)
Demographics	Age, Gender, Ethnicity, Number of Children, Student Status, and College Major	Modified from recommendations by the US Census Bureau

Abbreviations: OKFA (Overall knowledge of food allergies); OKEA (Overall knowledge of epinephrine autoinjector); KT (Knowledge test); EXPE (Experience); EXP_EPI (Experience with epinephrine autoinjector); EXP_MED (Experience with other injectable medications); CRAR (Confidence in recognizing an allergic reaction); CEPI (Confidence in using epinephrine autoinjector); LTR (Bystander's likelihood to respond).

The Construct Validity Index (CVI) and the overall scale Content Validity Index (S-CVIs) based on the aggregate ratings from five experts were calculated (Table 2). CVIs of .78 or higher for three or more experts are considered evidence of good content validity (Polit, Beck, & Owen, 2007), with .90 established as an excellent content validity (Polit & Beck, 2012). Additionally, self-reported analog scale questions were deemed sound by all five expert reviewers, with no proposed changes.

Table 2. Reliability for Food-Allergic Emergency Survey Scales

Tool/Scales	Code	Scale	Original items	S-CVI	Final items	Cronbach's alpha	N
Knowledge	KN	Y/N/DKN	15	.96	15	.814	54
Bystander's Likelihood to Respond	LTR	1–5	15	.80	10	.874	54

Following a discussion of the assessments derived from the experts, the items of both scales were clarified, reduced, and prepared for follow-up testing. Two aspects were assessed: (1) construct validity using known groups and (2) internal consistency for the items within some of the measures. Additionally, a subset of analysis was done to test the use of alternative administration procedures (pen-paper vs. web-based) for future execution in a larger study.

Additionally, descriptive data for modified *Knowledge* and newly developed *Bystander's Likelihood to Respond* scales were assessed (Table 3).

2.1.2. Pilot of the tool

With IRB approval in an exempt category, psychometric properties were evaluated within a convenience sample of 55 undergraduate freshman students, enrolled in criminal justice, business, and nursing classes in 2016–2017 school year, at one Catholic suburban college in New York metropolitan area. Because the pilot testing of the tool was based on a paper-pencil format and the ultimate implementation of the survey would be web-based, test-retest reliability was used with the alternate forms. A test-retest process using the two forms was executed on a convenience sample of additionally recruited 34 undergraduate and 14 graduate students in nursing, using a confidential web-based survey, followed by a confidential in-class pen/paper format survey, with a modest incentive of a \$20 gift card raffle. Participation was voluntary and subjects were told that completion of the survey represented their consent to participate. The online and paper surveys asked participants to volunteer their email addresses so that the two sets of data could be paired.

2.1.3. Reliability

Test-retest reliability was performed on two classes: undergraduate freshman nursing students enrolled in a nursing fundamentals course and registered nurses (RNs) enrolled in a graduate nursing research course with permission from the class instructors. The aim was to assess if the responses had any significant variations from the web-based format using Google forms versus the pen and paper format as well as to determine differences in knowledge for construct validity. Students completed the online version of the survey before completing the pen and paper version. Survey completion time varied from 12 to 20 min in each format. An in-class raffle was held upon submission of both surveys. Out of 34 undergraduate students, 30 completed both surveys. Out of 14 graduate students, 11 completed both surveys. Data were reviewed for any significant discrepancies between web-based and paper-and-paper responses for each participant. The percent agreement for all participants on alternate forms was 90%, making it possible to use the web form of the instrument in future studies. Consensus among several researchers indicate that responses to computerized surveys are as reliable as responses to paper-and-pencil surveys (Basnov, Kongsved, Bech, & Hjollund, 2009; Dodou & de Winter, 2014; Gosling, Vazire, Srivastava, & John, 2004; Weigold, Weigold, & Russell, 2013).

Table 3. Descriptive Statistics of Food-Allergic Emergency Survey Scales

	Knowledge Scale (KN)	Bystander's Likelihood to Respond Scale (LTR)
N	55	55
Mean	8.8750	39.7455
Median	10.0000	40.0000
Std. deviation	3.61845	6.89932
Skewness	-.540	-.223
Std. error of skewness	.319	.322
Kurtosis	-.545	-.920
Std. error of kurtosis	.628	.634

2.1.4. Construct validity

Construct validity was assessed by using these known groups (graduate nursing students who are already registered nurses and undergraduate nursing students). Several items were selected to test the hypotheses that RNs would score higher on the Knowledge items of the scales developed for the study.

To further assess construct validity using known groups and reliability of the instrument, a second pilot study using the paper and pen survey was designed. The sample for the pilot study consisted of a convenience sample of undergraduate freshman students enrolled in the fall 2016 semester at the same private Catholic, suburban college near metropolitan NY area. Three classes were recruited specifically to differentiate how known groups should answer some of the items based on their career choices (i.e. “helping” professions vs. “business” professions). Students enrolled in criminal justice, business, and nursing classes were visited and given an anonymous pen and paper survey during their class time. Names were collected on separate index cards and returned together with the survey for a raffle drawing incentive of \$20. All survey responses were coded and entered into Google forms for analysis. The data were analyzed for validity and reliability of the instrument.

3. Results

3.1. Reliability

The sample yielded a complete set of data from a total sample of 55 freshman students, including 30 female, 25 male with a mean age of 18 years. The race/ethnicity in the sample included White (57%), Hispanic (14%), Asian (9%), Black/African American (5%), and other (15%). Majority of the respondents did not have any children (89%) and were not married (89%). Data were cleaned for completeness, and prepared for analysis of internal consistency using Cronbach alpha. Items were tested for reliability using total interitem correlation and several items were removed to reduce the length of the instrument, reduce survey burden, and improve the alpha for the combined items of the subscales for *Knowledge*, and *Bystander's Likelihood to Respond*. The results supported the use of the measures with alphas ranging from .814 to .874, respectively (Table 2). Following reliability testing, items and sections of the instrument were further refined to reduce the length, to prevent fatigue and incomplete entries. The final survey for the study using these items organized with general instructions and headings that do not bias the respondents were finalized. Demographic variables were moved at the beginning of the survey.

3.2. Construct validity

In assessing construct validity, using 14 graduate nursing students who are already registered nurses and 34 undergraduate nursing students, RNs scored higher on the Knowledge items of the scales than nursing students. The results were statistically significant as predicted with the Knowledge mean scores for RNs ($m = 12.8$, $sd = 1.51$) significantly higher ($p < .05$, $t = -3.15$) than the Knowledge mean scores for freshman nursing students ($m = 10.2$, $sd = 3.25$).

Further construct validity was assessed on three known groups. The sample was coded to test differences among the three groups of freshman students from the different disciplines (Table 4): Group 1 ($n = 16$) (Business); Group 2 ($n = 18$) (Criminal Justice); and Group 3 ($n = 21$) (Nursing).

The hypotheses were tested that predicted students who selected health or service professions would demonstrate higher scores on items that reflected their “willingness” to respond to a food-allergic emergency. An ANOVA was used on the summed scores of *Bystander's Likelihood to Respond (Total LTR)*; as well as on individual (LTR 1–10) items yielding a statistically significant scores for several items including: (a) LTR2, “I would intervene if no one else intervened” ($F = 7.151$, $p = .010$); (b) LTR7, “I would help inject Epinephrine Autoinjector” ($F = 5.727$, $p = .006$); (c) LTR9, “It is my professional obligation to intervene” ($F = 5.222$, $p = .009$); and (d) LTR10, “It is my moral obligation to help” ($F = 3.530$, $p = .037$); and total sum LTR ($F = 5.021$, $p < .05$) (Table 5).

Table 4. Descriptive of Total Sum of Bystander's LTR

College major	N	Mean	Std. deviation
1. Business	16	36.7222	4.90864
2. Criminal Justice	18	38.7500	7.04746
3. Nursing	21	43.0952	7.07039
Total	55	39.7455	6.89932

Table 5. One Way ANOVA—Bystander's Likelihood to Respond (LTR)

		Sum of Ssquares	F	P	(df)
LTR1	Between groups	1.966	2.043	.140	2
	Within groups	25.016			52
	Total	26.982			54
LTR2	Between groups	14.393	7.151	.002	2
	Within groups	52.334			52
	Total	66.727			54
LTR3	Between groups	4.239	1.999	.146	2
	Within groups	55.143			52
	Total	59.382			54
LTR4	Between groups	4.356	1.845	.168	2
	Within groups	61.390			52
	Total	65.745			54
LTR5	Between groups	.262	.194	.824	2
	Within groups	35.120			52
	Total	35.382			54
LTR6	Between groups	.125	.097	.908	2
	Within groups	33.620			52
	Total	33.745			54
LTR7	Between groups	14.211	5.727	.006	2
	Within groups	64.516			52
	Total	78.727			54
LTR8	Between groups	2.802	2.527	.090	2
	Within groups	28.834			52
	Total	31.636			54
LTR9	Between groups	14.634	5.222	.009	2
	Within groups	71.459			51
	Total	86.093			53
LTR10	Between groups	8.420	3.530	.037	2
	Within groups	62.016			52
	Total	70.436			54
	TOT_SUM_LTR	Between groups	416.016	5.021	.010
2					
	Within groups	2154.421			52
	Total	2570.436			54

$p < .05$

Bonferroni multiple comparisons analysis of total sum of bystander’s LTR by college majors yield statistically significant differences between nursing major students and business major ($m = 6.373$, $p = .010$), with no significant differences with students in criminal justice in their likelihood to respond (Table 6). These results provide reasonable evidence that the measures will be able to detect differences when used in studies on the population of college students at the same school.

4. Comment

Food allergies and anaphylaxis are increasing in prevalence and continue to affect one of the highest risk groups of adolescents and young adults, including on college campuses. Prompt recognition of signs and symptoms of anaphylaxis and treatment is crucial (Lieberman, 2016). An increased amount of time waiting for paramedics to arrive without the intervention of epinephrine administration significantly reduces the chances of survival. Researchers and policy makers have been working diligently to address challenges individuals living with life-threatening food allergies face on a daily basis. As new voluntary laws related to the availability and the use of stock EAI’s by nonlicensed individuals continue to emerge, organizations looking to adapt them will need valid and reliable tools to conduct assessments of their communities and identify groups or individuals who would be ready and willing to act in an FAE. This study developed and evaluated a new measure to assess factors associated with students’ WilRAFAE. This is a first measure to be able to identify groups and/or individuals ready and willing to act in an FAE on a college campus.

Development of the tool included establishment of content validity of concepts and subconcepts through calculations of CVIs and S-CVIs based on the ratings from five experts. Internal consistency, Cronbach’s coefficient alpha was established to assess internal consistency reliability of the scale for each new and modified scales. A test-retest reliability process using the two forms was executed on a convenience sample of undergraduate and graduate students in nursing. There was no significant variation from the Web-based format using Google forms versus the pen and paper format. Construct validity was assessed by comparing the means of two known groups: graduate nursing students who are already registered nurses and undergraduate nursing students. The results were statistically significant as predicted with the knowledge mean scores for RNs significantly higher than the knowledge mean scores for freshman nursing students. The tool showed to be valid based on the results of construct validity testing using three known groups of freshman students, with the summed scores of bystanders’ likelihood to respond, yielding a statistically significant score for selected items. This instrument is ready to be further tested in future studies. Further analysis should include exploratory factor analysis and structural equation models to establish the validity of the instrument.

4.1. Limitations

The WilRAFAE instrument was not tested among groups with limited English proficiency and was only limited to one location. Several other factors may affect validity, reliability, and generalization of the findings, including small sample size, demographic characteristics of the research site and

Table 6. Bonferroni Multiple Comparisons: Total Sum Bystander’s LTR by Major

College major	Class code	Mean difference
Business	Criminal Justice	-2.02778
	Nursing	-6.37302*
Criminal Justice	Business	2.02778
	Nursing	-4.34524
Nursing	Business	6.37302*
	Criminal Justice	4.34524

*The mean difference is significant at the .05 level.

majors offered by any given educational establishment, heightened awareness of and presence of already existing policies and practices to address the needs of students with food allergies and anaphylaxis, prior legal actions and/or incidents, and related state-based legislative actions.

4.1.1. Implications for use of the WilRAFAE instrument

The WilRAFAE instrument should be further tested and validated on a larger sample size; in other geographic regions, and on a more heterogeneous population (diverse college majors and cultural backgrounds). Multisite research on local, national, and international levels and partial use of the tool (Readiness only or Willingness only components) as well as continuous reassessment of the tool for possible modification is recommended.

5. Conclusions

Concepts and subconcepts extracted from the literature were used to construct WilRAFAE instrument and to test its psychometric properties in this pilot study. Significant contributions were made by other researchers in developing tools to measure knowledge, readiness, confidence, and willingness in injecting epinephrine autoinjector by caregivers and self-injecting by individuals with food allergies. Expanding on the work of previously published data, newly introduced WilRAFAE measure has the potential to provide valuable, a more comprehensive data by assessing readiness and willingness of individuals to act in a food allergic emergency on college campus. Future study will focus on validating the tool and help explore shared components among these concepts and how they relate to each other. The WilRAFAE instrument can assist organizations and communities in identifying groups or individuals ready and willing to help in an allergic emergency, and subsequently guide development of targeted policies related to food allergies and anaphylaxis training, as well as availability and strategic placement of nonpatient specific EAI in public spaces.

Abbreviations

WilRAFAE	Willingness and readiness to act in a food allergic emergency
FAE	Food allergic emergency
EAI	Epinephrine autoinjectors

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