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Influence of perceived stress on dressing and eating behaviors of Chinese female university students residing in the United States

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Abstract

The objective of this research was to evaluate how perceived stressful conditions (PSC) and perceived non-stressful conditions (PNSC) influence eating and dressing behaviors of Chinese females. Chinese female university students (18–30 years) residing in the United States, completed a validated and reliable 45-itemized Chinese Stress Eating and Dressing Survey (CSEDS). The CSEDS included: (i) effort to control making healthy eating choices and dressing, (ii) foods eaten and dress items selected during PSC, (iii) foods eaten and dress items selected during PNSC, and (iv) demographics. Seven comfort food categories and eight appearance categories were used. The CSEDS included multiple choice, yes/no, and Likert scale questions. Statistical analyses were performed using t tests. A total of 129 females completed the CSEDS. Mean body mass index (BMI) calculated from reported heights and weights was 20.86 ± 3.86 . From PNSC to PSC, there were significant decreases in all dressing patterns ($p < .028$), and the majority of the participants reported dressing casually during PSC (78.3%). Overall, there was a decrease in the types of foods eaten during PNSC to PSC, but significance was noted for common foods (e.g., Chinese, Other Asian, Italian, American, and Mexican; $p = .033$), mixed dishes (e.g., casseroles, soy and vegetable based dishes, meat entrees, and salads; $p = .018$), and soft foods (e.g., rice, noodles, bread, dumplings, and eggs; $p = .003$). During PSC, Chinese females tended to select a limited variety of foods, forego appearance enhancement items, and dress casually suggesting that ethnic groups vary in eating and dressing behaviors. Findings from this research contribute to the body of knowledge related to stress and its influence on appearance (eating and dressing) behaviors specifically of Chinese female university students when transitioning from one country to another.

Keywords: Chinese female students, Stress, Eating, Dressing

Introduction

Most cases of reported stress in adults can result from physical, emotional, interpersonal or psychological changes (O'Connor et al. 2008). Many studies have been conducted in the United States (U.S.) on how individuals change appearances during stressful and non-stressful conditions. There has also been some evidence supporting how stress specifically is associated with changes in food choices and dressing habits (Habhab et al. 2009; Hepworth et al. 2010; The American Institute of Stress 2008). Although previous

investigations on perceived stress, eating, and dressing have been conducted with Americans (Kandiah and Saiki 2010; Kandiah et al. 2008; Saiki et al. 2012), to date, no research has investigated how these factors affect other cultural groups upon transitioning from their homeland to the United States. Outcomes of research of this nature will enable professionals and scholars with better understanding of appearance (dress and diet) related behaviors and stress.

Recent statistics indicate that 66% of all international students studying in the U.S. are Asians and 48% of them are from China (Institute of International Education 2017a). According to the 2016 data from the Institute of International Education, 32% of all international college students studying in the US are from China (Institute of International Education 2017b). With the influx of Chinese students into the U.S. for, academic advancement, exploration of this population could contribute to the body of knowledge related to stress, eating, and dressing. Additionally, international students enrolled in a U.S. university have added barriers, such as learning different cultural values and languages (Misra and Castillo 2004). Therefore, it is important to study this population to better understand how stress affects eating and dressing behaviors, thus impacting their success of transitioning into a new culture (Berry 2005; Tseng and Fang 2011).

Literature review

Stress and appearance

Stress occurs when demands on an individual cannot be met with an individual's current set of resources (Greeno and Wing 1994). Stress can be experienced psychologically (e.g. increased feelings of sadness or anxiety; Yau and Potenza 2013), physiologically (e.g., stomach pain due to ulcers; Antonyan and Godlevskii 2012), or biologically (e.g., hormone changes; Allen et al. 2014), and these experiences may vary in magnitude ranging from small (e.g., losing your keys in the morning), to traumatic (e.g., being assaulted; Stults-Kolehmainen and Rajita 2014). There are a variety of methods that may be used to obtain a quantitative measure of psychological, biological, or physiological stress, including self-report (e.g., questionnaires; Shin 2013), biochemical (e.g., urine; Ferguson et al. 2015), behavioral (e.g. measuring error frequencies in spoken language; Laures-Gore et al. 2010), psychophysiological (e.g., neural changes via electroencephalogram; Putman et al. 2014) and neuroendocrine measures (e.g., cellular changes; Baum et al. 1982).

Kiecolt (1994) identified the theory "intentional self-change" which provides an explanation of the phenomenon of changing external physical appearance as a reflection of changing internal states. Appearance varies depending on levels of stress, which is reflected in changes in eating habits (e.g. eating unhealthy foods), exercising less, and dressing habits (e.g., Chang et al. 2008; Stitz and Pierce 2015). Stressful events have been found to change body image and underlying "motivations for changes in body appearance to promote self-image" (Stitz and Pierce 2015, p. 1). The impact of ongoing stress can influence health and self-esteem, which can then affect outward appearance (e.g. Keller et al. 2007; Wyler et al. 1971). Research has found, changes in both dressing habits and food intake as contributors to external appearance alterations due to intensity of internal changes in stress level. For example, tattoos have been used to demonstrate an internal self-change (e.g., Wohlrab et al. 2007) and self-punishment behaviors such as

restriction in food intake has been associated with post-traumatic stress disorder (e.g., Ross et al. 2009).

Eating behaviors and stress

Studies have shown alterations in stress or mood can affect appearances through food choices and consumption. A national survey in the U.S. found that approximately 4 in 10 Americans (43%) overate or consumed unhealthy foods to manage stress, whereas more than one-third (36%) due to stress, skipped a meal in the last month (American Psychological Association 2007). Legel et al. (2008) examined comfort food preferences and consumption patterns of women with different emotional tendencies. Food consumption was associated with negative feelings, concerns about weight gain, and satisfying an emotional void. In addition, the pleasurable attributes of food (e.g., flavor, texture, consistency) were also seen as a stress alleviator. There has also been research on the types of foods eaten when under stressful conditions. Wansink et al. (2003) found that males when stressed preferred warm, hearty, meal-related comfort foods, while females preferred sweet, snack-type foods. Likewise, Habhab et al. (2009) found females who were stressed preferred sweet, high-fat foods and women who were not stressed ate more low-fat than high-fat foods.

Using a validated and reliable survey, Saiki et al. (2012) examined the relationship between food and stress. Among female university students there were statistically significant increases in the selection of mixed dishes, salty/crunchy foods, sweet foods, and beverages during perceived stressful conditions.

Within a diverse group of college students, (Errisuriz et al. 2016) indicated that unhealthy food intake (e.g., soda, coffee, energy drinks, salty snacks, frozen food, and fast food) was positively associated with perceived stress. However, when stress management strategies were utilized, food intake of sweet snacks decreased significantly indicating students who were able to better manage stress consumed less sweet snacks. Hou et al. (2013) found that eating behaviors of Chinese adolescents were affected by emotional symptoms (e.g., depression and anxiety) and life stressors (e.g., family life, school life, and other relationships). Students who reported emotional symptoms and life stressors had a significant ($p \leq .001$) increase in engaging in unhealthy eating behaviors. When compared to boys, girls had a higher chance of participating in unhealthy eating behaviors.

Dressing behaviors and stress

On a daily basis, people's dressing behaviors are influenced by factors, such as stress and temperament. A negative event can be the deciding factor on the choice of an outfit (e.g., sweat pants or dresses). Research on the effects of stress on dress habits by the American Institute of Stress (2008) indicated that stress can lead to a negligence of appearance. On the contrary, Saiki et al. (2012) found when stressed, female participants (90.2%; $n = 487$) reported dressing formally (e.g., heels, suits, etc.), while 67.3% ($n = 365$) reported dressing fashionably (latest trends).

Varying factors contribute to how stress affects dressing habits. Some proposed factors include: personality, ethnicity, and mood (Kroeger and Thuesen 1998). People with personalities that are more susceptible to stress may experience greater variances in

their dressing habits when they are stressed compared to people with more laid back personalities. Kroeger and Thuesen (1998) have observed the link between ethnicity and appearance management noting that Chinese women maintain their appearance while experiencing stressful and non-stressful situations.

Adapting to a different culture may pose physical and mental challenges. Unlike their American counterpart, Chinese individuals have stronger opinions on body image, spending more time on appearance enhancement behaviors (Zhang 2012). When compared to American college women, Chinese students in Asia demonstrated higher levels of body image dissatisfaction. Furthermore, researchers found young females in China exhibited weight concern, dieting behaviors, body weight dissatisfaction, and eating disorders. Although, China is becoming more influenced by western ideals, they appear to retain their traditional beauty standards and perceptions (e.g., tall and thin body, big eyes, a watermelon seed-shaped face, and fair skin) (Zhang).

In spite of the prevalence of independent relationships existing among food, clothing, and stress, no known research has examined the interrelationships of food, clothing, and stress as it impacts Chinese female university students. To the best of the researcher's knowledge, to date, no studies have been conducted related to stress, eating, and dressing behaviors of Chinese adults. Therefore, the purpose of this research was to examine how perceived stress influences eating and dressing behaviors of Chinese female university students studying in the U.S. The following research questions were used. Among Chinese students studying in the U.S

1. How does dressing behavior differ during periods of perceived stressful versus non-stressful conditions? and
2. How does eating preferences and behavior differ during periods of perceived stressful versus non-stressful conditions.

Methods

After approval from the University's Institutional Review Board, Chinese female university students (18–30 years) who were studying in two geographical locations (Midwest and Northeast) in the U.S. were invited to participate in the study. Data were collected at Chinese University events. In addition, Chinese campus groups were invited to participate by e-mail that included a link to the survey.

A 45-itemized Chinese Stress Dressing and Eating Survey (CSDDES) was developed by the researchers. The researchers adopted a survey that assessed stress, dressing, and eating among females in the United States (Kandiah and Saiki 2010). The CSDDES consisted of four sections: (i) effort to control dressing and making healthy eating choices, (ii) dress items selected and foods eaten during perceived stressful conditions (PSC), (iii) dress items selected and foods eaten during perceived non-stressful conditions (PNSC), and (iv) demographics. Prior to the start of the research the CSDDES which included multiple choice, yes/no, and four point Likert scale questions was tested for reliability and validity. The Likert scale questions had response options ranging from "great" to "little or no" or "definitely disagree" to "definitely agree." Likert scale questions were also used to assess participants' effort put forth to control dressing and making healthy eating choices.

Multiple categories were used to determine appearance and food items selected during PSC and PNSC. For the purpose of this research, PSC was defined as participants being aware and sensing the feeling of stress at a particular moment while PNSC was when participants observed and sensed a calmness at a specific moment. Before the start of the research, definitions for PSC and PNSC were communicated to all participants through the consent form. The dressing categories were: accessories (e.g., earrings, hair clips, necklace, bracelet, watch, belt, glasses, handbag, and umbrella), informal dress (e.g., baseball cap, t-shirt/tank top, sweatshirt/hoodie, jeans, sweatpants, flip flops/sandals, tennis shoes, and socks), formal dress (e.g., blouses, suits, skirts, dresses, dress pants, heels, and hosiery), make-up (e.g., eye shadow, eye liner, foundation, blush, lipstick, nail polish, and mascara), skin care (e.g., facial creams, sunscreen, tanning, body lotions, and whitening cream), hair (e.g., hair products, curling hair, straightening hair, plucking hair, shaving legs, and shampoo), scent (e.g., perfume, deodorant, and breath freshener), and appearance enhancement services (e.g., hair salon, manicure/pedicure, and gym/lift weights).

In the food items section, there were seven categories which included: common foods (e.g., Chinese, Other Asian, Italian, American, and Mexican), mixed dishes (e.g., casserole dishes, soy and vegetable based dishes, meat entrees, and salads), salty/crunchy foods (e.g., chips, crackers, nuts, French fries, popcorn, pickles, and raw vegetables), sweet foods (e.g., muffins, hard candies, cold treats, chocolate, and fruit), creamy foods (e.g., peanut butter, creamy or thick stew/soups, clear soups, mashed potatoes, yogurt, pudding, and creamy salads), soft foods (e.g., rice, noodles, bread, dumplings, and eggs), and beverages (e.g., light teas, coffee, milk, water, soda, hot chocolate, alcohol, and juice). For all appearance and food categories there was a section entitled "other" which allowed participants to make a food or dress entry that was not identified.

The CSDES survey was developed from a previous survey on eating and dressing habits of females residing in the United States. Validity was established upon review from four experts, two in the fashion and two in the nutrition fields. In addition, two Chinese students studying in the United States reviewed the survey. After these changes to the survey were made, a pilot study was conducted with 34 Chinese university students who were not part of the main study. These students completed the survey twice at least 1 week apart. The Kappa coefficient and the percent agreement were computed for each of the 50 items comprising the food scales and the 56 items for the dressing scales in both PSC and PNSC. For the food items, the median Kappa coefficient was .54 and percent agreement was 82.4% when stressed and .63 and 88.6% when not stressed. For the dressing items, the median Kappa coefficient was .61 and percent agreement was 85.3% when stressed, and .69 and 88.6% when not stressed.

Statistical analyses were performed using IBM SPSS Statistics for Macintosh, Version 24.0. Questions from the four sections of the CSDES (e.g., effort given to control dressing and making healthy eating choices, dress items selected and foods eaten during PSC, dress items selected and foods eaten during PNSC, and demographics) were calculated and frequencies were reported. To compare the differences in appearance items and foods selected during PNSC and PSC, paired sample t tests were used and statistical significance was established at $p < .05$.

Table 1 Females' responses to questions about dressing and eating habits during PSC

Question	Yes ^a	No ^a
Change in appearance to relieve stress	69.8%; n = 90	29.5%; n = 38
Trying to look better	76.7%; n = 99	22.5%; n = 29
Dresses formally (heels, suits, etc.)	61.2%; n = 79	38.0%; n = 49
Dresses fashionably	56.6%; n = 73	41.9%; n = 54
Dresses casually (t-shirts, jeans, etc.)	78.3%; n = 101	20.9%; n = 127
Less time than ordinary getting dressed	59.7%; n = 77	38.0%; n = 49
Less time enhances appearance	57.4%; n = 74	40.3%; n = 52
Change in appetite	68.2%; n = 88	30.2%; n = 39
Eats to relieve stress	80.6%; n = 104	18.6%; n = 24
Makes healthy eating choices	75.2%; n = 97	24.0%; n = 31
Less time than ordinary preparing food	57.4%; n = 74	40.3%; n = 52

^a From a pool of 129, some participants did not respond to all questions

Results

Demographics

One hundred and twenty-nine Chinese females residing in the United States completed the research. Approximately one-third of the females had been living in the United States less than 1 year. Of 129 females, the majority were between 18 and 22 years of age (n = 85; 65.9%) and 33.3% (n = 43) between 23 and 30 years. The majority of participants were from Southern China (n = 58; 45%). Body mass index (BMI) calculated from self-reported height and weight indicated the majority of participants had a normal BMI (n = 20.86, \pm 3.86). Most females (n = 119; 92.2%) were single and more than half (n = 66; 51.2%) resided with non-family members or lived alone.

Comparisons of dressing and food items selected during PNSC and PSC

The purpose of this research was to examine how perceived stress influences eating and dressing behaviors of Chinese female students studying in the U.S. during PSC and PNSC. PSC and PNSC were stress levels determined by the participant. Data indicated 53.5% of females controlled their eating while 73.6% made healthy eating choices. Additionally, they took greater effort in planning and maintaining their appearances (77.5%) and dressed casually (86%). Furthermore, approximately one-half of the participants reported dressing formally (49.6%) or fashionably (51.9%).

As shown in Table 1, during PSC, participants tried to look better (76.7%), dressed formally (61.2%), or fashionably (56.6%). However, many reported dressing casually (78.3%), spending less time than ordinary getting dressed (59.7%), and spending less time enhancing their appearances (57.4%). Interestingly, during PSC a majority of females stated they experienced a change in appetite (68.2%). There was a split, in that one-half indicated an increase and the other half experienced a decrease in appetite. More than three-fourths (80.6%) tended to eat to relieve stress, while over three-fourths (75.2%) reported making healthy eating choices during PSC.

Paired sample t values showed there were changes in dressing habits and food preferences between PNSC to PSC. Significance was noted for all patterns of dressing (e.g., accessories, informal dress, formal dress, make-up, skin care, hair, scent, and appearance enhancement services) revealing when stressed, females selected fewer dress items

Table 2 Differences in participants' dressing patterns and food preferences from PNSC to PSC

Variable	PNSC mean	PSC mean	Mean changes	T value	Significance
Dressing					
Accessories	2.83	2.20	.63	4.27	< .001*
Informal dress	3.52	3.01	.51	4.13	< .001*
Formal dress	2.69	2.22	.47	3.95	< .001*
Make-up	3.08	2.51	.57	3.14	.002*
Skin care	2.31	1.88	.43	4.67	< .001*
Hair	2.02	1.66	.36	3.57	.001*
Scent	1.27	1.15	.12	2.47	.015*
Appearance enhancement services	1.38	1.25	.13	2.22	.028*
Food					
Common foods	1.94	1.76	.18	2.16	.033*
Mixed dishes	1.84	1.66	.18	2.40	.018*
Soft foods	3.01	2.63	.38	3.00	.003*
Salty/crunchy foods	2.24	2.16	.08	.72	.475
Sweet foods	2.24	2.13	.11	.95	.344
Creamy foods	2.12	1.97	.15	1.28	.205
Beverages	3.27	3.02	.25	1.49	.140

* $p < .05$

($p < .028$). Similarly, overall patterns for food items selected decreased from PNSC to PSC. Categories of common foods (e.g., Chinese, Other Asian, Italian, American, and Mexican; $t = 2.16$; $df = 125$; $p = .033$), mixed dishes (e.g., casseroles, soy and vegetable based dishes, meat entrees, and salads; $t = 2.40$; $df = 124$; $p = .018$), and soft foods (e.g., rice, noodles, bread, dumplings, and eggs; $t = 3.00$; $df = 125$; $p = .003$) significantly decreased during PSC (Table 2).

Discussion

The findings of this research indicate that from PNSC to PSC, there were statistically significant decreases in the selection of common foods, mixed dishes, and soft foods, which differs from results of previous research. Unlike the current study, outcomes with American female participants demonstrated increases in mixed dishes, salty/crunchy foods, sweet foods, and beverages (Saiki et al. 2012). With Chinese participants, from PNSC to PSC, there were statistically significant decreases in all patterns of dressing indicating that females selected fewer dress items when stressed. These results are congruent with previous research with a sub-sample of the US female population (Kandiah et al. 2008; Kandiah and Saiki 2010; Saiki et al. 2012).

In the present study, over two-thirds (68.2%) of the Chinese female participants noticed a change in appetite when stressed. This supports findings from previous research (Kandiah et al. 2008; Saiki et al. 2012). Furthermore, from the results of the current study many of them reported eating to relieve stress which is consistent with other literature. However, many of the previous studies found when subjects ate more food to relieve stress, they tended to consume more unhealthy foods (Errisuriz et al. 2016; Habhab et al. 2009; Hou et al. 2013; Legel et al. 2008; Wansink et al. 2003). Approximately three-fourths of Chinese females made healthy eating choices during PSC, and this

result is higher than previous work where only one-half of participants tended to make healthy eating choices during PSC (Kandiah et al. 2008; Saiki et al. 2012). This implies that Chinese females in this study may have better ways of managing food choices during PSC conditions as compared to their American counterparts, or it could be due in part to Chinese females' stronger concerns about weight and higher body-weight dissatisfaction compared to American females (Zhang 2012).

A large percentage of participants reported trying to look better and dress formally when stressed. However, paired sample *t* tests indicated when compared to PNSC, during PSC participants' responses showed statistically significant decreases in all appearance items. In addition, a large percentage of them tended to dress casually when stressed. Furthermore, decreasing use of appearance items during PSC supports those by the American Institute of Stress (2008), but contradicts outcomes from previous research (Saiki et al. 2012). On the contrary Saiki, Kandiah, and McCarthy found with American females, only 5% indicated they dressed casually when stressed while 95% dressed more formally (heels, suits, etc.) or fashionably. Unlike Chinese, American females spent more time enhancing their appearance and getting dressed during PSC. These findings are unique because it has been reported that Chinese individuals, especially Southern Chinese, are more sensitive to ideal appearance standards which triggers females to spend more time on appearance enhancements. However, this was not the case in the present study.

Acculturation may be the driving force behind these differences. Perhaps the adaptation to the American culture has affected how stress influences dressing and eating behaviors of Chinese female students. Outcomes from previous investigation has shown that Asian immigrants are often susceptible to weight gain as they conform to the sedentary lifestyle behaviors and poor diet quality of Western culture (Tseng and Fang 2011). Though Americans tend to dress formally during PSC, the dress code on US college campuses is typically casual. It is possible that a decrease in dressing behaviors (e.g. wearing accessories, applying cosmetics, etc.) during PSC by Chinese students is a means of assimilating into the American culture. Since there are numerous pressures and difficulties which arise when studying abroad. By replicating the standard dress practices of their American peers, the participants could potentially alleviate one avenue of stress by ensuring their attire fits the cultural norm.

The lack of desire to dress formally when stressed coupled with altered dietary habits could also be attributed to the fact that many of the participants reported lived alone. Lupi et al. (2015) reported when college students lived alone they frequently neglected consuming a balanced diet and forgo regular exercise habits. In regards to this matter, appearance is often less of a priority when living alone. In the present study, this too could contribute to the occurrence of casual dressing during PSC. Research demonstrates college students appear to exhibit similar lifestyle and eating practices. Irrespective of ethnicity, the findings from the present research are in agreement with previous outcomes implying that those who lived alone and/or were single tended to eat poorly.

Conclusions and future recommendations

The results of this study indicate that when experiencing PSC during acculturation females tend to forgo appearance enhancement items, dress casually, and select a limited variety of foods. This suggests that ethnicities vary in eating and dressing behaviors. The acculturation maybe due to, body image standards, and/or a combination of several other compounding factors (e.g., dietary practices, economic status, lifestyle, etc.). With the influx of foreign nationals, namely Chinese into the U.S., it is critical that appropriate interventions (e.g., nutrition counseling, educational workshops on dressing norms, along with peer and professional mentoring) are available to alleviate stress and enable successful acculturation. During integration of interventions, a multidisciplinary team (e.g., registered dietitian, psychologist, linguist, social worker, etc.) should take certain factors (e.g., educational background, cultural and societal norms of the ethnic group, and language barriers) under consideration in the administration of a successful and sustainable program.

Academically this research contributes to an understanding of possible acculturation challenges, particularly related to eating and dressing, faced by various cultural groups. This instigation broadens the scope and depth related to appearance behaviors (e.g. dressing and eating). Within the industry, from an apparel marketing perspective, advertisements could feature and/or fashion designers could develop trendy casual styles to target populations from China studying in the United States. Since there was a decrease consumption of common foods, mixed dishes, and salty foods during PSC, it appears that registered dietitians nutritionists may need to be actively involved with food industries to be creative in the development of nutrient dense foods for sustained health during acculturation.

Some of the strengths from this project include: (i) it is the first study to examine how stress influences dressing and eating among Chinese university female students in the U.S.; (ii) the CSDS instrument was unique because it incorporated a wide variety of food and clothing options; (iii) it assessed a specific ethnic group of females assimilating into to the U.S.; and (iv) it provided a foundation for continued scholarly work in multidisciplinary professional fields including fashion and textiles.

Future recommendations would be to explore and compare other ethnic groups from diverse geographical locations, inclusion of varied ages, gender, and socio-economic status, and incorporation of a larger population with participants' documentation of dressing and eating behaviors during PSC and PNSC. Other possible avenues include qualitative studies to better understand behavior patterns during acculturation.

Authors' contributions:

JK, DS carried out the data collection, participated in the development and the final editing of the manuscript. KD assisted with writing the manuscript. ADA participated in data collection and editing the manuscript. All authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no competing interests.

Ethics approval and consent to participate

After approval from Ball State University's Institutional Review Board (#655217-2) indicating compliance with the Helsinki Declaration, Chinese female university students (18–30 years) who were studying in two geographical locations (Mid-west and Northeast) in the U.S. were invited to participate in the study.

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